



Sustainability indicators for crypto-assets

Disclosures pursuant to
Article 66(5) MiCA

This report was provided by:



Table of Contents

Preamble	12
Overview	12
Sustainability indicators	27
Bitcoin	27
Dogecoin	31
Kaspa	35
Litecoin	38
Bitcoin Cash	41
Ethereum Classic Ether	46
Zcash	49
Ravencoin	54
Core	57
Dash	60
eCash	64
Solana SOL	69
Stacks	73
Internet Computer Token	76
Verge	80
TRON TRX	84
Filecoin	88
Ethereum Eth	94
Conflux	97
Toncoin	100
NEAR Protocol	103
Avalanche AVAX	109
Cardano ADA	113
MultiversX EGLD	117
Polkadot DOT	122
Flow	128
Kusama	131
Ripple XRP	134
Arweave	140
Algorand	143
Sui	146

USDC	149
Merlin	175
Tezos	177
Aptos Coin	181
Injective Token	183
KAVA	189
SEI	195
Cosmos ATOM	198
canton	205
Flare	207
Zilliqa	209
IOST	214
ICON	217
Cronos	219
XDC Network	226
Polygon POL	229
Qtum	233
Binance Coin	235
Casper	239
Sonic	241
Hedera HBAR	243
Mina	245
Celestia	248
ROSE	251
Ontology	259
Hyperliquid	261
Gas	263
Moonbeam	265
NEO	268
Osmosis	271
Gnosis Chain	274
ChainLink Token	276
Story	290
WAX	292
Monad	294
kaia	296

Stellar Lumen	298
DYDX	301
MovieBloc	304
VeChain	306
Celo	310
Ronin	314
MANTRA	316
Lisk	318
Secret	320
Axelar	323
THORChain	337
Moonriver	339
Zeta	341
Bittensor	343
Chiliz	345
Metis Token	348
scroll	350
Boba Token	352
Contentos	355
Plasma	357
Astar	359
ZKsync	361
Plume	363
Paxos Gold	366
Uniswap	372
Ondo	379
manta	381
Aave Token	383
Curve DAO Token	395
Cetus Protocol	402
DeepBook Token	404
Walrus	406
Xai	408
Pepe	411
ENA	413
SHIBA INU	415

Pendle	417
cyber	422
PancakeSwap	427
Pump.fun	434
BIO	437
Sweat Economy	441
Optimism	443
SPX6900	446
Fartcoin	450
ApeCoin	453
Centrifuge	459
AKT	461
SKY Governance Token	463
Onyxcoin	465
Mog Coin	469
Lido DAO Token	471
SUNDOG	479
World Liberty Financial	482
Bonk	488
Euro Coin	491
Axie Infinity Shard	493
Eigen	500
StorjToken	502
Morpho Token	504
Arbitrum	506
Quant	509
Convex Token	512
OFFICIAL TRUMP	514
StarkNet Token	517
Worldcoin	519
Clearpool	523
Gala	525
Aethir Token	527
Virtual Protocol	529
1INCH Token	533
Ethereum Name Service	543

SAND	547
StargateToken	553
Graph Token	562
Render Token	565
SushiSwap	569
JasmyCoin	577
Reserve Rights	579
VeThor	583
Aerodrome	585
LayerZero	587
Bancor	590
Compound	595
FLOKI	605
AIOZ Network	609
Raydium	611
Immutable X	614
SuperVerse	618
JoeToken	620
BitTorrent-New	626
ether.fi governance token	631
Pudgy Penguins	633
Dexe	636
CoW Protocol Token	640
Synthetix Network	642
LoopringCoin V2	655
Fetch	657
Ankr	659
Arkham	672
Dusk Network	674
Trace Token	678
Paal AI	680
Blur	682
Smooth Love Potion	684
Decentraland	687
API3	692
Turbo	694

Banana	696
usual	698
Telcoin	700
Safe Token	704
Kamino Finance	706
VELO	709
Renzo	714
Basic Attention Token	716
Status Network Token	726
Beam	728
UMA Voting Token v1	733
Big Time	735
Illuvium	737
Syrup Token	741
Orderly Network	743
yearn.finance	745
POPCAT	758
dogwifhat	761
Swell Governance Token	764
Tellor Tributes	766
Audius	774
Amp	779
Realio Network	784
Orca	790
Layer3	793
double_zero	795
Useless Coin	798
0x Protocol Token	801
Wormhole Token	807
Highstreet Token	814
puffer	818
Echelon Prime	820
SPACE ID	822
SUN	826
Kyber Network Crystal v2	829
JUST	838

tokenfi	841
Memecoin	845
Pixels	847
Helium	850
zigchain	854
Alchemy	862
Civic	866
Rocket Pool	869
Request Token	873
Livepeer	875
Jito	878
galxe	881
Liquity	885
Mask Network	887
AltLayer Token	893
Golem Network Token	897
ssv network	899
Pyth Network	901
Numeraire	904
zentry	906
PowerLedger	910
Yield Guild Games Token	912
Polyhedra Network Token	918
Aster	920
Gluwa Creditcoin Vesting Token	923
Spell Token	925
SKALE	931
Zora	933
Wootrade Network	935
AINFT	945
Cartesi Token	951
BENQI	953
sentient	956
synfutures	958
Stader	960
DIA	962

COTI Token	964
Zebec Network	968
Orbs	971
Threshold Network Token	977
Gods Unchained	979
Biconomy Token	981
TARS AI	983
NYM	986
Bounce Token	989
Chainflip	993
Vanar	995
aixbt by Virtuals	999
Grass	1003
Hashflow	1006
HoloToken	1008
Synapse	1011
Flux	1024
ConstitutionDAO	1031
Limewire	1033
cat in a dogs world	1037
APEX Token	1040
PORTAL	1044
Radicle	1046
Venice Token	1048
Across Protocol Token	1050
CelerToken	1052
BOOK OF MEME	1056
Chromia	1059
chillguy	1061
babydoge	1064
Adventure Gold	1070
Prom	1072
Vulcan Forged PYR Token	1076
Marlin POND	1080
GMX	1083
Moo Deng	1087

Goatseus Maximus	1090
iEx ec Network Token	1093
Magic Eden	1095
BandToken	1098
SuperRare	1102
ARPA Token	1104
Gmt	1110
Open Campus	1113
Coin98	1117
Horizen	1124
Pirate Nation Token	1126
Open Loot	1128
deBridge	1130
Enzyme	1133
Peanut the Squirrel	1137
XMON	1140
Parcl	1142
IO.NET	1145
Maverick Protocol	1148
Neiro	1152
DODO bird	1154
Brett	1159
Access Protocol	1161
recall	1164
ChainGPT	1166
Avantis	1169
Drift	1171
Venus	1174
Cloud	1178
carv	1181
Trust Wallet	1187
Vita Inu	1193
Heima	1196
LeverFi	1198
Bonfida	1200
NOT	1203

Degen	1205
Tensor	1207
Toshi	1210
Jupiter	1212
vision	1216
Subsquid	1219
SafePal Token	1222
KAITO	1225
Mobox	1227
Automata	1230
Edge	1236
Hooked Protocol	1238
Standard Tokenization Protocol	1241
Lista USD	1243
Gains Network	1246
Pundi X Token	1249
BinaryX	1251
Tokocrypto Token	1254
Nakamoto Games	1257
Shentu	1260
NFPrompt	1263
Leo Token	1266
My Neighbor Alice	1269

Preamble

About the Crypto-Asset Service Provider (CASP)

Name of the CASP: Finst B.V.
Street and number: Herengracht 454
City: Amsterdam
Country: Netherlands
LEI: 724500UI8UD7HKGJVJX65

About this report

This disclosure serves as evidence of compliance with the regulatory requirements of Article 66(5) MiCA. Under this provision, crypto-asset service providers are required to disclose significant adverse impacts on the climate and the environment. In particular, this disclosure complies with "Commission Delegated Regulation (EU) 2025/422 of 17 December 2024 supplementing Regulation (EU) 2023/1114 of the European Parliament and of the Council with regard to regulatory technical standards specifying the content, methodologies and presentation of information in respect of sustainability indicators in relation to adverse impacts on the climate and other environment-related adverse impacts". The optional information referred to in Article 6(8)(a) to (d) of Delegated Regulation (EU) 2025/422 is not included.

This report remains valid until material changes occur in the underlying data, in which case it will be updated promptly.

Overview

This is an overview of the core indicator "energy consumption" and does not constitute the disclosure required under Article 66(5) MiCA. The full disclosure is set out below.

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
1	Bitcoin	V15WLZJMF	139,547,581,185.99
2	Dogecoin	35PLJP6J7	4,810,266,754.26
3	Kaspa	N2LWX5WS0	2,831,162,818.96
4	Litecoin	D74JZ1VRD	710,975,266.87
5	Bitcoin Cash	919BF3W7L	667,825,346.26
6	Ethereum Classic Ether	DGMQMFZD4	546,678,609.37
7	Zcash	7JPSSTXMS	322,297,447.75
8	Ravencoin	SVCV42BS8	153,587,386.66
9	Core	5JRW5LZQ	94,233,551.08

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
10	Dash	PPDH6B273	67,500,000.80
11	eCash	CCBL9HXG9	29,090,885.95
12	Solana SOL	6QZ1LNC12	6,843,750.00
13	Stacks	PQTGLSGRG	6,279,641.15
14	Internet Computer Token	4DHTM5D7P	5,834,160.00
15	Verge	6N3DCCBCZ	4,958,188.53
16	TRON TRX	HZ9HHNPLG	4,025,312.07
17	Filecoin	S6702SWRZ	2,409,047.11
18	Ethereum Eth	D5RG2FHH0	2,159,953.20
19	Conflux	2K9VS42WV	1,837,140.73
20	Toncoin	KK12JMBTX	1,419,120.00
21	NEAR Protocol	MXXM59Z0T	920,024.96
22	Avalanche AVAX	S6JCBF70N	798,534.02
23	Cardano ADA	76QS7QCXB	773,946.00
24	MultiversX EGLD	H1V5PHW7P	716,130.63
25	Polkadot DOT	SGD9NLTRG	642,546.00
26	Flow	6T49BCSXZ	526,695.00
27	Kusama	PX4GCX5B5	474,616.80
28	Ripple XRP	42PHJB2BS	456,266.87
29	Arweave	CPX6BGPR0	437,562.00
30	Algorand	K8S6W74KS	420,961.80
31	Sui	64RFW3D8P	394,725.60
32	USDC	TJWK5QTRK	355,963.98
33	Merlin	NW1M13H3L	293,049.92
34	Tezos	FLJPFR9RS	282,247.45

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
35	Aptos Coin	C4CQCGLH2	262,800.00
36	Injective Token	92M9B0DZ7	242,136.25
37	KAVA	2HZXZQLKX	236,682.94
38	SEI	XCDVP53WR	210,305.17
39	Cosmos ATOM	6C7F2WVZH	186,481.26
40	canton	/	184,222.80
41	Flare	DVRV6HSK5	170,820.00
42	Zilliqa	ZJ9HGBW9R	157,680.70
43	IOST	N156HCF29	137,970.00
44	ICON	P3JS307D2	115,106.40
45	Cronos	GWM30MLW3	109,205.54
46	XDC Network	2DHMJ018G	105,121.85
47	Polygon POL	GB8DQ8DWN	95,946.40
48	Qtum	SH1MLXP1W	91,191.60
49	Binance Coin	8N2VXJB1	90,228.00
50	Casper	K508S2JCD	85,935.60
51	Sonic	7JBMLCWCR	84,358.80
52	Hedera HBAR	2WWB8QS47	82,125.00
53	Mina	133H6VJ48	81,205.20
54	Celestia	M7NN4STH9	80,791.98
55	ROSE	SXGLQRF6T	79,366.31
56	Ontology	M2W3DQB67	71,192.52
57	Hyperliquid	HLTPNVXN0	67,014.00
58	Gas	/	65,700.00
59	Moonbeam	K4HV4GN5K	65,700.00

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
60	NEO	N2FWML4CL	65,700.00
61	Osmosis	TDS6NVZ46	65,180.92
62	Gnosis Chain	37M195C63	63,072.00
63	ChainLink Token	3R3J70FDR	62,850.73
64	Story	BVZJV41L8	59,130.00
65	WAX	H76QDN5MF	54,750.00
66	Monad	/	53,348.40
67	kaia	/	52,560.00
68	Stellar Lumen	ZCN8SR2H7	52,560.00
69	DYDX	1HZHK551M	44,938.80
70	MovieBloc	/	44,495.32
71	VeChain	M2DJLNPDW	39,946.50
72	Celo	VWWMVDM0J	39,420.00
73	Ronin	TVJX4PPWF	39,420.00
74	MANTRA	11B60HRDS	33,375.60
75	Lisk	7J6VRX7JZ	32,850.00
76	Secret	93XJT88VH	31,536.00
77	Axelar	ZN1MJGVLX	29,753.77
78	THORChain	426HSHMDM	26,805.60
79	Moonriver	KW2NCBQ6M	26,280.00
80	Zeta	9BJJBHB21	25,537.16
81	Bittensor	LBQFC0FVK	25,228.80
82	Chiliz	KNS06KRXQ	23,234.88
83	Metis Token	RCGXTQ3G0	21,127.90
84	scroll	/	20,235.60

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
85	Boba Token	L7CKSKP8K	19,899.42
86	Contentos	/	14,979.60
87	Plasma	ZC0VHB8ZB	13,402.80
88	Astar	87L5SX99N	13,140.00
89	ZKsync	BCBLPFRBX	6,570.49
90	Plume	FRZQZJ7BL	6,343.09
91	Paxos Gold	RPGFC7GN3	4,670.65
92	Uniswap	XMB84LZBZ	3,570.39
93	Ondo	WKH09L3DV	3,449.58
94	manta	/	3,373.49
95	Aave Token	H618RN577	2,571.20
96	Curve DAO Token	P8DXFQ5LD	2,528.50
97	Cetus Protocol	WMW834RP9	2,379.55
98	DeepBook Token	B41HCBXWK	2,239.58
99	Walrus	VDK0388GB	2,239.58
100	Xai	/	2,036.31
101	Pepe	J41R6PF81	1,953.64
102	ENA	SPRSCSVSW	1,936.82
103	SHIBA INU	M4HFTFNPC	1,816.73
104	Pendle	5RJT6339X	1,792.13
105	cyber	/	1,686.03
106	PancakeSwap	LZ3V3Z6FD	1,668.02
107	Pump.fun	C2F189JNL	1,457.08
108	BIO	TBR0XDRN8	1,322.43
109	Sweat Economy	DFK01RSF7	1,215.04

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
110	Optimism	9NRMM2RC4	1,142.07
111	SPX6900	V9FVRLGKC	1,141.55
112	Fartcoin	Z673VT588	1,078.04
113	ApeCoin	7WKVRWPNR	1,071.60
114	Centrifuge	J8HB3QFM5	1,041.15
115	AKT	LK4B4JZJ5	977.62
116	SKY Governance Token	G4GDNF84C	963.65
117	Onyxcoin	XSGP9L77X	943.65
118	Mog Coin	C4044KDRD	917.66
119	Lido DAO Token	8W8GLGL65	902.88
120	SUNDOG	/	901.94
121	World Liberty Financial	3XVWCVFSX	876.24
122	Bonk	H6KJTT0CP	859.16
123	Euro Coin	/	843.36
124	Axie Infinity Shard	RTTDS5MHT	840.99
125	Eigen	QRLFSB800	825.19
126	StorjToken	3W1DV4L6C	805.03
127	Morpho Token	CH7NXRXR1	684.59
128	Arbitrum	44TP35HF9	677.28
129	Quant	L8M8X31JL	671.18
130	Convex Token	MDLR8VGRS	665.71
131	OFFICIAL TRUMP	LJDPGNXXK	615.37
132	StarkNet Token	NLWPNNWQZ	614.33
133	Worldcoin	BJD0TZ8V1	606.74
134	Clearpool	J2N57NP8S	595.95

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
135	Gala	XS363HTZB	577.43
136	Aethir Token	1SL20Z9P1	534.06
137	Virtual Protocol	7WMBV0R29	526.29
138	1INCH Token	SVRFHQZRZN	519.59
139	Ethereum Name Service	B70SMJ5DQ	507.94
140	SAND	BVGX9WS2C	482.69
141	StargateToken	RGP779MCT	481.59
142	Graph Token	VMQPVH41W	481.21
143	Render Token	XR0JSKLNZ	479.08
144	SushiSwap	C1Z2W2TT1	474.09
145	JasmyCoin	CTLCNFBZW	459.19
146	Reserve Rights	DQT9BWGCF	458.21
147	VeThor	C06P3SQNX	439.40
148	Aerodrome	N26VFQW6M	425.18
149	LayerZero	C0HH6QTBN	411.86
150	Bancor	HXXRZB3CB	389.21
151	Compound	KCHF60NW7	387.57
152	FLOKI	R1XC4HQT5	368.39
153	AIOZ Network	BRPL13L58	365.65
154	Raydium	7HFXRDFHH	351.83
155	Immutable X	9LJ0XLJBT	349.04
156	SuperVerse	N886T4TWH	348.54
157	JoeToken	VV204Q4J4	347.86
158	BitTorrent-New	2MTMX7RJR	343.35
159	ether.fi governance token	RJTJR45MC	326.40

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
160	Pudgy Penguins	13JBPT88T	325.39
161	Dexe	TZRK30R6L	325.05
162	CoW Protocol Token	SF0HRQBH7	316.68
163	Synthetix Network	RSN26S0SB	315.03
164	LoopringCoin V2	NZCPF6J82	310.08
165	Fetch	HWBLGXNBX	294.34
166	Ankr	BL90MVXW4	288.60
167	Arkham	327V1DQ8H	286.73
168	Dusk Network	/	278.52
169	Trace Token	JD5R52PQX	278.49
170	Paal AI	/	277.43
171	Blur	R91SVKW99	276.01
172	Smooth Love Potion	1JMZBTS1G	275.33
173	Decentraland	21C6LF4SP	272.17
174	API3	9PJW29SF7	266.00
175	Turbo	3GCHWJSWC	265.01
176	Banana	5WZXL33SN	260.68
177	usual	/	257.98
178	Telcoin	Q95MMRGRC	246.56
179	Safe Token	GLNXBZWH5	242.37
180	Kamino Finance	LLRPNCLLK	240.43
181	VELO	Q52FMJ684	239.84
182	Renzo	3SPXMRFC	233.78
183	Basic Attention Token	51F8M277P	231.01
184	Status Network Token	X41MS94D1	222.21

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
185	Beam	X70FWW3GT	217.49
186	UMA Voting Token v1	JM4LKD71T	214.90
187	Big Time	DM8NPMHHW	212.84
188	Illuvium	1J74CCB0S	210.79
189	Syrup Token	7DLXGNF13	210.71
190	Orderly Network	/	209.30
191	yearn.finance	LS56Z3QRX	208.21
192	POPCAT	CPLCKVT11	204.07
193	dogwifhat	10G31SK86	203.02
194	Swell Governance Token	G2M3R6WBH	200.50
195	Tellor Tributes	B1P335VP1	197.16
196	Audius	QZMN0FP41	196.83
197	Amp	BCR85DWDR	195.88
198	Realio Network	/	184.80
199	Orca	QS946B4NN	183.29
200	Layer3	GCG7S59XF	180.98
201	double_zero	/	177.37
202	Useless Coin	8HBMRV08Q	173.83
203	0x Protocol Token	HX56HH1ZX	173.61
204	Wormhole Token	25J14XV4F	171.34
205	Highstreet Token	PM8GC6X1K	171.15
206	puffer	/	169.62
207	Echelon Prime	1VJ02JBZN	165.37
208	SPACE ID	C1D0QW564	163.73
209	SUN	DRSV113K4	163.14

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
210	Kyber Network Crystal v2	L0DZSBLVZ	162.66
211	JUST	DFGV0P5MN	160.57
212	tokenfi	/	156.22
213	Memecoin	THW1BFN8J	153.87
214	Pixels	5HPLWBHDP	152.69
215	Helium	4GX02L80B	149.10
216	zigchain	/	148.85
217	Alchemy	MBKSZCVQM	144.81
218	Civic	95LV3DCWZ	142.18
219	Rocket Pool	69Q6NLJ3M	142.09
220	Request Token	3CJF47H8S	138.18
221	Livepeer	J80JRP8VM	136.41
222	Jito	D3XB6KZ00	133.65
223	galxe	/	133.36
224	Liquity	C5D1WG11D	131.44
225	Mask Network	VTV046TSP	131.04
226	AltLayer Token	B7HS0LP5T	125.37
227	Golem Network Token	XRWVBJL68	120.86
228	ssv network	CLN52KS0K	120.44
229	Pyth Network	3980Q2CPS	120.39
230	Numeraire	TCRZ9GZRF	120.30
231	zentry	/	116.45
232	PowerLedger	JWDR0ZDL6	115.12
233	Yield Guild Games Token	WV93P8B45	114.01
234	Polyhedra Network Token	WBRGJ0BFP	112.14

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
235	Aster	H8BH7VR5W	110.17
236	Gluwa Creditcoin Vesting Token	CJSC8G9C3	103.83
237	Spell Token	2D7W0LVCF	100.71
238	SKALE	9KVZ861DR	98.58
239	Zora	M4DCVM90D	98.17
240	Wootrade Network	G4515JG80	97.79
241	AINFT	4MH0C4BL6	97.67
242	Cartesi Token	BL44WHVKM	93.54
243	BENQI	HZZKQKLNK	91.36
244	sentient	/	86.16
245	synfutures	/	84.27
246	Stader	T1CP5RKGN	84.24
247	DIA	/	82.75
248	COTI Token	4LMM6WFBW	82.29
249	Zebec Network	DHV5NRJCF	81.54
250	Orbs	XW3GWJ75G	78.16
251	Threshold Network Token	LTSB7W5CZ	77.15
252	Gods Unchained	56SF1DNGQ	72.32
253	Biconomy Token	Z2JL201QX	71.54
254	TARS AI	STW1X0J38	71.41
255	NYM	/	71.40
256	Bounce Token	CX8MCQ9R0	68.30
257	Chainflip	FLHWQFNL3	67.85
258	Vanar	/	66.80

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
259	aixbt by Virtuals	8762TQWQ6	66.58
260	Grass	MNCR2MKHP	64.69
261	Hashflow	N3K1P14QN	64.16
262	HoloToken	PZHXZVGJB	64.16
263	Synapse	GS8ZH81L	62.82
264	Flux	4DF5G5HFZ	60.29
265	ConstitutionDAO	M69M29HTV	59.40
266	Limewire	/	57.75
267	cat in a dogs world	5Z3NS3NDB	57.52
268	APEX Token	SHV8KFQSK	55.78
269	PORTAL	FM8WBW4WC	55.15
270	Radicle	315760HRD	55.15
271	Venice Token	P0SD47M0W	54.45
272	Across Protocol Token	1J4GM86GD	54.29
273	CelerToken	3W8JZTFR6	53.90
274	BOOK OF MEME	JQCH4ZRFB	49.97
275	Chromia	/	48.05
276	chillguy	/	45.26
277	babydoge	/	44.62
278	Adventure Gold	2QNVF4SDM	41.16
279	Prom	/	39.55
280	Vulcan Forged PYR Token	CPQX5D6RN	38.60
281	Marlin POND	QFL8HTJ6P	37.90
282	GMX	RBR43JPK5	37.22
283	Moo Deng	H3X85BK7M	35.77

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
284	Goatseus Maximus	7FS1WX5VK	33.21
285	iEx ec Network Token	XFRDT01VR	30.16
286	Magic Eden	7987R7S6H	29.93
287	BandToken	1QM2QZQ5N	28.03
288	SuperRare	BP7F347WD	27.96
289	ARPA Token	XM59GZ001	27.64
290	Gmt	/	26.93
291	Open Campus	RZ2VMHM33	26.24
292	Coin98	HP7M2N1QF	26.22
293	Horizen	T9QL1ZT5D	25.84
294	Pirate Nation Token	70H2X3L01	23.92
295	Open Loot	/	23.63
296	deBridge	NT91TJWNC	23.47
297	Enzyme	/	23.14
298	Peanut the Squirrel	75D0KJ7WN	21.73
299	XMON	BQCLHDP88	21.29
300	Parcl	JPJ2QRH6R	16.42
301	IO.NET	/	13.67
302	Maverick Protocol	50VKK1B1X	12.89
303	Neiro	Q4TK4Q00M	12.35
304	DODO bird	SPRN0WLRS	12.35
305	Brett	/	11.70
306	Access Protocol	N173NQNWW	11.53
307	recall	/	11.17
308	ChainGPT	D3J4ZQGZ4	10.94

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
309	Avantis	DGJJGJJPB	9.87
310	Drift	6RVP9P5TB	9.49
311	Venus	V1GPCS5PV	9.21
312	Cloud	TP1T71J95	8.97
313	carv	/	8.52
314	Trust Wallet	SKLQJRHFV	8.41
315	Vita Inu	/	8.20
316	Heima	2Q6SRP1GT	7.95
317	LeverFi	PBVTW87G4	7.31
318	Bonfida	K7TKSGGHC	7.24
319	NOT	2W30TD6D9	6.45
320	Degen	253CXJJ4H	5.98
321	Tensor	NTJJ182D7	5.73
322	Toshi	WT9GJ1K9R	5.51
323	Jupiter	LKWYN892M	5.13
324	vision	/	4.02
325	Subsquad	S0059SFFN	3.24
326	SafePal Token	K79PF0NLX	3.06
327	KAITO	Z3JGDP628	2.49
328	Mobox	LXRP46Q0V	2.46
329	Automata	N66M8Q49R	2.31
330	Edge	JG63F041Q	1.95
331	Hooked Protocol	5WC3ZHNC8	1.57
332	Standard Protocol	Tokenization /	1.35

#	Crypto-Asset Name	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
333	Lista USD	Q819WJTBB	1.05
334	Gains Network	XLGLF5LZ7	0.86
335	Pundi X Token	X088BGGWB	0.85
336	BinaryX	BFTCGQMGC	0.78
337	Tokocrypto Token	ZC1SP684P	0.66
338	Nakamoto Games	/	0.59
339	Shentu	/	0.28
340	NFPrompt	/	0.12
341	Leo Token	59RRBDSKQ	0.00
342	My Neighbor Alice	1S7VZCTZL	0.00

Sustainability indicators



Bitcoin

BTC | V15WLZJMF

Quantitative information

Quantitative sustainability indicators for Bitcoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Bitcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	139547581185.98764	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	4.59329	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	57493053.81688	tCO2e
S.14 GHG intensity	1.89242	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Bitcoin is present on the following networks: Bitcoin, Lightning Network.

The Bitcoin blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. Here's a detailed breakdown of how it works:

Core Concepts:

1. Nodes and Miners:

- Nodes: Nodes are computers running the Bitcoin software that participate in the network by validating transactions and blocks.
- Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.

2. Blockchain: The blockchain is a public ledger that records all Bitcoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
 - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
 - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group ("FFG") relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the "per transaction" count would be substantially higher.

S.5 Incentive Mechanisms and Applicable Fees

Bitcoin is present on the following networks: Bitcoin, Lightning Network.

The Bitcoin blockchain relies on a Proof-of-Work (PoW) consensus mechanism to ensure the security and integrity of transactions. This mechanism involves economic incentives for miners and a fee structure that supports network sustainability:

Incentive Mechanisms:

1. Block Rewards:
 - Newly Minted Bitcoins: Miners are incentivized by block rewards, which consist of newly created bitcoins awarded to the miner who successfully mines a new block. Initially, the block reward was 50 BTC, but it halves every 210,000 blocks (approx. every four years) in an event known as the "halving."
 - Halving and Scarcity: The halving mechanism ensures that the total supply of Bitcoin is capped at 21 million, creating scarcity and potentially increasing value over time.

2. Transaction Fees:

- User Fees: Each transaction includes a fee paid by the user to incentivize miners to include their transaction in a block. These fees are crucial, especially as the block reward diminishes over time due to halving.
- Fee Market: Transaction fees are determined by the market, where users compete to have their transactions processed quickly. Higher fees typically result in faster inclusion in a block, especially during periods of high network congestion.

For the calculation of the corresponding indicators, the additional energy consumption and the transactions of the Lightning Network have also been taken into account, as this reflects the categorization of the Digital Token Identifier Foundation for the respective functionally fungible group ("FFG") relevant for this reporting. If one would exclude these transactions, the respective estimations regarding the "per transaction" count would be substantially higher

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: SHA-256. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) lightning_network is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If

no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Dogecoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Dogecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	4810266754.26461	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.46048	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	1981810.95671	tCO ₂ e
S.14 GHG intensity	0.18972	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Dogecoin (DOGE) uses a Proof of Work (PoW) consensus mechanism, similar to Bitcoin, but with some key differences.

Core Concepts :

1. Nodes and Miners:

- Nodes: Nodes in the Dogecoin network are computers running the Dogecoin software. They validate transactions, maintain the blockchain, and relay information across the network.
- Miners: Miners are specialized nodes that solve cryptographic puzzles to create new blocks and validate transactions. This process is known as mining.

2. Blockchain: The blockchain is a public ledger that records all Dogecoin transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).

3. Hash Functions: Dogecoin uses the Scrypt hash function, which is different from Bitcoin's SHA-256. Scrypt is designed to be more memory-intensive, making it more resistant to ASIC (Application-Specific Integrated Circuit) mining and encouraging more widespread participation by regular users with less powerful hardware.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction is validated by nodes to ensure it adheres to the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
 - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the Scrypt hash function, produces a hash below a certain target value. This target value is adjusted periodically to maintain a consistent block creation time.
 - Proof of Work: Finding a valid nonce requires significant computational effort. Once a miner finds a valid nonce, the new block is broadcast to the network.
3. Block Validation and Addition: Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid. If the block is valid, nodes add it to their copy of the blockchain, and the process repeats for the next block.
4. Chain Consensus: The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain. In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

Security and Economic Incentives:

1. Incentives for Miners:
 - Block Rewards: Miners are incentivized to participate in the network by receiving block rewards. Initially, Dogecoin had a variable block reward, but now it offers a fixed reward of 10,000 DOGE per block.
 - Transaction Fees: Miners also collect transaction fees from the transactions included in the block. These fees provide an additional incentive for miners.
2. Security:
 - Hash Rate and Difficulty: The security of the Dogecoin network is directly proportional to its hash rate, the total computational power of all miners. A higher hash rate means more difficult and costly attacks.
 - 51% Attack: An attacker would need to control more than 50% of the network's hash rate to double-spend or rewrite parts of the blockchain. The cost and resource requirement for such an attack make it impractical for a sufficiently large and decentralized network like Dogecoin.
3. Merged Mining: Dogecoin supports merged mining with Litecoin (LTC). This means miners can mine both Dogecoin and Litecoin simultaneously without additional computational effort. This enhances the security of both networks by pooling their hash rates.

S.5 Incentive Mechanisms and Applicable Fees

Dogecoin uses a Proof of Work (PoW) consensus mechanism to ensure network security and integrity, relying on economic incentives for miners and transaction fees from users.

Incentive Mechanisms

1. Miners:
 - Block Rewards: Miners receive block rewards for successfully mining new blocks. Initially, Dogecoin had a variable block reward, but it now offers a fixed reward of 10,000 DOGE per

block. These rewards are a primary incentive for miners to invest in the computational power necessary to secure the network.

- Transaction Fees: In addition to block rewards, miners also earn transaction fees from the transactions they include in the blocks they mine. Although Dogecoin's transaction fees are typically low, they still provide an important supplementary income for miners.
- Merged Mining: Dogecoin supports merged mining with Litecoin, allowing miners to simultaneously mine both cryptocurrencies without additional computational effort. This process increases the hash rate and security of both networks by pooling their resources.

2. Security:

- Hash Rate and Difficulty: The security of Dogecoin's network is directly related to its hash rate, the total computational power used by all miners. A higher hash rate makes the network more resistant to attacks. The mining difficulty adjusts periodically to ensure that blocks are mined approximately every minute, maintaining network stability. 51% Attack Deterrence: Controlling more than 50% of the network's hash rate to perform a 51% attack is costly and difficult. The significant computational power and energy required make such attacks impractical for a large and decentralized network like Dogecoin.

Fees Applicable on the Dogecoin Blockchain:

1. Transaction Fees:

- Flat Fee Structure: Dogecoin uses a relatively simple fee structure. The typical transaction fee is 1 DOGE per kilobyte of transaction data. This low fee is one of Dogecoin's appeals, making it suitable for small and micro-transactions.
- Incentives for Faster Processing: Although transaction fees are generally low, users can choose to pay higher fees to incentivize miners to include their transactions in the next block, ensuring faster processing times.

2. Mining Rewards:

- Block Subsidy: The fixed block reward of 10,000 DOGE incentivizes miners to continue securing the network. This reward will persist as Dogecoin does not have a maximum supply cap, ensuring continuous incentives for miners.
- Fee Inclusion: Besides the block subsidy, the inclusion of transaction fees provides an additional, albeit smaller, incentive for miners to process transactions efficiently.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Scrypt. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Kaspa

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Kaspa	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2831162818.95504	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.77566	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	1166427.93040	tCO ₂ e
S.14 GHG intensity	0.31957	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

The Kaspa blockchain uses a unique Proof-of-Work consensus mechanism called the GHOSTDAG (Greedy Heaviest Observed Subtree Directed Acyclic Graph) protocol. GHOSTDAG is designed to offer high throughput, low latency, and secure finality, addressing scalability and performance challenges typically faced by traditional blockchain systems.

Key Features of Kaspa's Consensus Mechanism:

1. Directed Acyclic Graph (DAG) Structure: Kaspa operates on a DAG, allowing multiple blocks to be produced simultaneously and linked together in a way that eliminates the need for a single linear chain. This allows for parallel block production, significantly increasing the overall throughput of the network. Unlike traditional blockchains where only the longest chain is considered valid, Kaspa allows blocks to coexist, increasing transaction throughput and scalability.

2. GHOSTDAG Protocol: The GHOSTDAG protocol resolves the challenges that arise in DAG-based networks by ensuring a consistent ordering of blocks. It uses the concept of "growing" blocks from the heaviest observed subtree.

S.5 Incentive Mechanisms and Applicable Fees

Kaspa employs a Proof-of-Work (PoW) consensus mechanism to secure its network and incentivize participants. Miners validate transactions and add new blocks to the DAG (Directed Acyclic Graph) structure, earning rewards for their efforts.

Incentive Mechanism:

1. Mining Rewards:

- Block Rewards: Miners receive newly minted KAS tokens as rewards for successfully mining new blocks. The block reward decreases over time, following a predetermined schedule, to control the total supply of KAS tokens.
- Transaction Fees: In addition to block rewards, miners earn transaction fees from the transactions included in the blocks they mine. Users pay these fees to incentivize miners to prioritize their transactions.

2. Transaction Fees:

Users pay transaction fees to have their transactions processed and included in the blockchain. These fees are determined by the size of the transaction and the current network conditions. Higher fees can expedite transaction inclusion, especially during periods of high network activity.

Applicable Fees:

1. Transaction Fees:

Transaction fees are calculated based on the size of the transaction, measured in bytes. The fee rate is dynamic and adjusts according to network congestion and demand. Users can estimate appropriate fee rates using tools like the Rusty Kaspa node's `getFeeEstimate()` RPC method, which provides real-time fee rate suggestions based on current network conditions.

2. Fee Rate and Quality of Service (QoS):

The fee rate influences the priority of transactions. A higher fee rate increases the likelihood of a transaction being included in the next block, ensuring faster confirmation times. Kaspa's fee structure allows users to adjust their fee rates to balance cost and transaction speed according to their preferences.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: KHeavyhash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the

number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Litecoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Litecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	710975266.86801	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.05100	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	292919.00965	tCO ₂ e
S.14 GHG intensity	0.02101	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Litecoin, like Bitcoin, uses Proof of Work (PoW) as its consensus mechanism, but with a few key differences:

1. **Script Hashing Algorithm:** Unlike Bitcoin's SHA-256 algorithm, Litecoin uses the Scrypt hashing algorithm, which is more memory-intensive. This makes mining Litecoin more accessible to regular users and limits the advantages of specialized hardware (like ASICs) in the early years.
2. **Mining and Block Creation:** Miners compete to solve cryptographic puzzles and, upon success, add new blocks to the blockchain. This process involves solving the Scrypt algorithm, which requires computational work. The first miner to solve the problem earns the block reward and transaction fees associated with the transactions in the block.
3. **Block Time:** Litecoin has a block time of 2.5 minutes, much faster than Bitcoin's 10 minutes. This means transactions confirm more quickly, increasing the overall network speed.

4. Block Reward Halving: Similar to Bitcoin, Litecoin has a block reward halving event approximately every four years. Initially, miners earned 50 LTC per block, but this reward decreases by half after each halving event. This process continues until the maximum supply of 84 million LTC is reached.
5. Difficulty Adjustment: Litecoin adjusts the mining difficulty approximately every 2,016 blocks (about every 3.5 days) to ensure that blocks continue to be mined at a consistent rate of 2.5 minutes per block, regardless of fluctuations in the total network hash rate.

S.5 Incentive Mechanisms and Applicable Fees

Litecoin, like Bitcoin, uses the Proof of Work (PoW) consensus mechanism to secure transactions and incentivize miners.

Incentive Mechanisms:

1. Mining Rewards:

Block Rewards: Miners are rewarded with Litecoin (LTC) for successfully mining new blocks. Initially, miners received 50 LTC per block, but this reward halves approximately every four years.

Transaction Fees: Miners also earn transaction fees from the transactions included in the blocks they mine. Users pay fees to have their transactions processed by miners, especially when they need faster confirmation times.

2. Halving:

The halving mechanism ensures that over time, fewer Litecoins are introduced into circulation, creating a deflationary model. This makes mining more valuable as the circulating supply becomes scarcer, incentivizing miners to continue participating in the network even as block rewards decrease.

3. Economic Security:

The cost of mining (e.g., hardware and electricity) provides a strong economic incentive for miners to act honestly. If miners attempt to cheat or attack the network, they risk losing the computational work they invested, as invalid blocks will be rejected by the network.

Fees on the Litecoin Blockchain:

- Transaction Fees: Litecoin users pay a transaction fee for each transaction, typically calculated in LTC per byte of transaction data. The fees are dynamic and vary based on network congestion.
- Low Fees: Litecoin is known for its relatively low transaction fees compared to other blockchains like Bitcoin, which makes it ideal for smaller transactions and micro-payments.
- Fee Redistribution: Collected transaction fees are distributed to miners as part of their rewards for validating transactions and securing the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Scrypt. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all

implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Bitcoin Cash

BCH | 919BF3W7L

Quantitative information

Quantitative sustainability indicators for Bitcoin Cash

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Bitcoin Cash	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	667825346.26024	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.05180	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	275141.41232	tCO ₂ e
S.14 GHG intensity	0.02134	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Bitcoin Cash is present on the following networks: Bitcoin Cash, Smart Bitcoin Cash.

The Bitcoin Cash blockchain network uses a consensus mechanism called Proof of Work (PoW) to achieve distributed consensus among its nodes. It originated from the Bitcoin blockchain, hence has the same consensus mechanisms but with a larger block size, which makes it more centralized.

Core Concepts:

1. Nodes and Miners:

- Nodes: Nodes are computers running the Bitcoin Cash software that participate in the network by validating transactions and blocks.
- Miners: Special nodes, called miners, perform the work of creating new blocks by solving complex cryptographic puzzles.

2. Blockchain: The blockchain is a public ledger that records all Bitcoin Cash transactions in a series of blocks. Each block contains a list of transactions, a reference to the previous block (hash), a timestamp, and a nonce (a random number used once).
3. Hash Functions: Bitcoin Cash uses the SHA-256 cryptographic hash function to secure the data in blocks. A hash function takes input data and produces a fixed-size string of characters, which appears random.

Consensus Process:

1. Transaction Validation: Transactions are broadcast to the network and collected by miners into a block. Each transaction must be validated by nodes to ensure it follows the network's rules, such as correct signatures and sufficient funds.
2. Mining and Block Creation:
 - Nonce and Hash Puzzle: Miners compete to find a nonce that, when combined with the block's data and passed through the SHA-256 hash function, produces a hash that is less than a target value. This target value is adjusted periodically to ensure that blocks are mined approximately every 10 minutes.
 - Proof of Work: The process of finding this nonce is computationally intensive and requires significant energy and resources. Once a miner finds a valid nonce, they broadcast the newly mined block to the network.
3. Block Validation and Addition:
 - Other nodes in the network verify the new block to ensure the hash is correct and that all transactions within the block are valid.
 - If the block is valid, nodes add it to their copy of the blockchain and the process starts again with the next block.
4. Chain Consensus:
 - The longest chain (the chain with the most accumulated proof of work) is considered the valid chain by the network. Nodes always work to extend the longest valid chain.
 - In the case of multiple valid chains (forks), the network will eventually resolve the fork by continuing to mine and extending one chain until it becomes longer.

Smart Bitcoin Cash (SmartBCH) operates as a sidechain to Bitcoin Cash (BCH), leveraging a hybrid consensus mechanism combining Proof of Work (PoW) compatibility and validator-based validation.

Core Components:

- Proof of Work Compatibility: SmartBCH relies on Bitcoin Cash's PoW for settlement and security, ensuring robust integration with BCH's main chain. SHA-256 Algorithm: Uses the same SHA-256 hashing algorithm as Bitcoin Cash, allowing compatibility with existing mining hardware and infrastructure.
- Consensus via Validators: Transactions within SmartBCH are validated by a set of validators chosen based on staking and operational efficiency. This hybrid approach combines the hash power of PoW with a validator-based model to enhance scalability and flexibility.

S.5 Incentive Mechanisms and Applicable Fees

Bitcoin Cash is present on the following networks: Bitcoin Cash, Smart Bitcoin Cash.

The Bitcoin Cash blockchain operates on a Proof-of-Work (PoW) consensus mechanism, with incentives and fee structures designed to support miners and the overall network's sustainability:

Incentive Mechanism:

1. Block Rewards:

- Newly Minted Bitcoins: Miners receive a block reward, which consists of newly created bitcoins for successfully mining a new block. Initially, the reward was 50 BCH, but it halves approximately every four years in an event known as the "halving."
- Halving and Scarcity: The halving ensures that the total supply of Bitcoin Cash is capped at 21 million BCH, creating scarcity that could drive up value over time.

2. Transaction Fees:

- User Fees: Each transaction includes a fee, paid by users, that incentivizes miners to include the transaction in a new block. This fee market becomes increasingly important as block rewards decrease over time due to the halving events.
- Fee Market: Transaction fees are market-driven, with users competing to get their transactions included quickly. Higher fees lead to faster transaction processing, especially during periods of high network congestion.

Applicable Fees:

1. Transaction Fees:

Bitcoin Cash transactions require a small fee, paid in BCH, which is determined by the transaction's size and the network demand at the time. These fees are crucial for the continued operation of the network, particularly as block rewards decrease over time due to halvings.

2. Fee Structure During High Demand:

In times of high congestion, users may choose to increase their transaction fees to prioritize their transactions for faster processing. The fee structure ensures that miners are incentivized to prioritize higher-fee transactions.

SmartBCH's incentive model encourages validators and network participants to secure the sidechain and process transactions efficiently.

Incentive Mechanisms:

- Validator Rewards: Validators are rewarded with a share of transaction fees for their role in validating transactions and maintaining the network.
- Economic Alignment: The system incentivizes validators to act in the network's best interest, ensuring stability and fostering adoption through economic alignment.

Applicable Fees:

Transaction Fees: Fees for transactions on SmartBCH are paid in BCH, ensuring seamless integration with the Bitcoin Cash ecosystem.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: SHA-256. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical

Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Ethereum Classic Ether

ETC | DGMQMFZD4

Quantitative information

Quantitative sustainability indicators for Ethereum Classic Ether

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Ethereum Classic Ether	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	546678609.37437	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.10105	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	225229.43388	tCO ₂ e
S.14 GHG intensity	0.04163	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Ethereum Classic operates on a Proof of Work (PoW) consensus mechanism with the Etchash algorithm, which is a modified version of Ethash. This PoW model requires computational work from miners to validate transactions and secure the network.

Core Components:

- Proof of Work with Etchash Mining and Security: Miners use computational resources to perform the work necessary to add blocks to the blockchain, ensuring network security and resistance to tampering.
- Code is Law Philosophy Immutable Ledger: Following the 2016 DAO hack, Ethereum Classic upheld the "Code is Law" principle by retaining the unaltered blockchain. This commitment to immutability sets Ethereum Classic apart, preserving its original ledger without reverting transactions.

S.5 Incentive Mechanisms and Applicable Fees

Ethereum Classic's incentive model combines block rewards and transaction fees, encouraging miner participation and network security.

Incentive Mechanisms:

1. Block Rewards:

Deflationary Supply Model: Miners receive ETC through block rewards, which decrease over time, similar to Bitcoin's model. This deflationary design supports ETC's value retention and incentivizes continued mining efforts.

2. Transaction Fees:

User-Paid Fees: Users pay fees in ETC for sending transactions, interacting with smart contracts, and utilizing dApps. These fees provide miners with additional income and help maintain network security.

Applicable Fees: Ethereum Classic's fee structure involves user-paid transaction fees to support network operations and discourage spam transactions.

1. Transaction Fees:

- User-Paid Fees: Every transaction on Ethereum Classic incurs a fee in ETC, based on the computational effort required. These fees ensure that resources are efficiently used and contribute to miner revenue.
- Dynamic Demand-Based Fees: Fees vary according to transaction complexity and network demand, helping maintain transaction efficiency and preventing congestion.

2. Mining Rewards:

Block Rewards Reduction: Block rewards, which are scheduled to reduce over time, provide a primary income source for miners. This model aims to balance network security while managing ETC's supply.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Etchash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Zcash

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Zcash	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	322297447.75458	kWh/a
S.10 Renewable energy consumption	34.4781481038	%
S.11 Energy intensity	1.27750	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	132785.27733	tCO ₂ e
S.14 GHG intensity	0.52633	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Zcash is present on the following networks: Binance Smart Chain, Zcash.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Zcash operates on a Proof of Work (PoW) consensus mechanism, using the Equihash algorithm, which requires miners to dedicate computational power to validate transactions and produce new blocks.

Core Components:

1. Equihash PoW: Mining Process:
Miners compete to add new blocks by investing computational resources. This work serves as proof that miners are actively contributing to network security.
2. zk-SNARKs Integration:
Zcash utilizes zk-SNARKs (Zero-Knowledge Succinct Non-Interactive Arguments of Knowledge) to enable privacy-focused transactions. This cryptographic proof mechanism allows transactions to be verified without revealing sensitive information, such as the sender, recipient, or amount.

S.5 Incentive Mechanisms and Applicable Fees

Zcash is present on the following networks: Binance Smart Chain, Zcash.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegates.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Zcash incentivizes miners through block rewards and transaction fees, supporting both network security and operational efficiency.

Incentive Mechanisms:

1. Block Rewards: Miners receive ZEC as a reward for creating blocks, encouraging ongoing network support and computational investment.
2. Transaction Fees: Users pay transaction fees in ZEC for processing transactions, which miners receive in addition to block rewards.

Applicable Fees:

Enhanced Privacy and Shielded Transactions:

zk-SNARKs Efficiency: While shielded transactions offer privacy, they require more computational resources, which may slightly increase fees. Upgrades like Halo aim to enhance the efficiency of zk-SNARKs, keeping shielded transaction costs manageable.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Equihash. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If

no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Ravencoin

RVN | SVCV42BS8

Quantitative information

Quantitative sustainability indicators for Ravencoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Ravencoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	153587386.65559	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	7.09830	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	63277.39837	tCO ₂ e
S.14 GHG intensity	2.92447	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Ravencoin employs a Proof of Work (PoW) consensus mechanism with an ASIC-resistant algorithm to promote decentralization and enable efficient mining.

Core Components:

- Proof of Work (PoW): Ensures network security and transaction validation by requiring miners to perform computational work.
- KawPow Algorithm: Utilizes an ASIC-resistant algorithm designed to allow mining with GPUs, encouraging broader participation and maintaining decentralization.

S.5 Incentive Mechanisms and Applicable Fees

Ravencoin incentivizes network security and transaction processing through block rewards and user fees.

Incentive Mechanisms:

Block Rewards: Miners are rewarded with newly minted RVN tokens for successfully mining blocks and securing the blockchain.

Transaction Fees: Users pay minimal fees in RVN for transferring assets or executing operations, providing miners with additional compensation.

Applicable Fees:

Transaction Fees: Low fees in RVN are applied for all transactions, supporting cost-effective and efficient blockchain operations.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: KawPow. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is

available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.


Core

CORE | 5JRW5LZQ

Quantitative information

Quantitative sustainability indicators for Core

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Core	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	94233551.07569	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.03391	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	38823.85189	tCO ₂ e
S.14 GHG intensity	0.01397	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Core employs the Satoshi Plus consensus mechanism, which combines Delegated Proof of Work (DPoW), Delegated Proof of Stake (DPoS), and Non-Custodial Bitcoin Staking to provide robust security and scalability.

Core Components:

- Delegated Proof of Work (DPoW):
Integrates Bitcoin miners into the network by allowing them to contribute hash power to secure Core, without interfering with Bitcoin's primary operations.
- Delegated Proof of Stake (DPoS):
CORE token holders delegate their tokens to validators who handle block production and transaction validation, ensuring efficiency and decentralization.

Non-Custodial Bitcoin Staking:

Bitcoin holders can stake their BTC to participate in the network consensus, adding an extra layer of security while preserving ownership of their assets.

S.5 Incentive Mechanisms and Applicable Fees

Core incentivizes network participation through staking rewards, transaction fees, and governance opportunities.

Incentive Mechanisms:

Validator Rewards:

Validators earn rewards from transaction fees and newly minted CORE tokens distributed through the blockchain's inflation policy, with payouts proportional to their delegated hash power and CORE stake.

Staking Incentives:

Both CORE and Bitcoin stakers receive rewards for contributing to network security and stability, encouraging broader participation across asset classes.

Governance Participation:

CORE token holders have voting rights, allowing them to influence protocol upgrades and network parameters, supporting decentralized decision-making.

Applicable Fees:

Transaction Fees:

Users pay transaction fees in CORE tokens for executing transactions and smart contracts. These fees are distributed to validators as compensation for securing the network.

Inflation Policy:

A portion of validator rewards comes from newly minted CORE tokens, providing an additional incentive while maintaining a controlled inflation model.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used

which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Dash

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Dash	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	67500000.80459	kWh/a
S.10 Renewable energy consumption	34.4781470956	%
S.11 Energy intensity	0.24714	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	27809.73446	tCO ₂ e
S.14 GHG intensity	0.10182	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Dash is present on the following networks: Dash, Tron.

Dash combines Proof of Work (PoW) for block production with a masternode network, which adds enhanced services and governance. This hybrid approach enables Dash to offer both secure transaction validation and additional features like fast payments.

Core Components:

1. Proof of Work (PoW) with X11 Algorithm:
Block Production: Miners use the X11 algorithm to solve cryptographic puzzles, with the first to solve adding the next block and receiving a block reward.
2. Masternode Network – Proof of Service (PoSe):
 - Collateral Requirement: Operating a masternode requires locking 1,000 DASH, which acts as collateral to secure services provided by the node.

- Network Services: Masternodes support features such as InstantSend for rapid payments, PrivateSend for enhanced privacy, and governance.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

Dash is present on the following networks: Dash, Tron.

Dash rewards both miners and masternode operators to maintain network security and provide services, while also supporting community initiatives through a treasury fund.

Incentive Mechanisms:

1. Block Reward Distribution:
 - Miners: Receive 45% of each block reward for securing the network via PoW.
 - Masternodes: Earn 45% of each block reward, incentivizing them to operate and support network services.
 - Treasury Fund: 10% of each block reward is allocated to the Dash treasury, funding projects approved by the Dash DAO.
2. Masternode Staking and Rewards:

Passive Income for Operators: By locking 1,000 DASH, masternode operators earn rewards for providing network services and participating in governance.

Applicable Fees:

- Standard Transactions: Users pay a small fee in DASH, making it suitable for daily transactions due to its low-cost structure.
- InstantSend Transactions: Available for a slightly higher fee, these transactions are processed immediately by masternodes for added security.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for eCash

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	eCash	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	29090885.95396	kWh/a
S.10 Renewable energy consumption	34.4781471780	%
S.11 Energy intensity	0.94085	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	11985.33042	tCO ₂ e
S.14 GHG intensity	0.38763	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

eCash is present on the following networks: Binance Smart Chain, Ecash.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

eCash utilizes a hybrid consensus model combining Proof of Work (PoW) with the Avalanche Post-Consensus protocol, enhancing transaction finality and security.

Core Components:

1. Proof of Work with Avalanche Post-Consensus:
Dual-Layer Security: Blocks are initially mined through PoW, and then finalized with Avalanche, providing rapid finality and preventing block reversals.
2. ASERT Difficulty Adjustment:
Consistent Block Times: ASERT adjusts mining difficulty in real-time to maintain a 10-minute block interval, even with fluctuating network hashrate.
3. Staking for Governance:
Staking Participation: XEC holders can lock tokens to participate in governance and earn rewards, adding stability and engaging the community in the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

eCash is present on the following networks: Binance Smart Chain, Ecash.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegates.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

eCash incentivizes miners and stakeholders through block rewards, transaction fees, and staking rewards, supporting network security, engagement, and governance.

Incentive Mechanisms:

1. Block Rewards for Miners:

XEC Rewards: Miners earn block rewards in XEC, with periodic halving events to manage supply and encourage token scarcity over time.

2. Staking Rewards for XEC Holders:

Passive Income for Stakers: XEC holders who lock their tokens receive rewards, promoting active governance participation and network stability.

Applicable Fees:

User-Paid Fees in XEC: Transaction fees are paid in XEC, awarded to miners as additional compensation, and are kept low to encourage everyday use and microtransactions.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Solana SOL

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Solana SOL	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	6843750.00000	kWh/a
S.10 Renewable energy consumption	38.5831139958	%
S.11 Energy intensity	0.00000	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	2319.13534	tCO ₂ e
S.14 GHG intensity	0.00000	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The

information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.


Stacks

STX | PQTGLSGRG

Quantitative information

Quantitative sustainability indicators for Stacks

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Stacks	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	6279641.15337	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.00989	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	2587.18742	tCO ₂ e
S.14 GHG intensity	0.00407	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

The Stacks blockchain, a Layer 2 solution on top of Bitcoin, uses a unique consensus mechanism called Proof of Transfer (PoX). PoX is inspired by Bitcoin's Proof of Work (PoW) and leverages Bitcoin's security by anchoring Stacks transactions on the Bitcoin blockchain.

Core Concepts of Proof of Transfer (PoX):

1. Recycling Bitcoin's Security:

- Stacks utilizes Bitcoin's hash power and PoW energy by requiring Stacks miners to transfer BTC in exchange for the native token STX, essentially "recycling" Bitcoin's energy without additional mining.
- Transactions on Stacks achieve Bitcoin finality—they are secured by Bitcoin's immutable blockchain.

2. Two-Layered Peg Mechanism:

Stacks introduces a decentralized, trust-minimized peg called sBTC, allowing assets to move between Bitcoin and Stacks. b. This peg enables Stacks smart contracts to interact with Bitcoin securely and in a decentralized way, enhancing utility and enabling DeFi on Bitcoin.

3. Smart Contracts with Clarity Language:

Stacks supports Clarity, a smart contract language designed for predictability and safety. Clarity contracts allow developers to know exactly what a contract will do before execution, ensuring security.

4. Miners and Stakers:

Miners transfer BTC to earn newly minted STX, securing the network. b. STX Holders (stakers) are incentivized to lock up STX tokens, earning BTC rewards in return.

S.5 Incentive Mechanisms and Applicable Fees

The Stacks network incentivizes secure transactions and network participation through its unique Proof of Transfer (PoX) consensus model, which integrates incentives for both miners and STX holders.

Incentive Mechanisms to Secure Transactions:

1. Miners' Incentives:

- BTC Transfers for Block Rewards: Stacks miners secure the network by transferring Bitcoin (BTC) to compete for the opportunity to mine a new block and earn STX rewards. This transfer of BTC ensures miners are vested in the network's security without directly consuming additional computational power.
- Newly Minted STX Rewards: Miners who successfully mine a block are rewarded with newly minted STX tokens. This reward incentivizes miners to continue participating in securing the Stacks network.
- Bitcoin Finality: Since Stacks blocks are anchored to Bitcoin, the network leverages Bitcoin's security to ensure finality, meaning that once transactions are confirmed on Bitcoin, they are considered immutable and secure.

2. Incentives for STX Holders (Stacking Rewards):

- Stacking BTC Rewards: STX holders can participate in the consensus process through a mechanism called Stacking. By locking up (temporarily holding) their STX tokens, these participants contribute to network stability and security. In return, they receive BTC rewards paid by the miners.
- Decentralization and Security Contribution: The Stacking process promotes decentralization by encouraging broad participation from STX holders, who help maintain network stability and security. This model reduces reliance on a few large players and provides economic rewards for active participation.

3. Two-Layered Peg and Decentralized Utility:

By utilizing a two-way peg mechanism, the Stacks network allows BTC to be moved between Bitcoin and Stacks, enabling secure, decentralized transactions. This enhances the overall utility of the network, encouraging more users and developers to participate in the ecosystem.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the

hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Internet Computer Token

ICP | 4DHTM5D7P

Quantitative information

Quantitative sustainability indicators for Internet Computer Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Internet Computer Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	5834160.00000	kWh/a
S.10 Renewable energy consumption	35.90000000000	%
S.11 Energy intensity	0.00720	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	2047.79016	tCO ₂ e
S.14 GHG intensity	0.00253	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

The Internet Computer Protocol (ICP) uses a unique consensus mechanism called Threshold Relay combined with Chain Key Technology to ensure decentralized, scalable, and secure operations for its network.

Core Components of ICP's Consensus Mechanism:

1. Threshold Relay:

Threshold Relay is a consensus protocol that enables the network to achieve finality without a traditional Proof-of-Work or Proof-of-Stake mechanism. It leverages a group of nodes called "the committee" to generate a random beacon that is used for the selection of the next block producer. The protocol is designed to provide scalability and speed while maintaining decentralization by allowing any node to join the consensus process. The key feature of Threshold Relay is that it utilizes a threshold signature scheme, where a group of nodes must

collaborate to create a valid signature, ensuring that consensus is achieved even in the presence of faulty or malicious nodes.

2. Chain Key Technology:

Chain Key Technology is used to manage the state of the Internet Computer, allowing it to scale effectively across a vast number of nodes while still providing fast and secure transaction finality. This technology enables the creation and management of many independent blockchains (also known as subnet blockchains), each with its own set of validators. Chain Key Technology allows the Internet Computer to support billions of smart contracts without compromising speed, as it facilitates quick communication between the subnets and enables cross-chain interoperability.

3. Canister Smart Contracts:

- The Internet Computer utilizes a decentralized model where the computation of canister smart contracts (which hold the application logic) occurs across different nodes in the network. These canisters can run autonomously and scale with the network's growth.
- Finality and Security: The consensus mechanism ensures finality once a transaction is validated, meaning that once a block is added, it cannot be reverted, providing the security required for high-stakes applications. The use of Threshold Relay provides robust Byzantine Fault Tolerance (BFT), enabling the network to tolerate faulty or malicious behavior without compromising network integrity.

S.5 Incentive Mechanisms and Applicable Fees

The Internet Computer Protocol (ICP) incentivizes network participants (validators, node operators, and canister developers) through various reward mechanisms and transaction fees. Here's a breakdown of the incentive mechanisms and applicable fees related to ICP:

Incentive Mechanism:

1. Network Participation and Rewards:

- Validators: Validators are crucial for maintaining the integrity and security of the network. They stake ICP tokens to participate in consensus and are rewarded for validating blocks, maintaining the integrity of the decentralized network, and ensuring its performance. Rewards for validators are based on their participation in the consensus mechanism and their stake in the network.
- Node Operators: Node operators who maintain the physical infrastructure of the network (such as hardware and server resources) are also rewarded. These operators run the nodes that participate in the Threshold Relay and provide computational power to the network.

2. Canister Developers and Network Participants:

- Canister Smart Contracts: Developers of canisters (smart contracts) on the Internet Computer are incentivized through the creation of decentralized applications (dApps). Developers may also benefit from transaction fees generated by the usage of their dApps and the deployment of smart contracts on the network.
- Usage Fees: Users of decentralized applications (dApps) or canisters are incentivized to pay for their usage through fees. These fees are often paid in ICP tokens, and developers can receive a share of these fees based on the usage of their deployed applications.

3. Governance:

The ICP Token is used for governance via the Network Nervous System (NNS), where holders of ICP tokens participate in decisions regarding the protocol, such as network upgrades, incentive adjustments, and the allocation of funds. Token holders are rewarded with the ability to influence the future of the network.

4. Staking Rewards:

Staking: ICP token holders can participate in staking their tokens in the NNS, which influences network consensus and governance. By participating in staking, they help secure the network

and are rewarded with staking rewards (a form of passive income). The staking rewards are given to token holders who participate in securing the network via the NNS.

Applicable Fees:

1. Transaction Fees:

- Canister Calls: Every interaction with a canister (smart contract) on the Internet Computer incurs a transaction fee. These fees are typically paid in ICP tokens and are used to cover the computational resources required to process requests, store data, and manage execution.
- Fee Structure: Transaction fees depend on the complexity and resources consumed by the canister call or network operation. For example, operations that require more computational power or data storage may incur higher fees.

2. Storage Fees:

Canister Data Storage: Developers and users who deploy applications on the Internet Computer are required to pay fees for storing data. These fees ensure that network resources are used efficiently and that canisters do not waste storage space. The cost of storage is typically paid in ICP tokens.

3. Governance Participation Fees:

Voting and Proposal Fees: Participation in the governance process via the NNS (Network Nervous System) may require a small fee, depending on the type of governance action (such as submitting a proposal or voting). These fees ensure that governance is distributed and prevent spam attacks on the governance system.

4. Node and Validator Fees:

Fees for Node Operations: Node operators who provide computational power to the network may incur costs related to maintaining hardware and operating nodes. These fees are partially offset by rewards for providing network resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) `internet_computer` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of

participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Verge

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Verge	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	4958188.53063	kWh/a
S.10 Renewable energy consumption	34.4781668700	%
S.11 Energy intensity	9.04739	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	2042.75189	tCO ₂ e
S.14 GHG intensity	3.72749	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Verge is present on the following networks: Ethereum, Verge.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Verge secures its network with a multi-algorithm Proof of Work (PoW) consensus mechanism, which supports five different hashing algorithms, allowing for greater hardware compatibility and enhancing decentralization.

Core Components:

Multi-Algorithm Proof of Work:

- Hashing Diversity: Verge utilizes five algorithms—Scrypt, X17, Lyra2REv2, myr-groestl, and blake2s—allowing miners with various hardware types to participate. This flexibility makes the network more accessible and decentralized.
- Competitive Mining Environment: PoW mining requires computational power to validate transactions and produce new blocks, ensuring that block production is secure and decentralized.

S.5 Incentive Mechanisms and Applicable Fees

Verge is present on the following networks: Ethereum, Verge.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Verge incentivizes network participation through mining rewards and maintains a low-fee structure, making it well-suited for frequent, microtransactional usage.

Incentive Mechanisms:

1. Mining Rewards:

XVG Block Rewards: Miners are rewarded in XVG tokens for validating transactions and adding new blocks to the network, with rewards distributed across the five supported algorithms. This structure incentivizes miners to contribute to network security.

2. Deflationary Supply Model:

Fixed Supply Cap: Verge has a maximum supply of 16.5 billion XVG tokens. Once this cap is reached, no new tokens will be issued through block rewards, making Verge a deflationary asset designed to retain value.

Applicable Fees:

Low Transaction Fees: Cost-Effective Transactions: Verge's low transaction fees, paid in XVG, make it ideal for microtransactions and high-frequency transfers, encouraging everyday use across various applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'top-down' approach is being used, within which an economic calculation of the miners is assumed. Miners are persons or devices that actively participate in the proof-of-work consensus mechanism. The miners are considered to be the central factor for the energy consumption of the network. Hardware is pre-selected based on the consensus mechanism's hash algorithm: Scrypt, X17, Lyra2rev2, Myr-Groestl, Blake2s. A current profitability threshold is determined on the basis of the revenue and cost structure for mining operations. Only Hardware above the profitability threshold is considered for the network. The energy consumption of the network can be determined by taking into account the distribution for the hardware, the efficiency levels for operating the hardware and on-chain information regarding the miners' revenue opportunities. If significant use of merge mining is known, this is taken into account. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-

information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for TRON TRX

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	TRON TRX	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	4025312.07239	kWh/a
S.10 Renewable energy consumption	33.4000001638	%
S.11 Energy intensity	0.00002	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	1581.94764	tCO ₂ e
S.14 GHG intensity	0.00001	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

TRON TRX is present on the following networks: Base, Tron.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

TRON TRX is present on the following networks: Base, Tron.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
 - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
 - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) base, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally

Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Filecoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Filecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2409047.11329	kWh/a
S.10 Renewable energy consumption	37.9124254562	%
S.11 Energy intensity	0.00171	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	801.76428	tCO ₂ e
S.14 GHG intensity	0.00057	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Filecoin is present on the following networks: Binance Smart Chain, Filecoin, Huobi.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Filecoin's consensus mechanism, Expected Consensus (EC), is designed to reward data storage providers based on the amount of storage they contribute.

Core Components of Expected Consensus (EC):

1. Storage Power-Based Block Production:
 - Probabilistic Block Selection: Block producers (miners) are chosen probabilistically based on their storage power, meaning providers with more storage capacity have higher chances of being selected to produce new blocks.
2. Proof of Replication (PoRep):
 - Initial Data Verification: Miners provide cryptographic Proof of Replication to verify they are uniquely storing clients' data at the start of each storage contract.
3. Proof of Spacetime (PoSt):
 - Ongoing Verification: Miners periodically submit Proof of Spacetime to confirm they continue to store data over the contract's duration, maintaining data availability and integrity.
4. Chain Quality and Fork Choice:
 - Chain Quality Rule: In cases of chain splits, the network follows the chain with the highest cumulative storage power, ensuring security by selecting the most robust chain.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. Validator Selection: HECO supports up to 21 validators, selected based on their stake in the network.
2. Transaction Processing: Validators are responsible for processing transactions and adding blocks to the blockchain.
3. Transaction Finality: The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. Energy Efficiency: By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

S.5 Incentive Mechanisms and Applicable Fees

Filecoin is present on the following networks: Binance Smart Chain, Filecoin, Huobi.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Filecoin incentivizes storage providers (miners) to maintain data integrity and make decentralized storage available through block rewards and storage fees.

Incentive Mechanisms:

1. Block Rewards:

- Storage-Based Block Rewards: Block rewards in FIL (Filecoin's native token) are given to storage providers selected to add new blocks, proportional to their storage power. These rewards incentivize providers to contribute more storage to the network, enhancing security and decentralized data availability.
- Reward Distribution: Providers with higher storage capacity receive rewards more frequently, creating a direct economic incentive to offer larger storage volumes.

2. Storage Fees:

- Client Payments: Clients pay storage providers (miners) in FIL tokens to store data, incentivizing providers to offer reliable storage.
- Market Pricing: Storage costs are determined by supply and demand, allowing competitive, flexible pricing based on network conditions.

3. Data Retrieval Payments:

In addition to storage fees, miners can earn retrieval fees for providing data access to clients. These fees incentivize storage providers to make stored data readily accessible, enabling Filecoin to support efficient, decentralized data retrieval services.

4. Slashing and Penalties:

- If a miner fails to provide Proof of Spacetime, they may face slashing penalties, losing a portion of their FIL collateral. This mechanism disincentivizes data tampering or deletion by holding providers accountable to their storage commitments.
- Client Refunds: In cases of missed proofs, clients may receive refunds or compensations, ensuring that the network maintains a high standard of data reliability and provider accountability.

Applicable Fees:

1. Transaction Fees:

Filecoin charges transaction fees for standard network operations, paid in FIL. These fees help maintain network functionality and discourage spam by aligning costs with network resource usage.

2. Gas Fees:

Miners pay gas fees based on the computational resources required to submit PoRep and PoSt proofs. These fees are integral to the network's operation, ensuring that participants contribute fairly to Filecoin's resource demands.

3. Storage and Retrieval Fees:

Clients pay miners for data storage on a contract basis, and retrieval fees are paid when miners deliver data on request. These fees are tailored to the type and duration of storage services, providing flexibility in data pricing and availability.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:

Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.

2. Staking Participation:

Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):

Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.

2. Smart Contract Execution Fees:

Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, huobi is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Ethereum Eth

ETH | D5RG2FHH0

Quantitative information

Quantitative sustainability indicators for Ethereum Eth

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVX65	/
S.3 Name of the crypto-asset	Ethereum Eth	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2159953.20000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.00007	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	718.86066	tCO ₂ e
S.14 GHG intensity	0.00002	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-

information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Conflux

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Conflux	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1837140.73200	kWh/a
S.10 Renewable energy consumption	34.4781471084	%
S.11 Energy intensity	0.01013	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	754.94600	tCO ₂ e
S.14 GHG intensity	0.00417	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Conflux operates on a unique Tree-Graph consensus mechanism that combines Optimized Proof of Work (PoW) with Proof of Stake (PoS), allowing high transaction throughput, security, and scalability.

Core Components:

1. Tree-Graph Structure:

- **Concurrent Block Production:** Conflux's Tree-Graph model enables blocks to be produced in parallel, rather than sequentially in a single chain. This structure significantly increases transaction throughput and efficiency compared to traditional blockchains.
- **Hierarchy for Fork Reduction:** Unlike typical PoW blockchains where forks are common, Conflux's Tree-Graph organizes blocks hierarchically, allowing multiple chains to coexist without causing divergences. This minimizes the need for forks, ensuring stability and continuity in block production.

2. Optimized Proof of Work (PoW):

Conflux uses an optimized PoW model to maintain security and decentralization, offering similar security guarantees to traditional PoW systems but with enhanced efficiency, allowing high-performance block processing.

3. Proof of Stake (PoS) Integration:

- PoS for Finality: PoS nodes in Conflux are selected based on the amount of staked CFX (Conflux's native token). These nodes sign pivot blocks to finalize them, reducing the probability of forks and ensuring rapid finality.
- Balance Between PoW and PoS: By combining PoW and PoS, Conflux achieves a balanced, secure consensus system that leverages PoW's security while incorporating PoS for faster finality.

S.5 Incentive Mechanisms and Applicable Fees

Conflux incentivizes network participation and security through block rewards, transaction fees, and staking rewards, along with unique ecosystem support and storage fee structures.

Incentive Mechanisms:

1. Block Rewards and Transaction Fees for Miners:

Miners receive CFX rewards not only for mining blocks but also for securing the network. These rewards, including transaction fees, create an ongoing incentive for miners to participate actively and uphold network stability.

2. Staking Rewards for PoS Nodes:

PoS nodes, responsible for signing and finalizing pivot blocks, earn staking rewards based on their staked CFX amount. This reward structure encourages reliable PoS participation, enhancing network security and finality.

3. Dynamic Gas Fee Model:

- Ethereum-Like Gas Model: Conflux uses a gas model similar to Ethereum's, where fees are calculated based on the computational resources required (measured in gas) and the current gas price, which adjusts based on network demand.
- Dynamic Adjustment: During high network demand, gas fees increase to help manage congestion, while fees decrease in low-demand periods to promote network activity.

4. Ecosystem Fund Allocation:

A portion of transaction fees is allocated to the Conflux ecosystem fund, which supports long-term network development, community initiatives, and ecosystem growth. This fund helps sustain the network and fosters innovation within the ecosystem.

5. Storage Fee Model:

Conflux incorporates a storage fee to discourage unnecessary data storage on the blockchain. This model supports long-term sustainability by reducing blockchain bloat, helping to maintain efficient network performance over time.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) conflux is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Toncoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Toncoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1419120.00000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.00003	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	472.30168	tCO ₂ e
S.14 GHG intensity	0.00001	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:

Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.

2. Catchain Consensus Algorithm:

- High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
- Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.

3. Byzantine Fault Tolerance (BFT):

Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.

4. Validator Rotation and Slashing:

- Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.
- Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:

Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.

2. Transaction Fees:

Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.

3. Decentralization through Validator Rotation:

Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.

4. Slashing Mechanism:

Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



NEAR Protocol

NEAR | MXXM59Z0T

Quantitative information

Quantitative sustainability indicators for NEAR Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	NEAR Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	920024.96478	kWh/a
S.10 Renewable energy consumption	37.4188852620	%
S.11 Energy intensity	0.00007	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	309.82508	tCO ₂ e
S.14 GHG intensity	0.00002	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

NEAR Protocol is present on the following networks: Binance Smart Chain, Ethereum, Near Protocol.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:
 - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.

- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
- 2. Sharding with Nightshade:
 - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
 - This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:
 - Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.
2. Transaction Finality:
 - NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.
3. Epochs and Rotation:
 - Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

NEAR Protocol is present on the following networks: Binance Smart Chain, Ethereum, Near Protocol.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a

fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Avalanche AVAX

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Avalanche AVAX	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	798534.01522	kWh/a
S.10 Renewable energy consumption	36.3152910542	%
S.11 Energy intensity	0.00003	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	299.82222	tCO ₂ e
S.14 GHG intensity	0.00001	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Avalanche AVAX is present on the following networks: Avalanche, Avalanche X Chain.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.

- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
- 2. Snowflake Protocol:
 - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
 - Binary Confidence: Confidence counters are used to track the preferred binary decision.
 - Finality: When a binary decision reaches a certain confidence level, it becomes final.
- 3. Avalanche Protocol:
 - DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
 - Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
 - Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The Avalanche X-Chain uses the Avalanche consensus protocol, which relies on repeated subsampling of validators to reach agreement on transactions.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche AVAX is present on the following networks: Avalanche, Avalanche X Chain.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.

- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Validator incentives on the X-Chain are indirect and come from network-wide AVAX issuance. Transaction fees are fixed and burned to prevent spam and reduce the total supply of AVAX over time

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, avalanche_x_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical

data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Cardano ADA

ADA | 76QS7QCXB

Quantitative information

Quantitative sustainability indicators for Cardano ADA

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Cardano ADA	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	773946.00000	kWh/a
S.10 Renewable energy consumption	37.4187578605	%
S.11 Energy intensity	0.00109	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	260.63169	tCO ₂ e
S.14 GHG intensity	0.00037	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Core Components: Cardano uses the Ouroboros consensus mechanism, a Proof of Stake (PoS) protocol designed for scalability, security, and energy efficiency.

Core Concepts:

1. Proof of Stake (PoS): Validators (called slot leaders) are selected based on the amount of ADA they have staked, rather than solving complex computational puzzles. Validators propose and validate blocks, which are added to the blockchain.
2. Epochs and Slot Leaders: Cardano divides time into epochs (fixed time periods), each of which is subdivided into slots. Slot leaders are selected for each slot to validate and propose blocks. Slot leaders are chosen randomly based on the amount of ADA staked. More stake increases the probability of being selected. Validators are responsible for confirming transactions during their slot and passing the block to the next slot leader.

3. Delegation and Staking Pools: ADA holders can delegate their tokens to staking pools, which increases the pool's chances of being selected to validate a block. The pool operator and delegators share the rewards based on their stakes. This system ensures that participants who do not want to operate a full validator node can still earn rewards and contribute to network security by supporting trusted staking pools.
4. Security and Adversary Resistance: Ouroboros ensures security even in the presence of potential attacks. It assumes that adversaries may attempt to propagate alternative chains or send arbitrary messages. The protocol is secure as long as more than 51% of the staked ADA is controlled by honest participants. Settlement Delay: To protect against adversarial attacks, the new slot leader must consider the last few blocks as transient. Only the blocks preceding these are treated as finalized, ensuring that chain finality is secure against manipulation attempts. This mechanism also allows participants to temporarily go offline and resynchronize as long as they are not disconnected for more than the settlement delay period.
5. Chain Selection: Cardano's nodes adopt the longest valid chain rule: each node stores a local copy of the blockchain and replaces it with any discovered valid, longer chain. This ensures that all nodes eventually converge on a single version of the blockchain, maintaining network consistency.

S.5 Incentive Mechanisms and Applicable Fees

Cardano uses incentive mechanisms to ensure network security and decentralization through staking rewards, slashing mechanisms, and transaction fees.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:
 - Validators, known as slot leaders, secure the network by validating transactions and creating new blocks. To participate, validators must stake ADA, and those with larger stakes are more likely to be selected as slot leaders.
 - Validators are rewarded with newly minted ADA and transaction fees for successfully producing blocks and validating transactions.
 - Delegators, who may not wish to run a validator node, can delegate their ADA to staking pools. By doing so, they contribute to the network's security and earn a share of the rewards earned by the pool. The rewards are distributed proportionally based on the amount of ADA delegated.
2. Slashing Mechanism:
 - To prevent malicious behavior, Cardano employs a slashing mechanism. Validators who act dishonestly, fail to validate transactions properly, or produce incorrect blocks face penalties that involve the slashing of a portion of their staked ADA.
 - This provides strong economic incentives for validators to act honestly and ensures the network's integrity and security.
3. Delegation and Pool Operation:
 - Staking pools can charge operation fees (a margin on rewards) to maintain their infrastructure. This includes fixed costs set by pool operators. Delegators earn rewards after pool fees are deducted, providing a balanced incentive for both operators and delegators to participate actively.
 - Rewards are distributed at the end of each epoch, where staking pool performance and participation determine the distribution of ADA rewards to all stakeholders.

Applicable Fees:

1. Transaction Fees:

- Transaction fees on Cardano are paid in ADA and are generally low. They are calculated based on the size of the transaction and the network's current demand. These fees are paid to validators for including transactions in new blocks.
- The fee formula is: $a + b \times \text{size}$, where a is a constant (typically 0.155381 ADA), b is a coefficient related to the transaction size (0.000043946 ADA/byte), and size refers to the transaction size in bytes. This ensures that the fee adapts based on network load and the size of each transaction.

2. Staking Pool Fees:

- Staking pool operators charge operational costs and a margin fee, which covers the cost of running and maintaining the staking pool. These fees vary between pools but ensure that operators can continue to provide their services while offering rewards to delegators.
- After the operator's fee, the remaining rewards are distributed among the delegators based on the size of their stake.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is

available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



MultiversX EGLD

EGLD | H1V5PHW7P

Quantitative information

Quantitative sustainability indicators for MultiversX EGLD

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	MultiversX EGLD	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	716130.62809	kWh/a
S.10 Renewable energy consumption	34.4781510744	%
S.11 Energy intensity	0.00033	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	295.04298	tCO ₂ e
S.14 GHG intensity	0.00013	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

MultiversX EGLD is present on the following networks: Binance Smart Chain, Multiversx.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

MultiversX employs a consensus model called Secure Proof of Stake (SPoS), which integrates elements of Proof of Stake (PoS) with a rapid, randomized validator selection process. SPoS enables efficient and scalable consensus with high throughput and low latency.

Core Components:

1. Secure Proof of Stake (SPoS):
 - Randomized Validator Selection: Validators are selected in under 100 milliseconds based on their stake, with a quick rotation to maintain efficiency and prevent centralization.
 - Validator and Observer Nodes: Validator nodes process transactions and produce blocks, while Observer nodes are read-only, providing data access and network monitoring.
2. Adaptive State Sharding:
 - Parallel Transaction Processing: Adaptive State Sharding splits the network into shards, allowing for simultaneous transaction processing across multiple shards, which enhances scalability and network performance.
3. Meta Chain Coordination:
 - Cross-Shard Finalization: The Meta Chain manages cross-shard transactions, finalizing blocks and ensuring data consistency between shards.

S.5 Incentive Mechanisms and Applicable Fees

MultiversX EGLD is present on the following networks: Binance Smart Chain, Multiversx.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

MultiversX incentivizes network participation through staking rewards and transaction fees, supporting network security and performance.

Incentive Mechanisms:

Staking Rewards for Validators and Delegators:

- Validator Rewards: Validators earn EGLD tokens for processing transactions and producing blocks.
- Delegation Rewards: EGLD holders can delegate their tokens to validators to receive a portion of the staking rewards without managing a node.

Applicable Fees:

1. Transaction Fees:

Fee Structure: Fees are paid in EGLD and vary based on transaction complexity and size, covering smart contract execution, asset transfers, and other network interactions.

2. Delegation Opportunities:

Passive Staking for EGLD Holders: EGLD holders who delegate their tokens share in staking rewards, supporting network security and earning passive income.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used

which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Polkadot DOT

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Polkadot DOT	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	642546.00000	kWh/a
S.10 Renewable energy consumption	39.0062350679	%
S.11 Energy intensity	0.00004	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	190.07953	tCO ₂ e
S.14 GHG intensity	0.00001	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Polkadot DOT is present on the following networks: Astar, Polkadot, Statemint.

Astar uses a hybrid consensus mechanism that combines Proof of Stake (PoS) and Delegated Proof of Stake (DPoS), with the added feature of Sharded Multichain capabilities. The primary goal is to provide a scalable, interoperable, and decentralized platform for building decentralized applications (dApps), which can run on multiple blockchains in parallel.

Key Features of Astar's Consensus Mechanism:

1. Proof of Stake (PoS): In Astar, validators participate by staking ASTR tokens, the native currency of the network. The more tokens staked, the higher the chances of being selected as a validator. Validators are responsible for validating transactions and securing the network. Validators receive block rewards for their efforts, which are paid in ASTR tokens.
2. Delegated Proof of Stake (DPoS): Astar incorporates DPoS to allow ASTR token holders to vote for validators. Token holders delegate their voting power to trusted validators, who then produce

blocks and validate transactions. This ensures greater decentralization by allowing the community to have a direct say in who validates the network. Delegators receive a share of the block rewards earned by their selected validators.

3. Sharded Multichain: Astar's consensus mechanism allows for multichain execution via Parachains in the Polkadot ecosystem, enabling Astar to process multiple parallel chains and increase scalability. This sharding mechanism ensures that Astar can scale effectively, maintaining high throughput while decentralizing the network.
4. Finality: Astar leverages Polkadot's GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) finality gadget for fast and deterministic finality. Once a block is finalized, it is irreversible, ensuring the integrity and security of transactions.

Polkadot, a heterogeneous multi-chain framework designed to enable different blockchains to interoperate, uses a sophisticated consensus mechanism known as Nominated Proof-of-Stake (NPoS). This mechanism combines elements of Proof-of-Stake (PoS) and a layered consensus model involving multiple roles and stages.

Core Components:

1. Validators: Validators are responsible for producing new blocks and finalizing the relay chain, Polkadot's main chain. They stake DOT tokens and validate transactions, ensuring the security and integrity of the network.
2. Nominators: Nominators delegate their stake to trusted validators, choosing which validators they believe will act honestly and effectively. They share in the rewards and penalties of the validators they nominate.
3. Collators: Collators maintain parachains (individual blockchains that connect to the Polkadot relay chain) by collecting transactions from users and producing state transition proofs for validators.
4. Fishermen: Fishermen monitor the network for malicious activity. They report bad behavior to the validators to help maintain network security.

Consensus Process: Polkadot's consensus mechanism operates through a combination of two key protocols: GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) and BABE (Blind Assignment for Blockchain Extension).

1. BABE (Block Production): BABE is the block production mechanism. It operates similarly to a lottery, where validators are pseudo-randomly assigned slots to produce blocks based on their stake. Each validator signs the blocks they produce, which are then propagated through the network.
2. GRANDPA (Finality): GRANDPA is the finality gadget that provides a higher level of security by finalizing blocks after they are produced. Unlike traditional blockchains where blocks are considered final after a number of confirmations, GRANDPA allows for asynchronous finality. Validators vote on chains, and once a supermajority agrees, the chain is finalized instantly.

Detailed Steps:

1. Block Production (BABE):
 - Slot Allocation: Validators are selected to produce blocks in specific time slots.
 - Block Proposal: The selected validator for a slot proposes a block, including new transactions and state changes.
2. Block Propagation and Preliminary Consensus: Proposed blocks are propagated across the network, where other validators verify the correctness of the transactions and state transitions.
3. Finalization (GRANDPA):
 - Voting on Blocks: Validators vote on the chains they believe to be the correct history.

- Supermajority Agreement: Once more than two-thirds of validators agree on a block, it is finalized.
 - Instant Finality: This finality process ensures that once a block is finalized, it is irreversible and becomes part of the canonical chain.
4. Rewards and Penalties: Validators and nominators earn rewards for participating in the consensus process and maintaining network security. Misbehavior, such as producing invalid blocks or being offline, results in penalties, including slashing of staked tokens.

Statemint is a common-good parachain on the Polkadot and Kusama networks, designed to handle asset management and issuance efficiently while leveraging Polkadot's shared security model.

Core Components:

- Relay Chain Integration: Statemint inherits its consensus mechanism from the Polkadot Relay Chain, which operates on a Nominated Proof of Stake (NPoS) model. This model ensures robust security and decentralization by relying on validators and nominators.
- Shared Security: As a parachain, Statemint utilizes the Polkadot Relay Chain's validators for block validation, ensuring high security and interoperability without requiring independent validators.
- Collator Nodes: Statemint employs collator nodes to aggregate transactions into blocks and submit them to the Relay Chain validators for finalization. Collators do not participate in consensus directly but play a key role in transaction processing.
- Immediate Finality: The underlying Polkadot consensus mechanism ensures instant finality using the GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) protocol, which provides secure and efficient transaction confirmation.

S.5 Incentive Mechanisms and Applicable Fees

Polkadot DOT is present on the following networks: Astar, Polkadot, Statemint.

Astar incentivizes network participation through block rewards, transaction fees, and staking rewards while encouraging governance via delegated voting.

Incentive Mechanism:

1. Staking Rewards: Validators earn ASTR tokens for validating transactions and securing the network. The more tokens staked, the higher the chances of validating blocks.
2. Delegated Proof of Stake (DPoS): ASTR token holders can delegate their tokens to validators, sharing in the rewards based on the performance of their chosen validators.
3. Cross-Chain dApp Rewards: Developers deploying dApps on Astar earn rewards for using the network's multichain capabilities.
4. Governance Participation: ASTR token holders participate in on-chain governance to vote on proposals and protocol changes.

Applicable Fees:

1. Transaction Fees: Users pay fees in ASTR tokens for transactions. These are collected by validators who process the transactions.
2. dApp Execution Fees: Developers pay for smart contract execution based on resource demands.
3. Cross-Chain Fees: Additional fees apply for asset transfers and interactions between different blockchain networks.
4. Parachain Slot Fees: Astar incurs fees for its parachain slot on the Polkadot network to ensure interoperability.

Polkadot uses a consensus mechanism called Nominated Proof-of-Stake (NPoS), which involves a combination of validators, nominators, and a unique layered consensus process to secure the network:

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are responsible for producing new blocks and finalizing the relay chain. They are incentivized with staking rewards, which are distributed in proportion to their stake and their performance in the consensus process. Validators earn these rewards for maintaining uptime and correctly validating transactions.
- Commission: Validators can set a commission rate that they charge on the rewards earned by their nominators. This incentivizes them to perform well to attract more nominators.

2. Nominators:

- Delegation: Nominators stake their tokens by delegating them to trusted validators. They share in the rewards earned by the validators they support. This mechanism incentivizes nominators to carefully choose reliable validators.
- Rewards Distribution: The rewards are distributed among validators and their nominators based on the amount of stake contributed by each party. This ensures that both parties are incentivized to maintain the network's security.

3. Collators:

Parachain Maintenance: Collators maintain parachains by collecting transactions and producing state transition proofs for validators. They are incentivized through rewards for their role in keeping the parachain operational and secure.

4. Fishermen:

Monitoring: Fishermen are responsible for monitoring the network for malicious activities. They are rewarded for identifying and reporting malicious behavior, which helps maintain the network's security.

5. Economic Penalties:

- Slashing: Validators and nominators face penalties in the form of slashing if they engage in malicious activities such as double-signing or being offline for extended periods. Slashing results in the loss of a portion of their staked tokens, which serves as a strong deterrent against bad behavior.
- Unbonding Period: To withdraw staked tokens, participants must go through an unbonding period during which their tokens are still at risk of being slashed. This ensures continued network security even when validators or nominators decide to exit.

Fees on the Polkadot Blockchain:

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Polkadot are dynamic, adjusting based on network demand and the complexity of the transaction. This model ensures that fees remain fair and proportional to the network's usage.
- Fee Burn: A portion of the transaction fees is burned (permanently removed from circulation), which helps to control inflation and can potentially increase the value of the remaining tokens.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Polkadot are based on the computational resources required. This encourages efficient use of network resources.

3. Parachain Slot Auction Fees:

Bidding for Slots: Projects that want to secure a parachain slot must participate in a slot auction. They bid DOT tokens, and the highest bidders win the right to operate a parachain for a

specified period. This process ensures that only serious projects with significant backing can secure parachain slots, contributing to the network's overall quality and security.

Statemint is a common-good parachain on the Polkadot and Kusama networks, designed to enable efficient asset management while benefiting from Polkadot's shared security and governance model.

Incentive Mechanisms:

- Relay Chain Validators: Validators securing the Polkadot Relay Chain are indirectly incentivized through block rewards and transaction fees collected across all parachains, including Statemint. This ensures the stability and security of the network without requiring Statemint-specific rewards.
- Collator Compensation: Collator nodes aggregate transactions and produce blocks for Statemint. They may be compensated through external arrangements, such as subsidies or user-driven incentives, depending on governance decisions and usage patterns.
- Governance Participation: Polkadot (DOT) and Kusama (KSM) token holders influence Statemint's operations, such as fee adjustments and protocol upgrades, through on-chain governance mechanisms.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in the native tokens of the Relay Chain, DOT for Polkadot or KSM for Kusama. These fees are distributed to Relay Chain validators to support the network's maintenance.
- Asset Creation and Transfer Fees: Fees apply for creating new assets and transferring them on the Statemint chain. These fees help prevent spam and ensure efficient use of network resources.
- Governance-Defined Fee Adjustments: The Statemint parachain's fees can be adjusted through governance proposals, enabling the community to adapt costs to network conditions.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.

**Flow**

FLOW | 6T49BCSXZ

Quantitative information

Quantitative sustainability indicators for Flow

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Flow	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	526695.00000	kWh/a
S.10 Renewable energy consumption	37.9124101186	%
S.11 Energy intensity	0.00029	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO ₂ e
S.13 Scope 2 DLT GHG emission - Purchased	175.29098	tCO ₂ e
S.14 GHG intensity	0.00010	kgCO ₂ e

Qualitative information

S.4 Consensus Mechanism

Flow employs a Proof of Stake (PoS) model with a multi-role node architecture and the HotStuff Byzantine Fault Tolerant (BFT) protocol to achieve high throughput, scalability, and fast finality.

Core Components of Flow's Consensus:

1. Proof of Stake with Multi-Role Architecture:

Specialized Node Roles: Flow's PoS model features a multi-node architecture where node roles are divided among different types of specialized nodes, each responsible for specific tasks. This separation enhances scalability by allowing nodes to focus on particular operations, leading to efficient transaction processing and high throughput.

2. HotStuff Consensus Algorithm:

- Optimized for High Throughput and Fast Finality: Flow utilizes an optimized version of the HotStuff consensus protocol, which is designed to support high-speed, low-latency transactions essential for Flow's performance-oriented blockchain.

- BFT Compliance: HotStuff is a BFT protocol, allowing it to tolerate up to one-third of nodes acting maliciously without compromising the network's security. This resilience ensures the network remains secure and functional, even with potential faults or dishonest nodes.
3. Leader-Based Block Proposal:
- Leader and Replica Nodes: HotStuff operates with a leader-based approach where a designated leader node proposes new blocks, and other nodes (replicas) validate these blocks. This method simplifies the consensus process, reducing complexity and improving efficiency.
 - Leader Rotation Mechanism: To prevent centralization and enhance fault tolerance, HotStuff incorporates a leader rotation system, replacing the leader if it becomes unresponsive or acts maliciously. This rotation ensures continuous network reliability and minimizes downtime.

S.5 Incentive Mechanisms and Applicable Fees

Flow's incentive model rewards validator nodes, supports ecosystem growth, and maintains affordable fees for developers and users.

Incentive Mechanisms:

1. Staking Rewards for Specialized Nodes:
Role-Based Rewards: Validators earn Flow tokens according to their specific roles and contributions within the multi-node architecture, aligning rewards with each node's responsibilities to encourage balanced and effective network participation.
2. Transaction Fees:
Stable and Consumer-Friendly Fees: Flow's fee structure is designed for predictability, keeping transaction costs stable for both developers and users. Fees are based on transaction complexity and provide an ongoing income stream for validators.
3. Misbehavior Penalties:
Penalties for Downtime or Malicious Behavior: To maintain network stability, Flow imposes penalties on validators for misbehavior or downtime. This incentivizes high-quality validator participation and ensures consistent performance.
4. Ecosystem and Developer Support:
Dedicated Portion of Fees and Rewards: A portion of Flow's transaction fees and rewards is allocated to developer initiatives, ecosystem growth, and community engagement. This investment fosters innovation, supports long-term network health, and aligns incentives for ecosystem development.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Share of electricity generated by renewables - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/share-electricity-renewables>.

S.16 Key GHG sources and methodologies

To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction.

Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. "Carbon intensity of electricity generation - Ember and Energy Institute" [dataset]. Ember, "Yearly Electricity Data Europe"; Ember, "Yearly Electricity Data"; Energy Institute, "Statistical Review of World Energy" [original data]. Retrieved from <https://ourworldindata.org/grapher/carbon-intensity-electricity> Licenced under CC BY 4.0.



Quantitative information

Quantitative sustainability indicators for Kusama

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Kusama	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	474616.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Kusama is a scalable, interoperable blockchain platform built using a Nominated Proof of Stake (NPoS) consensus mechanism. It is a canary network for Polkadot, allowing developers to experiment and deploy new features before they are added to Polkadot. Kusama's NPoS mechanism ensures high security, decentralized control, and rapid block finality.

Key Features of Kusama's Consensus Mechanism:

1. Nominated Proof of Stake (NPoS):

- Validators and Nominators: Kusama's consensus mechanism relies on validators and nominators. Validators are responsible for producing blocks and validating transactions, while nominators select trustworthy validators by staking KSM (Kusama's native token).
- Staking and Security: Validators must stake KSM tokens to participate in consensus, and nominators back validators with their KSM tokens. The more KSM tokens staked by both validators and nominators, the more secure the network is.
- Validator Rotation: Validators are selected based on the amount of KSM staked, with a fixed number of validators chosen to participate in consensus at any given time. The network periodically rotates validators to ensure fairness and prevent centralization.
- Finality and Security: NPoS ensures secure and fast finality. Once a block is validated, it becomes part of the immutable blockchain, meaning it cannot be reverted or reorganized.

2. Governance:

- On-Chain Governance: Kusama features a robust on-chain governance system that allows KSM holders to vote on important protocol decisions, including changes to the consensus mechanism, network upgrades, and other governance parameters.

- Democratic Decision-Making: All token holders have voting power proportional to the amount of KSM they hold and are willing to lock up. This ensures decentralized control over network upgrades and parameters.
- Governance Proposals: Kusama's governance is open and transparent, with proposals submitted by the community, allowing participants to shape the direction of the network.

3. Parachain Auctions:

- Shared Security: Kusama supports parachains, which are individual blockchains that benefit from Kusama's shared security model. Parachain slots are won through auctions where participants bid with KSM tokens, ensuring that only the most committed participants secure a parachain slot.
- Scalability: This multi-chain model enables Kusama to scale horizontally, allowing for the connection of numerous independent blockchains, which can interoperate within the Kusama ecosystem.

4. Fast Finality and High Throughput:

- Speed: Kusama's consensus mechanism allows for rapid block finality and high throughput, supporting thousands of transactions per second.
- Low Latency: The system's low-latency design ensures quick confirmation times, enabling Kusama to handle high transaction volumes efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Kusama's incentive mechanisms ensure active participation in securing and maintaining the network while its fee structure supports efficient operation and scalability of the ecosystem.

Incentive Mechanism:

1. Validator Rewards:

- Block Rewards: Validators in Kusama earn rewards for successfully producing blocks and validating transactions. These rewards are given in KSM tokens and are distributed proportionally to the amount of KSM staked by validators and nominators.
- Transaction Fees: In addition to block rewards, validators also earn transaction fees for validating and including transactions in blocks. These fees are paid by users who want their transactions included in the next block.

2. Nominator Rewards:

- Staking Rewards: Nominators, who delegate their KSM tokens to trusted validators, share in the rewards earned by the validators they support. Nominators receive a proportion of both the block rewards and transaction fees, incentivizing them to choose high-performing validators.
- Reward Distribution: The rewards earned by nominators are distributed based on the amount of KSM they have staked with a validator. More KSM staked means higher rewards for the nominator.

3. Parachain Auction Participation:

- Slot Auctions: Kusama's parachain slots are won through an auction process, where participants bid using KSM tokens. This incentivizes KSM holders to lock up their tokens in parachain auctions to secure valuable parachain slots for their projects.
- Crowdloan Incentives: Projects bidding for parachain slots can incentivize users to participate in crowdloans, where users lend their KSM tokens to the project in exchange for potential rewards once the project secures a parachain slot.

4. Governance Participation:

Voting Rewards: KSM token holders who participate in governance decisions, such as voting on proposals and upgrades, are incentivized with the ability to influence the future of the network. Although there are no direct financial rewards for voting, active participation in governance ensures the sustainability and growth of the ecosystem.

Applicable Fees:

1. Transaction Fees:

- Fee Structure: Kusama users pay transaction fees for processing their transactions on the network. These fees are generally low and are determined by the transaction's size and network demand. Transaction fees are paid in KSM tokens and are used to compensate validators for their work.
- Dynamic Fee Adjustment: The fee rate can adjust based on the current network congestion. During periods of high demand, transaction fees can increase, prioritizing faster processing of transactions with higher fees.

2. Parachain Slot Auction Fees:

Bidding Fees: Projects wishing to secure a parachain slot must participate in an auction and bid KSM tokens to win the slot. The auction fees paid to win a parachain slot are burned or redistributed within the Kusama ecosystem to support network growth and maintenance.

3. Storage Fees:

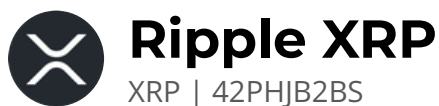
Data Storage: Kusama charges fees for storing data on the network, including smart contracts and parachain data. These fees are required to ensure efficient data usage and prevent unnecessary resource consumption. Fees for storage are also paid in KSM tokens.

4. Governance Fees:

Proposal and Voting Costs: Participants in governance, such as those submitting proposals or voting on network upgrades, may be required to pay minimal fees, ensuring the governance process is secure and spam-free. These costs help prevent abuse of the voting system and are intended to maintain an orderly governance environment.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Ripple XRP

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Ripple XRP	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	456266.86581	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ripple XRP is present on the following networks: Binance Smart Chain, Klaytn, Ripple.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Klaytn employs a modified Istanbul Byzantine Fault Tolerance (IBFT) consensus algorithm, a variant of Proof of Authority (PoA), enabling high performance and immediate transaction finality.

Core Components of Klaytn's Consensus:

1. **Modified IBFT Algorithm:**
Immediate Transaction Finality: Klaytn's IBFT algorithm ensures that once a block is validated, it is immediately final and cannot be reversed. This guarantees that transactions are quickly settled, providing a secure and efficient user experience.
2. **Klaytn Governance Council:**
 - **Council-Driven Governance:** The Klaytn network is governed by the Klaytn Governance Council, a consortium of global organizations responsible for selecting and maintaining Consensus Nodes (CNs). This council-based governance model balances decentralization with performance and ensures transparency in decision-making.
 - **Two-Thirds Majority for Finalization:** For a block to be finalized, it must receive signatures from more than two-thirds of the council members, ensuring broad consensus and network security.
3. **Three-Tiered Node Architecture:**
 - **Consensus Nodes (CNs):** The selected validators responsible for producing and validating blocks. CNs are at the core of the network's security and stability.
 - **Proxy Nodes (PNs):** Act as intermediaries, relaying data between CNs and the broader network, which helps distribute network traffic and improve accessibility.
 - **Endpoint Nodes (ENs):** Interface directly with end-users, facilitating transactions, executing smart contracts, and serving as user access points to the Klaytn network.

The Ripple blockchain, specifically the XRP Ledger (XRPL), uses a consensus mechanism known as the Ripple Protocol Consensus Algorithm (RPCA). It differs from Proof of Work (PoW) and Proof of Stake (PoS) as it doesn't rely on mining or staking but instead leverages trusted validators in a Federated Byzantine Agreement (FBA) model.

Core Concepts:

1. **Validators and Unique Node Lists (UNL):** Validators are trusted nodes in the network that validate transactions and propose new ledger updates. Each node maintains a list of trusted validators known as its Unique Node List (UNL). Consensus is achieved when 80% of the validators in a node's UNL agree on the validity of a transaction or block. This ensures high levels of security and decentralization.
2. **Transaction Ordering and Validation:** Transactions are broadcast to validators, and once 80% of the validators agree, the transaction is considered confirmed. Each ledger in the XRPL contains transaction data, and validators ensure the validity and proper ordering of these transactions.

Consensus Process:

1. **Proposal Phase:** Validators propose new transactions to be added to the ledger.
2. **Validation Phase:** Validators vote on proposed transactions by comparing them to their UNL. Consensus is achieved when 80% of validators agree.
3. **Finalization:** Once consensus is reached, the transactions are written into the new ledger, making them irreversible and final.

S.5 Incentive Mechanisms and Applicable Fees

Ripple XRP is present on the following networks: Binance Smart Chain, Klaytn, Ripple.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - **Shared Rewards:** Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. **Candidates:**

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. **Economic Security:**
 - **Slashing:** Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - **Opportunity Cost:** Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Klaytn's incentive structure includes block rewards and transaction fees distributed to Consensus Nodes (CNs) and various network funds, fostering network security, sustainability, and community development.

Incentive Mechanisms:

1. Rewards for Consensus Nodes (CNs):

- Fixed Block Rewards: CNs earn fixed rewards in KLAY tokens for validating and producing blocks. This predictable income incentivizes CNs to maintain active participation and secure the network.
- Transaction Fees: Users pay transaction fees in KLAY tokens, which are collected by the network and distributed among the CNs as additional rewards, further supporting network security and stability.

2. Block Reward Distribution: Governance Council (GC) Reward:

- GC Block Proposer Reward: 10% of the block reward goes to the specific CN that proposed the block, incentivizing continuous active participation.
- GC Staking Award: 40% of the block reward is distributed among all Governance Council members who stake KLAY, promoting network security by rewarding staked tokens.
- Klaytn Community Fund (KCF): 30% of each block reward is allocated to the KCF to support community development, dApp creation, and overall ecosystem growth.
- Klaytn Foundation Fund (KFF): 20% of the block reward goes to the KFF, providing resources for long-term network sustainability and future development initiatives.

3. Transaction Fees:

- User Fees for Network Interaction: Users pay fees in KLAY based on gas usage and gas price for transactions. These fees are then distributed to CNs, incentivizing efficient transaction processing and active participation.

Applicable Fees:

Transaction Fees: Transaction fees on Klaytn are paid in KLAY and calculated based on gas consumption. These fees support network maintenance by compensating validators and fostering economic sustainability.

The Ripple XRP blockchain uses a unique incentive structure that differs from traditional Proof of Work (PoW) or Proof of Stake (PoS) systems, focusing on its Ripple Protocol Consensus Algorithm (RPCA).

Incentive Mechanisms to Secure Transactions:

1. Validators: Validators on the Ripple network are not directly compensated with rewards like in PoW/PoS models. Instead, they are incentivized by the utility and stability of the network, particularly financial institutions that benefit from Ripple's efficiency in cross-border payments.
2. No Mining: Since Ripple does not use mining, it eliminates the need for energy-intensive computations, contributing to fast transaction speeds and scalability.

Fees on the Ripple XRP Blockchain:

1. Transaction Fees: Ripple charges minimal transaction fees (typically fractions of an XRP, known as "drops") for each transaction. The purpose of these fees is to prevent network spam and overload.
2. Burn Mechanism: A portion of each transaction fee is burned, meaning it's permanently removed from circulation. This reduces the overall supply of XRP over time, contributing to potential long-term value stability.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, klaytn is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary

principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Arweave

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Arweave	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	437562.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Arweave is present on the following networks: Arweave, Ethereum.

Arweave employs a unique Proof of Access (PoA) consensus mechanism, which integrates a requirement for miners to provide cryptographic proof of access to historical data, known as a "recall block." This ensures that miners contribute to both data storage and network security by storing and verifying historical data.

Core Components:

1. Proof of Access (PoA):

- Recall Block Verification: During mining, miners must retrieve and validate a randomly selected "recall block" from Arweave's data history, proving they retain access to stored data. This process secures the network while emphasizing long-term data availability.
- Enhanced Proof of Work (PoW): PoA builds upon traditional PoW by requiring miners to demonstrate access to previously stored data, adding a storage-focused layer to network security and incentivizing distributed data retention.

2. Data-Centric Mining Incentives:

Distributed Storage: The PoA design encourages miners to store a broad history of blocks, as possessing more recall blocks enhances their probability of successfully mining new blocks and earning rewards.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is

randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Arweave is present on the following networks: Arweave, Ethereum.

Arweave's economic model incentivizes miners to contribute to data storage through upfront storage fees and ongoing block rewards, supporting the network's mission of providing permanent and accessible data storage.

Incentive Mechanisms:

1. One-Time Storage Fees:

Permanent Data Storage: Users pay a one-time, upfront fee in AR tokens, calculated based on data size and projected storage costs. This fee funds indefinite data storage on the network.

Endowment Pool: A portion of each storage fee is allocated to an endowment pool, covering future storage costs as technology advances, ensuring sustainable, permanent data storage.

2. Mining Rewards:

Block Rewards: Miners earn AR tokens for successfully mining blocks, incentivizing them to store historical data and maintain network integrity.

Applicable Fees: Storage fees in AR are set by data size and projected long-term costs, covering the initial and future costs of data permanence.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The

energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Algorand

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Algorand	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	420961.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Algorand blockchain utilizes a consensus mechanism termed Pure Proof-of-Stake (PPoS). Consensus, in this context, describes the method by which blocks are selected and appended to the blockchain. Algorand employs a verifiable random function (VRF) to select leaders who propose blocks for each round.

Upon block proposal, a pseudorandomly selected committee of voters is chosen to evaluate the proposal. If a supermajority of these votes are from honest participants, the block is certified. What makes this algorithm a Pure Proof of Stake is that users are chosen for committees based on the number of algos in their accounts. This system leverages random committee selection to maintain high performance and inclusivity within the network.

The consensus process involves three stages:

1. Propose: A leader proposes a new block.
2. Soft Vote: A committee of voters assesses the proposed block.
3. Certify Vote: Another committee certifies the block if it meets the required honesty threshold.

S.5 Incentive Mechanisms and Applicable Fees

Algorand's consensus mechanism, Pure Proof-of-Stake (PPoS), relies on the participation of token holders (stakers) to ensure the network's security and integrity:

1. Participation Rewards:
 - Staking Rewards: Users who participate in the consensus protocol by staking their ALGO tokens earn rewards. These rewards are distributed periodically and are proportional to the amount of ALGO staked. This incentivizes users to hold and stake their tokens, contributing to network security and stability.
 - Node Participation Rewards: Validators, also known as participation nodes, are responsible for proposing and voting on blocks. These nodes receive additional rewards for their active role in maintaining the network.
2. Transaction Fees:
 - Flat Fee Model: Algorand employs a flat fee model for transactions, which ensures predictability and simplicity. The standard transaction fee on Algorand is very low (around 0.001 ALGO per transaction). These fees are paid by users to have their transactions processed and included in a block.
 - Fee Redistribution: Collected transaction fees are redistributed to participants in the network. This includes stakers and validators, further incentivizing their participation and ensuring continuous network operation.
3. Economic Security:

Token Locking: To participate in the consensus mechanism, users must lock up their ALGO tokens. This economic stake acts as a security deposit that can be slashed (forfeited) if the participant acts maliciously. The potential loss of staked tokens discourages dishonest behavior and helps maintain network integrity.

Fees on the Algorand Blockchain

1. Transaction Fees:

Algorand uses a flat transaction fee model. The current standard fee is 0.001 ALGO per transaction. This fee is minimal compared to other blockchain networks, ensuring affordability and accessibility.
2. Smart Contract Execution Fees:

Fees for executing smart contracts on Algorand are also designed to be low. These fees are based on the computational resources required to execute the contract, ensuring that users are only charged for the actual resources they consume.
3. Asset Creation Fees:

Creating new assets (tokens) on the Algorand blockchain involves a small fee. This fee is necessary to prevent spam and ensure that only genuine assets are created and maintained on the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we

update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Sui

SUI | 64RFW3D8P

Quantitative information

Quantitative sustainability indicators for Sui

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Sui	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	394725.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:

- The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
- Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
- Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:

Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.

3. Optimistic Execution:

Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:

The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5. Fault Tolerance:

The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:

Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.

2. Slashing:

Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.

3. Delegation:

Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:

Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.

2. Dynamic Fee Model:

The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for USDC

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	USDC	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	355963.97913	kWh/a

Qualitative information

S.4 Consensus Mechanism

USDC is present on the following networks: Algorand, Aptos Coin, Arbitrum, Avalanche, Base, Celo, Ethereum, Flow, Hedera Hbar, Hyperliquid, Linea, Near Protocol, Optimism, Plume, Polygon, Ripple, Sei, Solana, Sonic, Statemint, Stellar, Sui, Tron, Xdc Network, Zksync.

The Algorand blockchain utilizes a consensus mechanism termed Pure Proof-of-Stake (PPoS). Consensus, in this context, describes the method by which blocks are selected and appended to the blockchain. Algorand employs a verifiable random function (VRF) to select leaders who propose blocks for each round.

Upon block proposal, a pseudorandomly selected committee of voters is chosen to evaluate the proposal. If a supermajority of these votes are from honest participants, the block is certified. What makes this algorithm a Pure Proof of Stake is that users are chosen for committees based on the number of algos in their accounts. This system leverages random committee selection to maintain high performance and inclusivity within the network.

The consensus process involves three stages:

1. Propose: A leader proposes a new block.
2. Soft Vote: A committee of voters assesses the proposed block.
3. Certify Vote: Another committee certifies the block if it meets the required honesty threshold.

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:
 - Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
 - Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
 - Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
 - Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.
2. Snowflake Protocol:
 - Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.

- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Celo uses a Proof of Stake (PoS) consensus model, which supports a decentralized, community-driven approach to governance and network security.

Core Components of Celo's Consensus:

1. Proof of Stake (PoS):

Validator Role: Validators are responsible for creating new blocks, validating transactions, and maintaining the security and integrity of the network. Validators are selected based on the amount of CELO tokens they hold and stake, incentivizing honest participation and network reliability.

2. Decentralized Governance:

Community Voting: Governance on Celo is decentralized, allowing CELO token holders to vote on proposals and changes to the network. This community-driven approach ensures that token holders have a say in the network's development and strategic direction.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Flow employs a Proof of Stake (PoS) model with a multi-role node architecture and the HotStuff Byzantine Fault Tolerant (BFT) protocol to achieve high throughput, scalability, and fast finality.

Core Components of Flow's Consensus:

1. Proof of Stake with Multi-Role Architecture:

Specialized Node Roles: Flow's PoS model features a multi-node architecture where node roles are divided among different types of specialized nodes, each responsible for specific tasks. This

separation enhances scalability by allowing nodes to focus on particular operations, leading to efficient transaction processing and high throughput.

2. HotStuff Consensus Algorithm:

- Optimized for High Throughput and Fast Finality: Flow utilizes an optimized version of the HotStuff consensus protocol, which is designed to support high-speed, low-latency transactions essential for Flow's performance-oriented blockchain.
- BFT Compliance: HotStuff is a BFT protocol, allowing it to tolerate up to one-third of nodes acting maliciously without compromising the network's security. This resilience ensures the network remains secure and functional, even with potential faults or dishonest nodes.

3. Leader-Based Block Proposal:

- Leader and Replica Nodes: HotStuff operates with a leader-based approach where a designated leader node proposes new blocks, and other nodes (replicas) validate these blocks. This method simplifies the consensus process, reducing complexity and improving efficiency.
- Leader Rotation Mechanism: To prevent centralization and enhance fault tolerance, HotStuff incorporates a leader rotation system, replacing the leader if it becomes unresponsive or acts maliciously. This rotation ensures continuous network reliability and minimizes downtime.

Hedera Hashgraph operates on a unique Hashgraph consensus algorithm, a directed acyclic graph (DAG) system that diverges from traditional blockchain technology. It uses Asynchronous Byzantine Fault Tolerance (aBFT) to secure the network.

Core Components:

1. Hashgraph Consensus and aBFT:

Hedera Hashgraph's consensus mechanism achieves aBFT, which allows the network to tolerate malicious nodes without compromising security, ensuring high levels of fault tolerance and stability.

2. Gossip about Gossip Protocol:

The network employs a "Gossip about Gossip" protocol, where nodes share transaction information along with details of previous gossip events. This process allows each node to rapidly learn the entire network state, enhancing communication efficiency and minimizing latency.

3. Virtual Voting:

Hedera does not rely on traditional miners or stakers. Instead, it uses virtual voting, where nodes reach consensus by analyzing the gossip history and simulating votes based on the order and frequency of transactions received. Virtual voting eliminates the need for actual voting messages, reducing network congestion and speeding up consensus.

4. Deterministic Finality:

Once consensus is reached, transactions achieve deterministic finality instantly, making them irreversible and confirmed within seconds. This attribute is ideal for applications needing quick and irreversible transaction confirmations.

5. Staking for Network Security:

Hedera incorporates staking to bolster network security. HBAR holders can stake their tokens to support validator nodes, contributing to the network's resilience and encouraging long-term engagement in consensus operations.

Hyperliquid is a decentralized perpetual exchange (DEX) built on its proprietary Layer 1 blockchain, Hyperliquid L1. At the core of its architecture is the HyperBFT consensus mechanism, inspired by the Hotstuff protocol, designed to meet the demands of high-frequency trading while maintaining security and consistency across the ecosystem.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Plume is described as relying on an architecture aligned with optimistic rollup technology within the Arbitrum Orbit framework. Under this design, transaction ordering is typically performed by a sequencer, while settlement and finality are achieved via anchoring to Ethereum. Economic incentives and protocol rules are generally designed to encourage timely submission of fraud proofs (where applicable) within predefined challenge windows. The precise security guarantees and finality characteristics depend on the rollup configuration, the sequencer setup, and Ethereum's underlying security assumptions.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

The Ripple blockchain, specifically the XRP Ledger (XRPL), uses a consensus mechanism known as the Ripple Protocol Consensus Algorithm (RPCA). It differs from Proof of Work (PoW) and Proof of Stake (PoS) as it doesn't rely on mining or staking but instead leverages trusted validators in a Federated Byzantine Agreement (FBA) model.

Core Concepts:

1. Validators and Unique Node Lists (UNL): Validators are trusted nodes in the network that validate transactions and propose new ledger updates. Each node maintains a list of trusted validators

known as its Unique Node List (UNL). Consensus is achieved when 80% of the validators in a node's UNL agree on the validity of a transaction or block. This ensures high levels of security and decentralization.

2. Transaction Ordering and Validation: Transactions are broadcast to validators, and once 80% of the validators agree, the transaction is considered confirmed. Each ledger in the XRPL contains transaction data, and validators ensure the validity and proper ordering of these transactions.

Consensus Process:

1. Proposal Phase: Validators propose new transactions to be added to the ledger.
2. Validation Phase: Validators vote on proposed transactions by comparing them to their UNL. Consensus is achieved when 80% of validators agree.
3. Finalization: Once consensus is reached, the transactions are written into the new ledger, making them irreversible and final.

Sei leverages its Twin-Turbo consensus mechanism, integrating advanced transaction processing techniques with the reliability of Tendermint Core, to achieve high performance and security.

Core Components:

- Twin-Turbo Consensus:
 - Optimistic Block Processing: Validators process transactions optimistically, assuming their validity, reducing latency and increasing throughput.
 - Intelligent Block Propagation: Compressed block proposals containing transaction hashes enable validators to reconstruct blocks locally, expediting consensus.
 - Single Slot Finality: Ensures immediate block finality upon addition, eliminating the need for confirmations and minimizing the risk of chain reorganizations.
- Tendermint Core Integration:
 - Incorporates Byzantine Fault Tolerance (BFT) to maintain security and resilience, safeguarding the network against malicious actors.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

Sonic utilizes a Proof-of-Stake (PoS) consensus mechanism integrated with a Directed Acyclic Graph (DAG) architecture to enhance scalability and efficiency. Validators are required to stake the network's native \$S tokens, with a minimum of 500,000 \$S tokens needed to operate a validator node. This substantial staking requirement ensures that validators have a significant investment in the network's integrity.

Statemint is a common-good parachain on the Polkadot and Kusama networks, designed to handle asset management and issuance efficiently while leveraging Polkadot's shared security model.

Core Components:

- Relay Chain Integration: Statemint inherits its consensus mechanism from the Polkadot Relay Chain, which operates on a Nominated Proof of Stake (NPoS) model. This model ensures robust security and decentralization by relying on validators and nominators.
- Shared Security: As a parachain, Statemint utilizes the Polkadot Relay Chain's validators for block validation, ensuring high security and interoperability without requiring independent validators.
- Collator Nodes: Statemint employs collator nodes to aggregate transactions into blocks and submit them to the Relay Chain validators for finalization. Collators do not participate in consensus directly but play a key role in transaction processing.
- Immediate Finality: The underlying Polkadot consensus mechanism ensures instant finality using the GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) protocol, which provides secure and efficient transaction confirmation.

Stellar uses a unique consensus mechanism known as the Stellar Consensus Protocol (SCP).

Core Concepts:

1. Federated Byzantine Agreement (FBA):

- SCP is built on the principles of Federated Byzantine Agreement (FBA), which allows decentralized, leaderless consensus without the need for a closed system of trusted participants.
- Quorum Slices: Each node in the network selects a set of other nodes (quorum slice) that it trusts. Consensus is achieved when these slices overlap and collectively agree on the transaction state.

2. Nodes and Validators:

- Nodes: Nodes running the Stellar software participate in the network by validating transactions and maintaining the ledger.
- Validators: Nodes that are responsible for validating transactions and reaching consensus on the state of the ledger. Consensus Process

3. Transaction Validation:

Transactions are submitted to the network and nodes validate them based on predetermined rules, such as sufficient balances and valid signatures.

4. Nomination Phase:

- Nomination: Nodes nominate values (proposed transactions) that they believe should be included in the next ledger. Nodes communicate their nominations to their quorum slices.
- Agreement on Nominations: Nodes vote on the nominated values, and through a process of voting and federated agreement, a set of candidate values emerges. This phase continues until nodes agree on a single value or a set of values.

5. Ballot Protocol (Voting and Acceptance): Balloting:

- The agreed-upon values from the nomination phase are then put into ballots. Each ballot goes through multiple rounds of voting, where nodes vote to either accept or reject the proposed values.
- Federated Voting: Nodes exchange votes within their quorum slices, and if a value receives sufficient votes across overlapping slices, it moves to the next stage.
- Acceptance and Confirmation: If a value gathers enough votes through multiple stages (prepare, confirm, externalize), it is accepted and externalized as the next state of the ledger.

6. Ledger Update:

Once consensus is reached, the new transactions are recorded in the ledger. Nodes update their copies of the ledger to reflect the new state. Security and Economic Incentives

7. Trust and Quorum Slices:

Nodes are free to choose their own quorum slices, which provides flexibility and decentralization. The overlapping nature of quorum slices ensures that the network can reach consensus even if some nodes are faulty or malicious.

8. Stability and Security:

SCP ensures that the network can achieve consensus efficiently without relying on energy-intensive mining processes. This makes it environmentally friendly and suitable for high-throughput applications.

9. Incentive Mechanisms:

Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, the network incentivizes participation through the intrinsic value of maintaining a secure, efficient, and reliable payment network.

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:

- The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
- Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
- Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:

Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.

3. Optimistic Execution:

Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:

The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5. Fault Tolerance:

The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in

the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.

2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

XinFin Network operates on a modified Delegated Proof of Stake (XDPoS) model, XDPoS 2.0, which ensures scalability, security, and efficiency suitable for enterprise applications.

Core Components:

1. XDPoS 2.0 (Delegated Proof of Stake):

Masternode System: Validators, known as masternodes, are required to stake XDC tokens to participate in transaction validation and block production. Validators are selected based on both stake size and community votes, ensuring only reliable nodes secure the network.

2. Double Validation Feature:

- **Enhanced Security:** Each transaction is validated by two independent validators before it's finalized, reducing the risk of double-spending or malicious behavior and increasing network reliability.
- **Randomized Validator Rotation:** Validators are selected in a rotating and randomized manner, preventing any single validator from consistently producing blocks, which enhances decentralization and security.

zkSync operates as a Layer 2 scaling solution for Ethereum, leveraging zero-knowledge rollups (ZK-Rollups) to enable fast, cost-effective, and secure transactions. This consensus mechanism allows zkSync to offload transaction computation from Ethereum's Layer 1, ensuring scalability while maintaining Ethereum's base-layer security.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):

zkSync aggregates multiple transactions off-chain and processes them in batches. A cryptographic proof, called a validity proof, is generated for each batch and submitted to the Ethereum mainnet. This ensures that all transactions are valid and compliant with Ethereum's rules without processing them individually on Layer 1.

- Validity Proofs:

zkSync uses zk-SNARKs (Succinct Non-Interactive Arguments of Knowledge) for its validity proofs. These proofs provide mathematical guarantees that transactions within a batch are valid, eliminating the need for Ethereum nodes to re-execute off-chain transactions.

- Sequencers:

Transactions on zkSync are ordered and processed by sequencers, which bundle transactions into batches. Sequencers maintain network efficiency and provide fast confirmations.

- Fraud Resistance:

Unlike Optimistic Rollups, zkSync relies on validity proofs rather than fraud proofs, meaning that transactions are final and secure as soon as the validity proof is accepted by Ethereum.

- Data Availability:

All transaction data is stored on-chain, ensuring that the network remains decentralized and users can reconstruct the state of zkSync at any time.

S.5 Incentive Mechanisms and Applicable Fees

USDC is present on the following networks: Algorand, Aptos Coin, Arbitrum, Avalanche, Base, Celo, Ethereum, Flow, Hedera Hbar, Hyperliquid, Linea, Near Protocol, Optimism, Plume, Polygon, Ripple, Sei, Solana, Sonic, Statemint, Stellar, Sui, Tron, Xdc Network, Zksync.

Algorand's consensus mechanism, Pure Proof-of-Stake (PPoS), relies on the participation of token holders (stakers) to ensure the network's security and integrity:

1. Participation Rewards:

- Staking Rewards: Users who participate in the consensus protocol by staking their ALGO tokens earn rewards. These rewards are distributed periodically and are proportional to the amount of ALGO staked. This incentivizes users to hold and stake their tokens, contributing to network security and stability.
- Node Participation Rewards: Validators, also known as participation nodes, are responsible for proposing and voting on blocks. These nodes receive additional rewards for their active role in maintaining the network.

2. Transaction Fees:

- Flat Fee Model: Algorand employs a flat fee model for transactions, which ensures predictability and simplicity. The standard transaction fee on Algorand is very low (around 0.001 ALGO per transaction). These fees are paid by users to have their transactions processed and included in a block.
- Fee Redistribution: Collected transaction fees are redistributed to participants in the network. This includes stakers and validators, further incentivizing their participation and ensuring continuous network operation.

3. Economic Security:

Token Locking: To participate in the consensus mechanism, users must lock up their ALGO tokens. This economic stake acts as a security deposit that can be slashed (forfeited) if the participant acts maliciously. The potential loss of staked tokens discourages dishonest behavior and helps maintain network integrity.

Fees on the Algorand Blockchain

1. Transaction Fees:

Algorand uses a flat transaction fee model. The current standard fee is 0.001 ALGO per transaction. This fee is minimal compared to other blockchain networks, ensuring affordability and accessibility.

2. Smart Contract Execution Fees:

Fees for executing smart contracts on Algorand are also designed to be low. These fees are based on the computational resources required to execute the contract, ensuring that users are only charged for the actual resources they consume.

3. Asset Creation Fees:

Creating new assets (tokens) on the Algorand blockchain involves a small fee. This fee is necessary to prevent spam and ensure that only genuine assets are created and maintained on the network.

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.
- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Celo's incentive model rewards validators and prioritizes accessibility with minimal transaction fees, especially for cross-border payments, supporting a flexible and user-friendly ecosystem.

Incentive Mechanisms:

1. Validator Rewards:

Transaction Fees and Newly Minted Tokens: Validators earn rewards from transaction fees as well as newly minted CELO tokens. This dual-source reward system provides a continuous financial incentive for validators to act honestly and secure the network.

2. Transaction Flexibility and Gas Price:

- Gas Limit and Price Control: Each transaction specifies a maximum gas limit, ensuring that users are not excessively charged if a transaction fails. Users can also set a gas price to prioritize transactions, allowing faster processing for higher fees.
- Payment Flexibility with Multiple Currencies: Unlike many blockchains, Celo allows transaction fees to be paid in various ERC-20 tokens, providing flexibility for users. This approach improves accessibility, especially for individuals with limited access to traditional banking.

3. Minimal Fee Structure for Accessibility:

- Designed for Low-Cost Transactions: Celo's fee structure is intentionally minimal, particularly for cross-border payments, making it ideal for users who may not have traditional banking options. This focus on accessibility aligns with Celo's mission to bring blockchain technology to underserved communities.

Applicable Fees:

Transaction Fees: Fees are calculated based on gas usage, with a maximum gas limit set per transaction. This limit protects users from excessive costs, while the option to pay in multiple currencies enhances flexibility.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Flow's incentive model rewards validator nodes, supports ecosystem growth, and maintains affordable fees for developers and users.

Incentive Mechanisms:

1. Staking Rewards for Specialized Nodes:

Role-Based Rewards: Validators earn Flow tokens according to their specific roles and contributions within the multi-node architecture, aligning rewards with each node's responsibilities to encourage balanced and effective network participation.

2. Transaction Fees:

Stable and Consumer-Friendly Fees: Flow's fee structure is designed for predictability, keeping transaction costs stable for both developers and users. Fees are based on transaction complexity and provide an ongoing income stream for validators.

3. Misbehavior Penalties:

Penalties for Downtime or Malicious Behavior: To maintain network stability, Flow imposes penalties on validators for misbehavior or downtime. This incentivizes high-quality validator participation and ensures consistent performance.

4. Ecosystem and Developer Support:

Dedicated Portion of Fees and Rewards: A portion of Flow's transaction fees and rewards is allocated to developer initiatives, ecosystem growth, and community engagement. This investment fosters innovation, supports long-term network health, and aligns incentives for ecosystem development.

Hedera Hashgraph incentivizes network participation through transaction fees and staking rewards, with a structured and predictable fee model designed for enterprise use.

Incentive Mechanisms:

1. Staking Rewards for Nodes:

- HBAR Rewards for Node Operators: Node operators earn HBAR rewards for providing network security and processing transactions, incentivizing them to act honestly and support network stability.
- User Staking: HBAR holders can stake their tokens to support nodes. Staking rewards offer an additional incentive for token holders to engage in network operations, although the structure may evolve with network growth.

2. Service-Based Node Rewards:

Nodes receive rewards based on specific services they provide to the network, such as:

- Consensus Services: Reaching consensus and maintaining transaction order.
- File Storage: Storing data on the Hedera network.
- Smart Contract Processing: Supporting contract executions for decentralized applications.

Applicable Fees:

1. Predictable Transaction Fees: Hedera's fee structure is fixed and predictable, ensuring transparent costs for users and appealing to enterprise-grade applications. Transaction fees are paid in HBAR and are designed to be stable, making it easier for businesses to plan for usage costs.

2. Fee Allocation: All transaction fees collected in HBAR are distributed to network nodes as rewards, reinforcing their role in maintaining network integrity and processing transactions efficiently.

Hyperliquid incentivizes participants through its native token, HYPE. Validators and delegators earn rewards in HYPE for securing the network and participating in governance. Users can also earn HYPE by staking, providing liquidity, and engaging in other ecosystem activities. This dual-token system encourages active participation and supports the network's growth and stability.

Hyperliquid employs a dynamic fee model where transaction fees are based on network activity and the complexity of the transactions. These fees are paid by users conducting transactions on the network and are designed to cover the costs of processing transactions while incentivizing validators.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

The network is described as applying transaction fees as a core economic mechanism to support network operation and security. Fee flows may be used to remunerate relevant network roles (for example, sequencer- or validator-related functions, if and to the extent such roles exist in the deployed architecture). In addition, PLUME is described as being used in connection with incentive and participation mechanisms, including potential staking-related arrangements and interaction with DeFi applications. Any yields, rewards, or other economic benefits are contingent on protocol parameters, market conditions, and user behaviour, and may be changed by governance or technical updates, or may not materialise as expected.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

The Ripple XRP blockchain uses a unique incentive structure that differs from traditional Proof of Work (PoW) or Proof of Stake (PoS) systems, focusing on its Ripple Protocol Consensus Algorithm (RPCA).

Incentive Mechanisms to Secure Transactions:

1. Validators: Validators on the Ripple network are not directly compensated with rewards like in PoW/PoS models. Instead, they are incentivized by the utility and stability of the network, particularly financial institutions that benefit from Ripple's efficiency in cross-border payments.
2. No Mining: Since Ripple does not use mining, it eliminates the need for energy-intensive computations, contributing to fast transaction speeds and scalability.

Fees on the Ripple XRP Blockchain:

1. Transaction Fees: Ripple charges minimal transaction fees (typically fractions of an XRP, known as "drops") for each transaction. The purpose of these fees is to prevent network spam and overload.
2. Burn Mechanism: A portion of each transaction fee is burned, meaning it's permanently removed from circulation. This reduces the overall supply of XRP over time, contributing to potential long-term value stability.

The Sei Network incentivizes participation through staking rewards and a transparent fee structure, supporting its decentralized ecosystem.

Incentive Mechanisms:

- Staking Rewards: Validators and delegators earn SEI tokens as rewards for securing the network through staking, promoting active engagement and long-term commitment.
- Governance Participation: SEI token holders can participate in network governance decisions, influencing protocol upgrades and key changes.

Applicable Fees:

Transaction Fees: Users pay fees in SEI tokens for network transactions. These fees are distributed to validators and delegators as rewards, supporting network operations and security.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:
 - Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more

tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Sonic's economic model is designed to incentivize active participation from both validators and developers. Validators earn rewards through a combination of block rewards and transaction fees. The block reward system employs a dynamic Annual Percentage Rate (APR) mechanism.

Statemint is a common-good parachain on the Polkadot and Kusama networks, designed to enable efficient asset management while benefiting from Polkadot's shared security and governance model.

Incentive Mechanisms:

- Relay Chain Validators: Validators securing the Polkadot Relay Chain are indirectly incentivized through block rewards and transaction fees collected across all parachains, including Statemint. This ensures the stability and security of the network without requiring Statemint-specific rewards.
- Collator Compensation: Collator nodes aggregate transactions and produce blocks for Statemint. They may be compensated through external arrangements, such as subsidies or user-driven incentives, depending on governance decisions and usage patterns.

- Governance Participation: Polkadot (DOT) and Kusama (KSM) token holders influence Statemint's operations, such as fee adjustments and protocol upgrades, through on-chain governance mechanisms.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in the native tokens of the Relay Chain, DOT for Polkadot or KSM for Kusama. These fees are distributed to Relay Chain validators to support the network's maintenance.
- Asset Creation and Transfer Fees: Fees apply for creating new assets and transferring them on the Statemint chain. These fees help prevent spam and ensure efficient use of network resources.
- Governance-Defined Fee Adjustments: The Statemint parachain's fees can be adjusted through governance proposals, enabling the community to adapt costs to network conditions.

Stellar's consensus mechanism, the Stellar Consensus Protocol (SCP), is designed to achieve decentralized and secure transaction validation through a federated Byzantine agreement (FBA) model. Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, it ensures network security and transaction validation through intrinsic network mechanisms and transaction fees.

Incentive Mechanisms:

1. Quorum Slices and Trust:

- Quorum Slices: Each node in the Stellar network selects other nodes it trusts to form a quorum slice. Consensus is achieved through the intersection of these slices, creating a robust and decentralized trust network.
- Federated Voting: Nodes communicate their votes within their quorum slices, and through multiple rounds of federated voting, they agree on the transaction state. This process ensures that even if some nodes are compromised, the network can still achieve consensus securely.

2. Intrinsic Value and Participation:

- Network Value: The intrinsic value of participating in a secure, efficient, and reliable payment network incentivizes nodes to act honestly and maintain network security. Organizations and individuals running nodes benefit from the network's functionality and the ability to facilitate transactions.
- Decentralization: By allowing nodes to choose their own quorum slices, Stellar promotes decentralization, reducing the risk of central points of failure and making the network more resilient to attacks. Fees on the Stellar Blockchain

3. Transaction Fees:

- Flat Fee Structure: Each transaction on the Stellar network incurs a flat fee of 0.00001 XLM (known as a base fee). This low and predictable fee structure makes Stellar suitable for micropayments and high-volume transactions.
- Spam Prevention: The transaction fee serves as a deterrent against spam attacks. By requiring a small fee for each transaction, Stellar ensures that the network remains efficient and that resources are not wasted on processing malicious or frivolous transactions.

4. Operational Costs:

Minimal Fees: The minimal transaction fees on Stellar not only prevent spam but also cover the operational costs of running the network. This ensures that the network can sustain itself without placing a significant financial burden on users.

5. Reserve Requirements:

- Account Reserves: To create a new account on the Stellar network, a minimum balance of 1 XLM is required. This reserve requirement prevents the creation of an excessive number of accounts, further protecting the network from spam and ensuring efficient resource usage.

- Trustline and Offer Reserves: Additional reserve requirements exist for creating trustlines and offers on the Stellar decentralized exchange (DEX). These reserves help maintain network integrity and prevent abuse.

Security and Economic Incentives:

1. Validators:

Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.

2. Slashing:

Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.

3. Delegation:

Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:

Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.

2. Dynamic Fee Model:

The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

XinFin incentivizes both validators and token holders to actively participate in network security and stability through staking and fee distribution mechanisms.

Incentive Mechanisms:

1. Staking Rewards:

- Validator Rewards: Validators earn XDC token rewards for validating transactions and maintaining network security.
- Delegator Rewards: XDC holders who delegate their tokens to validators receive a share of staking rewards, promoting community participation without requiring users to operate nodes.

2. Delegation Model:

Passive Income: XDC holders can delegate tokens to validators, enabling them to earn rewards passively and boosting network security through broader staking participation.

Applicable Fees:

- Fee Distribution: All transactions incur XDC fees, which are distributed to validators as additional rewards for their role in securing the network.
- Predictable Fees for Enterprises: Transaction fees are kept low and predictable, supporting XinFin's focus on enterprise use cases in finance, trade, and cross-border payments.

zkSync incentivizes network participants through a streamlined fee structure and role-based rewards, designed to ensure security, scalability, and usability for both users and validators.

Incentive Mechanism:

- Validator Rewards: Validators, who generate validity proofs and secure the network, are compensated through transaction fees paid by users. Their role ensures that batches of transactions are processed efficiently and accurately.
- Sequencer Incentives: Sequencers are responsible for bundling and ordering transactions off-chain. They earn a share of the transaction fees for maintaining network performance and fast processing times.
- Ecosystem Growth Rewards: zkSync allocates resources to incentivize developers and projects building on its platform, fostering a robust ecosystem of dApps, DeFi protocols, and NFT marketplaces.

Applicable Fees:

- Transaction Fees: Users pay fees in Ether (ETH) for transactions on zkSync. These fees are significantly lower than Ethereum Layer 1 fees, as zkSync processes transactions off-chain and submits only aggregated proofs to the Ethereum mainnet.
- Fee Model: Fees are dynamically calculated based on the complexity of transactions (e.g., token transfers, smart contract interactions) and the cost of submitting validity proofs to Ethereum.
- Scalability Benefits: zkSync's efficient rollup architecture reduces gas fees for users while ensuring that validators and sequencers are appropriately compensated for their roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) algorand, aptos_coin, arbitrum, avalanche, base, celo, ethereum, flow, hedera_hbar, hyperliquid, linea, near_protocol, optimism, plume, polygon, ripple, sei, solana, sonic, statemint, stellar, sui, tron, xdc_network, zksync is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Merlin

MERL | NW1M13H3L

Quantitative information

Quantitative sustainability indicators for Merlin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Merlin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	293049.92049	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Merlin Chain employs a Zero-Knowledge Rollup (ZK-Rollup) architecture and additional mechanisms to ensure efficient, secure, and decentralized transaction processing; transactions are aggregated off-chain into a single cryptographic proof before submission to the Bitcoin mainnet, enhancing scalability and reducing costs while leveraging Bitcoin's security; a Data Availability Committee (DAC) manages off-chain data validity and accessibility, ensuring integrity and transparency in the ZK-Rollup process; a two-step Zero-Knowledge Proof submission mechanism allows miners to participate in proof generation and submission, decentralizing the security model and creating a stable computational environment.

S.5 Incentive Mechanisms and Applicable Fees

Merlin Chain's incentive model ensures fair compensation for validators and a transparent fee structure for users; validators earn rewards from transaction fees for securing the network and processing transactions on both Layer 2 (L2) and Layer 1 (L1); L2 fees cover the cost of executing transactions on Merlin Chain's Layer 2 network, while L1 security fees cover the cost of transmitting aggregated transaction data and ZK proofs to the Bitcoin mainnet for finalization; the gas fee model, similar to EVM-compatible chains, determines fees based on network usage and computational requirements, ensuring predictable and efficient fee allocation.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, bitcoin, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Tezos

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Tezos	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	282247.45447	kWh/a

Qualitative information

S.4 Consensus Mechanism

Tezos is present on the following networks: Binance Smart Chain, Tezos.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Tezos operates on a Liquid Proof of Stake (LPoS) consensus mechanism, which combines flexibility in staking participation with an on-chain governance model.

Core Components:

Liquid Proof of Stake (LPoS) Tezos allows token holders to participate in staking by either directly staking their tokens or delegating them to a validator (known as a baker) without transferring ownership. Validators (bakers) are responsible for creating new blocks (baking) and endorsing other blocks for validation. Bakers and Endorsers Bakers are selected based on the amount of XTZ (Tezos tokens) staked or delegated to them. The more XTZ staked, the higher the probability of being chosen to bake or endorse blocks. Endorsers are randomly selected from a pool of bakers to validate and approve blocks baked by other bakers. This additional validation enhances network security. Self-Amendment and Governance Tezos's unique governance model allows token holders to propose, vote on, and implement network upgrades without requiring hard forks. This self-amendment protocol enables Tezos to evolve based on community and developer input, making it highly adaptable and flexible.

S.5 Incentive Mechanisms and Applicable Fees

Tezos is present on the following networks: Binance Smart Chain, Tezos.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Tezos incentivizes network participation and security through baking rewards, transaction fees, and an inflationary reward model.

Incentive Mechanisms:

Rewards for Baking and Endorsing Bakers receive XTZ rewards for baking new blocks. Endorsers, who validate and approve blocks baked by others, are also rewarded in XTZ. These rewards encourage active participation and help secure the network. Delegation Incentives XTZ holders who do not wish to bake can delegate their tokens to a baker, earning a share of the baker's rewards without directly participating. This delegation option broadens participation, making it accessible to more users, thereby enhancing overall network security. Security Deposit Requirement Bakers are required to post a bond (security deposit) in XTZ to bake blocks, which is

held as collateral to prevent dishonest actions. If a baker acts maliciously, they risk forfeiting this bond, creating a disincentive for bad behavior and aligning bakers' interests with network integrity.

Applicable Fees:

Transaction Fees Users pay transaction fees in XTZ for activities such as transferring funds and interacting with smart contracts. These fees are awarded to bakers and endorsers, providing them with an additional incentive to validate and secure the network. **Inflationary Reward Model** Tezos has an inflationary reward system, where new XTZ tokens are periodically created and distributed as rewards to bakers and endorsers. This model encourages continuous participation but gradually increases the XTZ supply, balancing network security and token availability over time.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

The following sources were used: `tzStats`



Quantitative information

Quantitative sustainability indicators for Aptos Coin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Aptos Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	262800.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

S.5 Incentive Mechanisms and Applicable Fees

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.

- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) aptos_coin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



INJ | 92M9B0DZ7

Quantitative information

Quantitative sustainability indicators for Injective Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Injective Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	242136.24969	kWh/a

Qualitative information

S.4 Consensus Mechanism

Injective Token is present on the following networks: Binance Smart Chain, Cosmos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
 - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
 - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
 - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
 - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but

face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Injective operates on a Tendermint-based Proof of Stake (PoS) consensus model, ensuring high throughput and immediate transaction finality.

Core Components:

- Tendermint-based Proof of Stake (PoS):
Ensures instant transaction finality and supports efficient block production for high-speed transactions.
- Validator Selection:
Validators are chosen based on the amount of INJ tokens staked, considering both self-staked and delegated tokens, to maintain a decentralized network.
- Delegation:
INJ holders can delegate their tokens to validators, earning a share of staking rewards while participating in network governance.
- Instant Finality:
The Tendermint consensus mechanism provides immediate finality, ensuring transactions cannot be reversed once validated.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Injective Token is present on the following networks: Binance Smart Chain, Cosmos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.

2. Slashing for Accountability:

Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:

User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.

2. Customizable Fee Model:

Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Injective incentivizes network participation through staking rewards and a unique transaction fee model that supports long-term value for INJ tokens.

Incentive Mechanisms:

Staking Rewards:

INJ holders earn rewards for staking their tokens, encouraging active participation in securing the network.

Validator Rewards:

Validators receive staking rewards and transaction fees for processing transactions and maintaining network security.

Applicable Fees:

Transaction Fees:

Users pay fees in INJ tokens for network transactions, including smart contract execution and trading.

Fee Structure:

A portion of transaction fees is burned via a weekly on-chain auction, reducing the overall supply of INJ tokens and supporting a deflationary tokenomics model.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.

- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, cosmos, ethereum, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for KAVA

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	KAVA	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	236682.93600	kWh/ a

Qualitative information

S.4 Consensus Mechanism

KAVA is present on the following networks: Binance Beacon Chain, Ethereum, Kava, Osmosis, Polygon.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but

face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Kava employs the Tendermint Core consensus engine with a Proof of Stake (PoS) model, ensuring security, scalability, and decentralized decision-making.

Core Components:

- Tendermint Core (PBFT): A Practical Byzantine Fault Tolerance-based consensus engine provides fast block finality and ensures consistent transaction validation.
- Proof of Stake (PoS): Validators are selected based on the amount of KAVA tokens staked, with the top 100 nodes by bonded stake responsible for validating blocks.
- Validator Selection and Accountability: A slashing mechanism penalizes validators for malicious actions like double-signing or extended downtime, encouraging honest and reliable participation.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

KAVA is present on the following networks: Binance Beacon Chain, Ethereum, Kava, Osmosis, Polygon.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Kava incentivizes network security and active participation through rewards and an inflationary model, aligning stakeholders' interests.

Incentive Mechanisms:

Validator Rewards:

Validators earn rewards in KAVA tokens from block rewards and transaction fees, compensating them for securing the network and processing transactions.

Staking Rewards:

KAVA holders can delegate their tokens to validators to earn a share of rewards while participating in network governance.

Applicable Fees:

Transaction Fees:

Users pay fees in KAVA tokens for transactions, which are distributed among validators and delegators, supporting network maintenance.

Inflation Mechanism:

New KAVA tokens are minted to fund ecosystem initiatives like Kava Rise, which supports decentralization, security, and ecosystem stability.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.

- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
 - Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.
2. Delegators:
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
 - Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.
3. Economic Security:
- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
 - Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.
- Fees on the Polygon Blockchain
4. Transaction Fees:
- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
 - Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.
5. Smart Contract Fees:
- Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.
6. Plasma Framework:
- State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we

update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_beacon_chain, ethereum, osmosis, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


SEI

SEI | XCDVP53WR

Quantitative information

Quantitative sustainability indicators for SEI

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SEI	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	210305.17440	kWh/a

Qualitative information

S.4 Consensus Mechanism

SEI is present on the following networks: Osmosis, Sei.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Sei leverages its Twin-Turbo consensus mechanism, integrating advanced transaction processing techniques with the reliability of Tendermint Core, to achieve high performance and security.

Core Components:

- Twin-Turbo Consensus:
 - Optimistic Block Processing: Validators process transactions optimistically, assuming their validity, reducing latency and increasing throughput.
 - Intelligent Block Propagation: Compressed block proposals containing transaction hashes enable validators to reconstruct blocks locally, expediting consensus.
 - Single Slot Finality: Ensures immediate block finality upon addition, eliminating the need for confirmations and minimizing the risk of chain reorganizations.
- Tendermint Core Integration:
 - Incorporates Byzantine Fault Tolerance (BFT) to maintain security and resilience, safeguarding the network against malicious actors.

S.5 Incentive Mechanisms and Applicable Fees

SEI is present on the following networks: Osmosis, Sei.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

The Sei Network incentivizes participation through staking rewards and a transparent fee structure, supporting its decentralized ecosystem.

Incentive Mechanisms:

- Staking Rewards: Validators and delegators earn SEI tokens as rewards for securing the network through staking, promoting active engagement and long-term commitment.
- Governance Participation: SEI token holders can participate in network governance decisions, influencing protocol upgrades and key changes.

Applicable Fees:

Transaction Fees: Users pay fees in SEI tokens for network transactions. These fees are distributed to validators and delegators as rewards, supporting network operations and security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Cosmos ATOM

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Cosmos ATOM	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	186481.26094	kWh/a

Qualitative information

S.4 Consensus Mechanism

Cosmos ATOM is present on the following networks: Binance Smart Chain, Bitsong, Cosmos, Cronos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

BitSong operates on a Delegated Proof-of-Stake (DPoS) consensus mechanism. In this model, BTSG token holders delegate their tokens to validators, who are responsible for producing and validating new blocks. The selection of validators is based on the amount of BTSG tokens staked and the duration of staking, which determines their voting power in the network's governance processes.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
 - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
 - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
 - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
 - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

Cronos operates on a Proof of Stake (PoS) model integrated with Tendermint's Byzantine Fault Tolerant (BFT) consensus, designed for decentralization, security, and interoperability. This model enables validators to be selected based on staking power, rewarding them for securing and validating the network.

Core Components:

- Proof of Stake (PoS) with Tendermint BFT Validator Selection: Validators are chosen based on the amount of CRO tokens staked, securing the network and producing blocks.
- Delegation Model: Token holders can delegate their CRO to validators, enabling participation in network security without needing to run a validator node.
- Cosmos SDK and Inter-Blockchain Communication (IBC) Cross-Chain Connectivity: Built on the Cosmos SDK, Cronos enables cross-chain communication, connecting to other Cosmos blockchains and ecosystems such as Ethereum and Binance Smart Chain.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Injective operates on a Tendermint-based Proof of Stake (PoS) consensus model, ensuring high throughput and immediate transaction finality.

Core Components:

- Tendermint-based Proof of Stake (PoS):
Ensures instant transaction finality and supports efficient block production for high-speed transactions.
- Validator Selection:
Validators are chosen based on the amount of INJ tokens staked, considering both self-staked and delegated tokens, to maintain a decentralized network.
- Delegation:
INJ holders can delegate their tokens to validators, earning a share of staking rewards while participating in network governance.
- Instant Finality:
The Tendermint consensus mechanism provides immediate finality, ensuring transactions cannot be reversed once validated.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.

- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Cosmos ATOM is present on the following networks: Binance Smart Chain, Bitsong, Cosmos, Cronos, Ethereum, Injective, Osmosis.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The native token, BTSG, serves multiple roles within the BitSong ecosystem, including transaction fee payments, staking, and governance participation. Validators earn rewards from transaction fees and block rewards, with a portion of these rewards distributed to delegators after deducting the validator's commission.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.

2. Slashing for Accountability:

Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:

User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.

2. Customizable Fee Model:

Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

Cronos incentivizes validators and delegators with staking rewards and transaction fees, aligning economic incentives with network security and growth.

Incentive Mechanisms:

- Staking Rewards Validators and Delegators: Both groups earn CRO rewards for supporting network security. Delegators earn a portion of the validator rewards, promoting broader network participation.
- Deflationary Mechanism Token Burning: A portion of transaction fees and staking rewards may be periodically burned, reducing CRO supply over time and potentially increasing token value.

Applicable Fees:

- Transaction and Smart Contract Fees Standard Transactions: Users pay CRO for network transactions and dApp interactions, providing a steady income for validators.
- Ethereum-Compatible Gas Fees: Executing Ethereum-compatible smart contracts incurs gas fees, similar to Ethereum, payable in CRO.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Injective incentivizes network participation through staking rewards and a unique transaction fee model that supports long-term value for INJ tokens.

Incentive Mechanisms:

Staking Rewards:

INJ holders earn rewards for staking their tokens, encouraging active participation in securing the network.

Validator Rewards:

Validators receive staking rewards and transaction fees for processing transactions and maintaining network security.

Applicable Fees:

Transaction Fees:

Users pay fees in INJ tokens for network transactions, including smart contract execution and trading.

Fee Structure:

A portion of transaction fees is burned via a weekly on-chain auction, reducing the overall supply of INJ tokens and supporting a deflationary tokenomics model.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, bitsong, cosmos, cronos, ethereum, injective, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for canton

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	canton	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	184222.80000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The Canton Network uses a “proof-of-stakeholder” consensus model. Participants who are stakeholders in a given transaction validate that transaction, while a separate synchronization domain (sync domain) sequences transactions and ensures ordering through a Byzantine Fault Tolerant protocol in its decentralized mode.

S.5 Incentive Mechanisms and Applicable Fees

Fees paid in the network’s native token are burned, while new tokens are minted as rewards based on participants’ contribution to network utility. Rewards are allocated across infrastructure providers, application builders, and users in line with their roles and the value they bring to the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The

information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Flare

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Flare	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	170820.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Flare Blockchain uses a unique consensus mechanism known as Avalanche Consensus combined with a Federated Byzantine Agreement (FBA) model to provide scalability, security, and decentralization. Flare aims to enable interoperability between blockchains by connecting smart contract platforms to non-Turing complete networks like Bitcoin, and this consensus mechanism plays a crucial role in the network's overall operation.

Key Features of Flare's Consensus Mechanism:

1. Avalanche Consensus:
 - Scalable and Fast: The Avalanche consensus is designed for high throughput and low latency. It uses a gossip protocol for communication between nodes, which helps achieve consensus faster than traditional consensus mechanisms like Proof-of-Work (PoW) or Proof-of-Stake (PoS). Nodes quickly confirm transaction validity by repeatedly querying other nodes, increasing network speed.
 - Decentralized and Secure: This consensus mechanism doesn't require heavy computational power like PoW, making it more energy-efficient while maintaining robust security.
2. Federated Byzantine Agreement (FBA):
 - Federated Nodes: FBA ensures that nodes within the Flare network reach a consensus without needing to rely on a central authority. The network uses a set of trusted "federated" nodes that help maintain consensus, allowing nodes outside the federated set to participate without requiring full trust.
 - Leaderless Consensus: FBA allows for a leaderless and decentralized structure, where each node can validate transactions independently, enhancing both security and decentralization.

3. Interoperability: Flare's consensus mechanism is designed to allow cross-chain communication, particularly bridging the gap between Turing-complete smart contract platforms like Ethereum and non-Turing-complete chains like Bitcoin. This makes it possible to bring data and value from non-smart contract chains into the smart contract ecosystem.

S.5 Incentive Mechanisms and Applicable Fees

Flare Network employs a multifaceted incentive mechanism to promote active participation and ensure the network's security and efficiency.

Incentive Mechanisms:

1. FTSO Delegation Rewards: Flare Time Series Oracle (FTSO) data providers offer price feeds to the network. Users can delegate their FLR tokens to these providers, earning a share of the rewards based on the accuracy of the data provided.
2. FlareDrops: A portion of FLR tokens is distributed monthly to WFLR holders through FlareDrops. This incentivizes users to hold and utilize WFLR tokens within the ecosystem.
3. rFLR Rewards: Reward FLR (rFLR) tokens are distributed monthly to enhance liquidity in Flare's DeFi ecosystem. Users can earn rFLR by participating in various DeFi activities, such as lending or borrowing assets.
4. FLR Protocol Emissions: Selected decentralized applications (dApps) launching on Flare receive FLR emissions to incentivize user participation and liquidity provision.

Applicable Fees:

1. Transaction Fees: Users pay FLR tokens to execute transactions on the network, compensating validators for processing and confirming transactions.
2. Staking Fees: When delegating FLR tokens to FTSO data providers or participating in staking activities, users may incur fees associated with these services.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Zilliqa

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Zilliqa	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	157680.70159	kWh/a

Qualitative information

S.4 Consensus Mechanism

Zilliqa is present on the following networks: Binance Smart Chain, Zilliqa.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The Zilliqa blockchain uses a hybrid consensus mechanism that combines Practical Byzantine Fault Tolerance (pBFT) and Proof of Work (PoW) to ensure high throughput, scalability, and security.

The main components of Zilliqa's consensus mechanism include the following:

1. **Sharding:**
Zilliqa achieves scalability through sharding, where the network is divided into smaller units called shards. Each shard processes its own set of transactions and smart contracts in parallel, allowing the network to handle a higher volume of transactions.
2. **Proof of Work (PoW):**
The PoW mechanism is used for consensus initiation. It is primarily used to secure the network and assign nodes to shards. PoW miners solve computational puzzles to participate in block generation. However, PoW is only used for a short time at the beginning of the consensus process, and the workload is much lower than in traditional PoW systems like Bitcoin. The PoW mechanism ensures that only nodes with sufficient computational power are selected to participate in the network, reducing the likelihood of Sybil attacks.
3. **Practical Byzantine Fault Tolerance (pBFT):**
Once the PoW phase is complete and nodes are assigned to shards, pBFT is used to reach consensus within each shard. This is a more energy-efficient consensus algorithm than traditional PoW because it doesn't require miners to perform extensive computations after the initial selection. pBFT ensures finality of blocks and ensures that even if some nodes behave maliciously or fail, the network can still reach an agreement and process transactions correctly. pBFT works by having validators from the shard participate in a consensus process to agree on the state of the blockchain. Validators propose blocks, vote on block validity, and ensure that a consensus is reached before blocks are finalized.
4. **High Throughput and Low Latency:**
Combining sharding with the use of PoW and pBFT allows Zilliqa to achieve high throughput and low latency. By processing transactions in parallel across multiple shards, the network can handle thousands of transactions per second, significantly improving scalability compared to traditional blockchain systems.

S.5 Incentive Mechanisms and Applicable Fees

Zilliqa is present on the following networks: Binance Smart Chain, Zilliqa.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The Zilliqa blockchain incentivizes network participants, including miners, validators, and developers, through block rewards, transaction fees, and staking rewards, while its fee model ensures the smooth operation of the network and the maintenance of its scalability and security.

Incentive Mechanism:

1. Mining Rewards (PoW Phase):

Block Rewards:

Miners who perform the Proof of Work (PoW) for the initial consensus phase are rewarded with ZIL tokens for successfully mining a block. This PoW phase is used to assign nodes to different shards.

Transaction Fees:

In addition to block rewards, miners also receive transaction fees for including transactions in the blocks they mine. These fees incentivize miners to prioritize transactions during high demand.

2. Staking Rewards:

Validators in Shards:

After the PoW phase, validators in each shard participate in the consensus process using Practical Byzantine Fault Tolerance (pBFT). Validators who propose or confirm blocks in the pBFT phase earn ZIL tokens as rewards for their participation in securing the network and validating transactions.

Sharding Rewards:

Zilliqa rewards validators in each shard based on their contributions to block finalization and their participation in the consensus mechanism.

3. Transaction Fees (Validators and Miners):

Transaction Fee Distribution:

Transaction fees are paid by users to have their transactions processed on the Zilliqa network. These fees are collected by the validators who propose the blocks or the miners who participate in the PoW phase.

Prioritization of Fees:

During periods of high network activity, users may need to increase their transaction fees to ensure quicker transaction inclusion. Validators prioritize higher fees to ensure transaction processing.

4. Incentives for Developers:

Smart Contract Deployment: Developers who deploy and maintain smart contracts on the Zilliqa network can also be incentivized through transaction fees generated by the usage of their smart contracts. The more transactions a smart contract processes, the more rewards the contract owner can earn.

Applicable Fees:

1. Transaction Fees:

Fee Calculation:

Transaction fees on Zilliqa are determined based on the size and complexity of the transaction. The fee is typically paid in ZIL tokens, which can fluctuate depending on network demand and transaction complexity.

Fee Rate:

The fee rate adjusts based on network congestion, meaning that higher transaction fees are necessary for quicker processing during periods of high demand. Zilliqa offers tools for users to estimate the proper transaction fee based on current network conditions.

2. Smart Contract Execution Fees:

Execution Costs: For transactions involving smart contracts, fees are calculated based on the computational resources required to execute the contract. These fees are also paid in ZIL tokens and vary depending on the complexity of the contract's execution.

3. Sharding Fees:

Fee to Participate in Shards: Since Zilliqa uses sharding, users may incur additional fees for interacting with specific shards. These fees help maintain the infrastructure for the parallel processing of transactions across the shards.

4. Storage Fees:

Storage of Data: Developers and users who store data on the blockchain, such as smart contracts or tokens, are required to pay storage fees. This helps prevent spam attacks and ensures efficient use of network resources. These fees are typically paid in ZIL tokens.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, zilliqa is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for IOST

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	IOST	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	137970.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The IOST blockchain uses a consensus mechanism called Proof of Believability (PoB), which is designed to combine the advantages of both Proof of Stake (PoS) and Delegated Proof of Stake (DPoS). The PoB mechanism ensures high scalability, decentralization, and fairness while providing security and efficiency for the network.

Key Features of IOST's Consensus Mechanism:

1. Proof of Believability (PoB):

Validators in the IOST network are chosen based on their "believability," which is determined by the amount of IOST tokens staked, their performance, and their reputation within the network. The more tokens a validator stakes and the better their performance, the higher their believability score, making them more likely to be selected as a block producer.

2. Scalability and Efficiency:

PoB ensures that IOST can process high transaction throughput and scale effectively. The system uses a process of "sharding" where the network is divided into multiple smaller units, allowing for parallel processing and high scalability.

3. Fairness:

The selection process for block producers is designed to be fair and decentralized. By using PoB, the IOST blockchain reduces the potential for centralization that can occur in traditional PoS systems, ensuring that more participants can take part in the validation process.

4. Delegated Proof of Stake (DPoS) Elements:

Validators are elected by token holders who vote with their IOST tokens. The elected validators produce and validate blocks, and the rewards are shared among them based on their believability and the number of tokens staked.

5. Finality and Security:

The PoB mechanism allows for quick finality of transactions, with each block being confirmed as soon as it's produced by a validator, enhancing the overall security and efficiency of the IOST blockchain

S.5 Incentive Mechanisms and Applicable Fees

The IOST blockchain incentivizes network participants, ensuring active participation and security through a combination of rewards for validators and delegators, along with transaction fees.

Incentive Mechanism:

1. Validator Rewards:

- Block Rewards: Validators are rewarded with IOST tokens for producing and validating blocks. The rewards are based on their believability score, determined by their stake in the network and their performance.
- Transaction Fees: In addition to block rewards, validators earn transaction fees from the transactions they validate. These fees incentivize them to prioritize transaction inclusion and maintain network integrity.

2. Delegator Rewards:

Delegators can stake their IOST tokens to vote for validators. When delegating, token holders earn a share of the rewards generated by the validator, proportional to the amount of tokens delegated. This encourages users to participate in securing the network and support trusted validators.

3. Staking and Reputation:

Validators must stake a certain amount of IOST tokens to be eligible to validate transactions. The more tokens staked, the higher the chance of being selected as a block producer. Performance is also a key factor in improving a validator's believability score, which directly impacts their chances of producing more blocks and earning rewards.

4. Penalties:

Validators who behave maliciously or fail to meet performance standards are penalized, including the potential loss of part of their staked tokens. This ensures the security and reliability of the network.

Applicable Fees:

1. Transaction Fees:

Transaction fees are paid by users to have their transactions processed and included in blocks. These fees vary depending on the complexity of the transaction and network demand. The fees are distributed to the validators who process the transactions, providing them with a continuous incentive to maintain the network.

2. Network Resource Fees:

IOST operates on a resource-based model where users must pay for energy and bandwidth to interact with the network, particularly for smart contract executions and dApp usage. Users who stake more IOST tokens are allocated more resources.

3. Smart Contract Execution Fees:

Interacting with decentralized applications (dApps) and executing smart contracts on the IOST network requires paying fees based on the computational resources consumed. These fees are paid in IOST tokens and support the operational costs of running dApps.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for ICON

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ICON	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	115106.40000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The ICON blockchain operates on a Delegated Proof of Contribution (DPoC) consensus mechanism, an innovative approach designed to reward network participants based on their contributions while ensuring robust decentralization and scalability.

Core Components:

- Delegated Proof of Contribution (DPoC):
DPoC extends beyond traditional Delegated Proof of Stake (DPoS) by factoring in each participant's contributions to the ecosystem, such as governance participation, network development, or community engagement. Validators, called Public Representatives (P-Reps), are elected by token holders based on their stake and perceived contributions to the network.
- P-Rep Election and Roles:
P-Reps validate transactions, produce blocks, and maintain the network's integrity. The top-ranked P-Reps participate actively in governance decisions, while sub-P-Reps serve as backup nodes, ensuring redundancy and decentralization.
- Scalability via Loop Fault Tolerance (LFT):
ICON employs LFT, an advanced Byzantine Fault Tolerance (BFT) algorithm, to enhance consensus speed and reduce latency while maintaining high fault tolerance.

S.5 Incentive Mechanisms and Applicable Fees

The ICON blockchain incentivizes network participants through a well-structured reward system and applies a straightforward fee model to support network operations and encourage ecosystem growth.

Incentive Mechanism:

- P-Rep Rewards: Public Representatives (P-Reps) earn rewards in ICX tokens for validating transactions, producing blocks, and maintaining the network. Rewards are distributed based on the rank and contribution of each P-Rep, incentivizing high performance and active participation.
- Delegator Rewards: ICON token holders who delegate their ICX tokens to P-Reps earn staking rewards proportional to their stake. This delegation model encourages broader participation and enhances network security by increasing staked ICX.
- Contribution Proposal System (CPS): CPS rewards community developers and projects that contribute to ICON's ecosystem. Approved proposals receive funding in ICX, promoting continuous network development.

Applicable Fees:

- Transaction Fees: Users pay fees in ICX tokens for transactions, such as transfers, smart contract executions, and interactions with decentralized applications (dApps). Fees are dynamically adjusted based on network activity to balance affordability and resource usage.
- Governance-Driven Allocation: A portion of transaction fees is redistributed to P-Reps and delegators, aligning incentives with network activity and maintaining security.
- Fee Sharing: ICON's fee-sharing model supports dApp developers by redistributing part of the fees generated by their applications, fostering innovation and adoption within the ecosystem.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Cronos

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Cronos	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	109205.54439	kWh/a

Qualitative information

S.4 Consensus Mechanism

Cronos is present on the following networks: Cosmos, Cronos, Cronos Pos, Ethereum, Osmosis, Solana.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
 - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
 - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
 - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
 - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

Cronos operates on a Proof of Stake (PoS) model integrated with Tendermint's Byzantine Fault Tolerant (BFT) consensus, designed for decentralization, security, and interoperability. This model enables validators to be selected based on staking power, rewarding them for securing and validating the network.

Core Components:

- Proof of Stake (PoS) with Tendermint BFT Validator Selection: Validators are chosen based on the amount of CRO tokens staked, securing the network and producing blocks.
- Delegation Model: Token holders can delegate their CRO to validators, enabling participation in network security without needing to run a validator node.
- Cosmos SDK and Inter-Blockchain Communication (IBC) Cross-Chain Connectivity: Built on the Cosmos SDK, Cronos enables cross-chain communication, connecting to other Cosmos blockchains and ecosystems such as Ethereum and Binance Smart Chain.

The Cronos POS Chain operates as a Layer-0 blockchain within the Cosmos ecosystem, utilizing the Tendermint Byzantine Fault Tolerant (BFT) consensus engine. It employs a Delegated Proof-of-Stake (DPoS) model, where the top 100 validators by total staked CRO tokens form the active set responsible for block production and network security.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Cronos is present on the following networks: Cosmos, Cronos, Cronos Pos, Ethereum, Osmosis, Solana.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.

2. Slashing for Accountability:

Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:

User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.

2. Customizable Fee Model:

Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

Cronos incentivizes validators and delegators with staking rewards and transaction fees, aligning economic incentives with network security and growth.

Incentive Mechanisms:

- Staking Rewards Validators and Delegators: Both groups earn CRO rewards for supporting network security. Delegators earn a portion of the validator rewards, promoting broader network participation.
- Deflationary Mechanism Token Burning: A portion of transaction fees and staking rewards may be periodically burned, reducing CRO supply over time and potentially increasing token value.

Applicable Fees:

- Transaction and Smart Contract Fees Standard Transactions: Users pay CRO for network transactions and dApp interactions, providing a steady income for validators.
- Ethereum-Compatible Gas Fees: Executing Ethereum-compatible smart contracts incurs gas fees, similar to Ethereum, payable in CRO.

The Cronos POS Chain uses its native CRO token to coordinate economic incentives and governance. Validators are rewarded for producing and validating blocks through a combination of inflationary

block rewards and transaction fees. Transaction fees, also paid in CRO, are distributed between validators and a community pool.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites,

open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) cosmos, cronos_pos, ethereum, osmosis, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



XDC Network

XDC | 2DHMJ018G

Quantitative information

Quantitative sustainability indicators for XDC Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	XDC Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	105121.84526	kWh/a

Qualitative information

S.4 Consensus Mechanism

XDC Network is present on the following networks: Ethereum, Xdc Network.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

XinFin Network operates on a modified Delegated Proof of Stake (XDPoS) model, XDPoS 2.0, which ensures scalability, security, and efficiency suitable for enterprise applications.

Core Components:

1. XDPoS 2.0 (Delegated Proof of Stake):

Masternode System: Validators, known as masternodes, are required to stake XDC tokens to participate in transaction validation and block production. Validators are selected based on both stake size and community votes, ensuring only reliable nodes secure the network.

2. Double Validation Feature:

- Enhanced Security: Each transaction is validated by two independent validators before it's finalized, reducing the risk of double-spending or malicious behavior and increasing network reliability.
- Randomized Validator Rotation: Validators are selected in a rotating and randomized manner, preventing any single validator from consistently producing blocks, which enhances decentralization and security.

S.5 Incentive Mechanisms and Applicable Fees

XDC Network is present on the following networks: Ethereum, Xdc Network.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

XinFin incentivizes both validators and token holders to actively participate in network security and stability through staking and fee distribution mechanisms.

Incentive Mechanisms:

1. Staking Rewards:

- Validator Rewards: Validators earn XDC token rewards for validating transactions and maintaining network security.
- Delegator Rewards: XDC holders who delegate their tokens to validators receive a share of staking rewards, promoting community participation without requiring users to operate nodes.

2. Delegation Model:

Passive Income: XDC holders can delegate tokens to validators, enabling them to earn rewards passively and boosting network security through broader staking participation.

Applicable Fees:

- Fee Distribution: All transactions incur XDC fees, which are distributed to validators as additional rewards for their role in securing the network.
- Predictable Fees for Enterprises: Transaction fees are kept low and predictable, supporting XinFin's focus on enterprise use cases in finance, trade, and cross-border payments.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the

hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Polygon POL

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Polygon POL	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	95946.39864	kWh/a

Qualitative information

S.4 Consensus Mechanism

Polygon POL is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Polygon POL is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Qtum

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Qtum	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	91191.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Qtum combines the security of Bitcoin's Unspent Transaction Output (UTXO) model with Ethereum-style smart contracts, using a Proof of Stake (PoS) consensus mechanism. This innovative hybrid approach supports decentralized applications (dApps) while ensuring secure and efficient transaction validation.

Core Components:

- Proof of Stake (PoS): Qtum operates on a PoS consensus, enabling QTUM token holders to participate in block validation based on the number of tokens they stake. There is no minimum staking requirement, so all QTUM holders are eligible to participate in staking and earn rewards, promoting accessibility and decentralization.
- Hybrid UTXO and Smart Contract Structure UTXO Model: Qtum retains Bitcoin's UTXO model, which enhances transaction security by providing discrete transaction outputs.
- Ethereum-Compatible Smart Contracts: Qtum integrates Ethereum's smart contract capabilities, allowing for the creation and execution of decentralized applications.
- Account Abstraction Layer (AAL): The AAL serves as a bridge between the UTXO model and Ethereum-style smart contracts, enabling smart contracts to operate on top of the UTXO structure. This layer makes Qtum compatible with existing Ethereum smart contracts, allowing developers to deploy Ethereum dApps on Qtum's blockchain while benefiting from UTXO's security. Qtum's consensus mechanism supports a hybrid blockchain architecture that provides enhanced security, flexibility for dApps, and accessibility for a wide range of users.

S.5 Incentive Mechanisms and Applicable Fees

Qtum incentivizes stakers to secure the network by rewarding them with both block rewards and transaction fees. This structure supports decentralized participation and promotes consistent network performance.

Incentive Mechanisms:

- Staking Rewards Block Rewards: Validators (stakers) are rewarded with QTUM tokens for producing new blocks, incentivizing them to maintain the security and stability of the network.
- Transaction Fees: Stakers also earn transaction fees from transactions within the blocks they validate. This dual-reward model aligns validator incentives with overall network activity and performance.
- Accessibility of Staking No Minimum Staking Requirement: Unlike many PoS blockchains, Qtum allows staking with any amount of QTUM, making staking accessible to a wide range of users, from small holders to larger stakeholders. This open approach promotes decentralization and broader community participation.
- Smart Contract Fees Gas-Like Fee Structure: Qtum charges fees for executing smart contracts, similar to Ethereum's gas model. These fees are paid in QTUM and contribute to staking rewards, incentivizing validators to support dApps and smart contract functionality on the network.

Applicable Fees: Transaction Fees Users pay transaction fees in QTUM for transferring funds and interacting with smart contracts. These fees are essential for network operations and are distributed to stakers, enhancing their reward structure. Smart Contract Execution Fees The gas-like fees applied to smart contract execution incentivize support for dApps on the network and provide an additional revenue stream for stakers, further aligning their participation with network growth.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Binance Coin

BNB | 8N2VXJKB1

Quantitative information

Quantitative sustainability indicators for Binance Coin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Binance Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	90228.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Coin is present on the following networks: Binance Smart Chain, Opbnb.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Coin is present on the following networks: Binance Smart Chain, Opbnb.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - **Shared Rewards:** Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. **Candidates:**

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. **Economic Security:**
 - **Slashing:** Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - **Opportunity Cost:** Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Casper

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Casper	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	85935.60000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Casper employs a unique Proof of Stake (PoS) consensus protocol known as the Highway Protocol, which enhances security, flexibility, and finality.

Core Components:

1. Highway Protocol (PoS):

The Highway protocol allows validators to reach consensus on blocks at varying levels of confidence, providing adaptable finality options based on security needs. This flexibility enables the network to accommodate different transaction requirements and ensure robust security.

2. Validator Selection and Continuous Validation:

- Selection Based on Staked CSPR: Validators are chosen based on the amount of CSPR tokens they stake. The higher the stake, the greater the chance of being selected to validate blocks.
- Continuous Block Finalization: Unlike traditional PoS networks with fixed epochs, Casper's Highway protocol allows for continuous block finalization, increasing network efficiency and reducing wait times for transactions.

3. Fork Choice Rule:

Casper uses the Greedy Heaviest Observed Subtree (GHOST) rule to select the main chain. This rule prioritizes the chain with the most cumulative stake, minimizing forks and improving chain stability.

S.5 Incentive Mechanisms and Applicable Fees

Casper's incentive model supports validator and delegator participation through staking rewards, transaction fees, and a controlled inflation model to maintain network security and economic sustainability.

Incentive Mechanisms:

1. Staking Rewards for Validators:

CSPR Rewards for Validation: Validators earn CSPR token rewards for staking and actively participating in block validation. This financial incentive encourages validators to contribute to network security and reliability.

2. Transaction Fees:

Fee Compensation for Validators: Users pay transaction fees in CSPR, which are distributed to validators. These fees provide additional compensation to validators, incentivizing efficient transaction processing.

3. Delegation Rewards for CSPR Holders:

Broadening Participation through Delegation: CSPR holders who prefer not to run validator nodes can delegate their tokens to validators, earning a share of staking rewards. This broadens network participation and supports decentralized security.

4. Adaptive Inflation Model:

Dynamic Adjustment of Token Supply: Casper's inflation model adjusts staking rewards based on the total network stake. This adaptive approach helps balance token rewards with the network's security needs, ensuring long-term economic sustainability.

5. Slashing Mechanism for Misbehavior:

Penalties for Dishonesty: Validators who act dishonestly or fail to meet performance standards risk losing a portion of their staked CSPR. This slashing mechanism discourages misbehavior and ensures network reliability.

Applicable Fees:

Transaction Fees in CSPR: Fees are paid in CSPR and distributed to validators, supporting their role in network maintenance and stability.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Sonic

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Sonic	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	84358.80000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Sonic utilizes a Proof-of-Stake (PoS) consensus mechanism integrated with a Directed Acyclic Graph (DAG) architecture to enhance scalability and efficiency. Validators are required to stake the network's native \$S tokens, with a minimum of 500,000 \$S tokens needed to operate a validator node. This substantial staking requirement ensures that validators have a significant investment in the network's integrity.

S.5 Incentive Mechanisms and Applicable Fees

Sonic's economic model is designed to incentivize active participation from both validators and developers. Validators earn rewards through a combination of block rewards and transaction fees. The block reward system employs a dynamic Annual Percentage Rate (APR) mechanism.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we

update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Hedera HBAR

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Hedera HBAR	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	82125.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Hedera Hashgraph operates on a unique Hashgraph consensus algorithm, a directed acyclic graph (DAG) system that diverges from traditional blockchain technology. It uses Asynchronous Byzantine Fault Tolerance (aBFT) to secure the network.

Core Components:

1. Hashgraph Consensus and aBFT:

Hedera Hashgraph's consensus mechanism achieves aBFT, which allows the network to tolerate malicious nodes without compromising security, ensuring high levels of fault tolerance and stability.

2. Gossip about Gossip Protocol:

The network employs a "Gossip about Gossip" protocol, where nodes share transaction information along with details of previous gossip events. This process allows each node to rapidly learn the entire network state, enhancing communication efficiency and minimizing latency.

3. Virtual Voting:

Hedera does not rely on traditional miners or stakers. Instead, it uses virtual voting, where nodes reach consensus by analyzing the gossip history and simulating votes based on the order and frequency of transactions received. Virtual voting eliminates the need for actual voting messages, reducing network congestion and speeding up consensus.

4. Deterministic Finality:

Once consensus is reached, transactions achieve deterministic finality instantly, making them irreversible and confirmed within seconds. This attribute is ideal for applications needing quick and irreversible transaction confirmations.

5. Staking for Network Security:

Hedera incorporates staking to bolster network security. HBAR holders can stake their tokens to support validator nodes, contributing to the network's resilience and encouraging long-term engagement in consensus operations.

S.5 Incentive Mechanisms and Applicable Fees

Hedera Hashgraph incentivizes network participation through transaction fees and staking rewards, with a structured and predictable fee model designed for enterprise use.

Incentive Mechanisms:

1. Staking Rewards for Nodes:

- HBAR Rewards for Node Operators: Node operators earn HBAR rewards for providing network security and processing transactions, incentivizing them to act honestly and support network stability.
- User Staking: HBAR holders can stake their tokens to support nodes. Staking rewards offer an additional incentive for token holders to engage in network operations, although the structure may evolve with network growth.

2. Service-Based Node Rewards:

Nodes receive rewards based on specific services they provide to the network, such as:

- Consensus Services: Reaching consensus and maintaining transaction order.
- File Storage: Storing data on the Hedera network.
- Smart Contract Processing: Supporting contract executions for decentralized applications.

Applicable Fees:

1. Predictable Transaction Fees: Hedera's fee structure is fixed and predictable, ensuring transparent costs for users and appealing to enterprise-grade applications. Transaction fees are paid in HBAR and are designed to be stable, making it easier for businesses to plan for usage costs.
2. Fee Allocation: All transaction fees collected in HBAR are distributed to network nodes as rewards, reinforcing their role in maintaining network integrity and processing transactions efficiently.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Mina

MINA | 133H6VJ48

Quantitative information

Quantitative sustainability indicators for Mina

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Mina	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	81205.20000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mina is present on the following networks: Ethereum, Mina.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Mina operates on a unique Proof-of-Stake (PoS) consensus protocol called Ouroboros Samasika, which is adapted to work with Mina's succinct blockchain structure. This innovative approach enables Mina to maintain a lightweight and efficient blockchain while ensuring security and decentralization.

Core Components of Mina's Consensus:

1. Ouroboros Samasika PoS Protocol:

Adaptation of Cardano's Ouroboros: Mina's PoS mechanism, Ouroboros Samasika, is a modified version of Cardano's Ouroboros PoS. It has been specifically optimized for Mina's succinct blockchain model, which requires minimal data storage for validating the entire chain.

2. Succinct Blockchain (Constant Size):

- **22 KB Fixed Size:** Unlike traditional blockchains, Mina maintains a minimal, fixed-size blockchain of around 22 KB. It achieves this through the use of recursive zero-knowledge proofs (zk-SNARKs), which compress the entire blockchain into a single, verifiable proof that any node can validate.
- **Efficient Verification:** This succinct structure allows Mina to operate efficiently without requiring nodes to store vast amounts of historical data. Instead, each node validates the chain by verifying a concise zk-SNARK proof, maintaining security and scalability.

3. Leader Election with Verifiable Random Function (VRF):

Randomized Validator Selection: Mina's leader election process is conducted through a Verifiable Random Function (VRF), which randomly selects validators to produce blocks based on their stake. This randomization enhances security, prevents manipulation, and ensures a decentralized network.

4. Fork Resolution:

Longest-Chain Rule: Mina employs a longest-chain rule with Ouroboros Samasika. The chain with the most accumulated proof-of-stake work is considered the valid chain. However, due to zk-SNARKs, Mina reduces the chain data required to verify the blockchain, making fork resolution more efficient.

S.5 Incentive Mechanisms and Applicable Fees

Mina is present on the following networks: Ethereum, Mina.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Mina incentivizes participants through block rewards, transaction fees, and a unique role called Snarkers to support network security, stability, and the succinct blockchain model.

Incentive Mechanisms:

1. Block Rewards for Validators (Block Producers):

- **Incentivizing Security and Block Production:** Validators, known as block producers, earn block rewards for successfully producing blocks. These rewards provide an incentive for users to stake their tokens and contribute to network security and block production.
- **Inflationary Model:** Mina has an inflationary token supply, where new tokens are minted as block rewards. This inflation rate is designed to decrease over time to reach a stable token supply, balancing incentives with long-term sustainability.

2. Transaction Fees:

- **Ongoing Rewards:** Validators also earn transaction fees from the transactions included in each block, providing a continuous reward mechanism that grows as network usage increases.
- **Dynamic Fees During Congestion:** Although Mina's transaction fees are generally flat, they can increase during times of high network demand. Validators can set higher fees to prioritize transactions, ensuring efficient block production during peak periods.

3. Incentives for Snarkers (Proof Generators):

- Role of Snarkers: Mina introduces Snarkers (or Snark Workers), a unique role in the network responsible for generating zk-SNARKs to verify the blockchain's state. These zk-SNARK proofs are essential for maintaining Mina's succinct structure.
- Compensation by Block Producers: Block producers pay Snarkers for their zk-SNARK proofs, creating a decentralized market for proof generation. This setup incentivizes individuals to produce these essential proofs, decentralizing the proof-generation process and supporting network functionality.

Applicable Fees:

Flat Transaction Fees with Dynamic Adjustments: Mina's transaction fees are typically flat, making the network accessible and predictable for users. However, during periods of network congestion, validators may set higher fees to prioritize transactions with higher fees, ensuring that critical transactions can be processed quickly.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Celestia

TIA | M7NN4STH9

Quantitative information

Quantitative sustainability indicators for Celestia

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Celestia	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	80791.97748	kWh/a

Qualitative information

S.4 Consensus Mechanism

Celestia is present on the following networks: Celestia, Injective, Osmosis.

Celestia employs a Proof-of-Stake (PoS) consensus mechanism, wherein validators are selected based on the amount of TIA tokens they stake. These validators are responsible for ordering transactions and ensuring data availability within the network.

Injective operates on a Tendermint-based Proof of Stake (PoS) consensus model, ensuring high throughput and immediate transaction finality.

Core Components:

- Tendermint-based Proof of Stake (PoS):
Ensures instant transaction finality and supports efficient block production for high-speed transactions.
- Validator Selection:
Validators are chosen based on the amount of INJ tokens staked, considering both self-staked and delegated tokens, to maintain a decentralized network.
- Delegation:
INJ holders can delegate their tokens to validators, earning a share of staking rewards while participating in network governance.
- Instant Finality:
The Tendermint consensus mechanism provides immediate finality, ensuring transactions cannot be reversed once validated.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Celestia is present on the following networks: Celestia, Injective, Osmosis.

The native token, TIA, serves multiple roles within the Celestia ecosystem. Validators earn rewards in TIA for participating in the consensus process and maintaining data availability. Users pay transaction fees in TIA when submitting data to the network.

Injective incentivizes network participation through staking rewards and a unique transaction fee model that supports long-term value for INJ tokens.

Incentive Mechanisms:

Staking Rewards:

INJ holders earn rewards for staking their tokens, encouraging active participation in securing the network.

Validator Rewards:

Validators receive staking rewards and transaction fees for processing transactions and maintaining network security.

Applicable Fees:

Transaction Fees:

Users pay fees in INJ tokens for network transactions, including smart contract execution and trading.

Fee Structure:

A portion of transaction fees is burned via a weekly on-chain auction, reducing the overall supply of INJ tokens and supporting a deflationary tokenomics model.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.

- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) injective, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for ROSE

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ROSE	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	79366.30972	kWh/a

Qualitative information

S.4 Consensus Mechanism

ROSE is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Rose, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Emerald Oasis Network utilizes a two-layer architecture to ensure security, scalability, and flexibility for various applications.

Core Components:

1. Consensus Layer (Proof of Stake):

The Consensus Layer operates on a Proof of Stake (PoS) mechanism. Validators stake ROSE tokens to secure the network and validate blocks, with rewards distributed based on stake size and validator performance.

2. ParaTime Layer (Parallel Execution Environments):

- Independent ParaTimes: This layer supports the parallel execution of multiple ParaTimes, each tailored to specific workloads like DeFi or privacy-preserving applications. Each ParaTime runs in isolation, allowing for optimized performance without affecting others.
- Trusted Execution Environments (TEEs): Some ParaTimes use TEEs to provide enhanced privacy, ensuring confidential data handling even from validators, which enables privacy-preserving smart contracts.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

ROSE is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Rose, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Emerald Oasis Network incentivizes both validators and token holders, fostering network security and scalability through staking and customizable transaction fees.

Incentive Mechanisms:

- Staking Rewards: Validators earn ROSE tokens for securing the Consensus Layer. Rewards are based on performance, encouraging validators to act reliably.
- Delegation Rewards: Token holders can delegate their ROSE tokens to validators, earning a share of staking rewards, which promotes wider network participation.
- Slashing Penalties: Validators face slashing penalties for malicious actions, such as double-signing, ensuring secure network behavior.

Applicable Fees:

ParaTime-Specific Fees: Fees are paid in ROSE tokens and vary by ParaTime based on computational and privacy requirements. Some ParaTimes are optimized for privacy-focused transactions, while others prioritize high throughput for large-scale applications.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Ontology

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Ontology	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	71192.52000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Ontology operates on a Verifiable Byzantine Fault Tolerance (VBFT) consensus mechanism, which combines Proof of Stake (PoS), Verifiable Random Function (VRF), and Byzantine Fault Tolerance (BFT) to deliver a secure and efficient consensus process.

Core Components:

- VBFT Hybrid Consensus: Combines PoS for staking, VRF for randomness in node selection, and BFT for transaction finality, ensuring both security and efficiency in the network.
- Node Selection via VRF: A Verifiable Random Function ensures randomness in selecting consensus nodes, making it difficult for adversaries to predict or manipulate the selection process.
- Stake-Based Voting: Nodes with higher stakes have greater voting power in the consensus process, aligning their incentives with the network's security and stability.

S.5 Incentive Mechanisms and Applicable Fees

Ontology employs a dual-token system and a comprehensive fee-sharing model to incentivize participation and ensure the network's sustainability.

Incentive Mechanisms:

- Staking Rewards: ONT holders can stake their tokens to earn ONG rewards. This incentivizes long-term commitment and active participation in governance and network stability.

- Governance Participation: ONT holders have voting rights in network governance decisions, enabling them to influence protocol upgrades and other critical parameters.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in ONG for transactions and smart contract executions. Fees are relatively low, making Ontology suitable for microtransactions and complex applications.
- Fee-Sharing Model: A portion of transaction fees is distributed to stakers and node operators, aligning the interests of all network participants and supporting the ecosystem's sustainability.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ontology is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Hyperliquid

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Hyperliquid	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	67014.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Hyperliquid is a decentralized perpetual exchange (DEX) built on its proprietary Layer 1 blockchain, Hyperliquid L1. At the core of its architecture is the HyperBFT consensus mechanism, inspired by the Hotstuff protocol, designed to meet the demands of high-frequency trading while maintaining security and consistency across the ecosystem.

S.5 Incentive Mechanisms and Applicable Fees

Hyperliquid incentivizes participants through its native token, HYPE. Validators and delegators earn rewards in HYPE for securing the network and participating in governance. Users can also earn HYPE by staking, providing liquidity, and engaging in other ecosystem activities. This dual-token system encourages active participation and supports the network's growth and stability.

Hyperliquid employs a dynamic fee model where transaction fees are based on network activity and the complexity of the transactions. These fees are paid by users conducting transactions on the network and are designed to cover the costs of processing transactions while incentivizing validators.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The

energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Gas

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Gas	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	65700.00000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The NEO blockchain uses a Delegated Byzantine Fault Tolerance (dBFT) consensus mechanism to validate transactions, relying on an elected committee and consensus nodes to maintain security and efficiency.

Core Components of dBFT:

1. Candidates:

- Individuals or organizations can register as candidates for committee membership, a process that requires on-chain registration.
- NEO holders vote for candidates based on their NEO holdings, with votes calculated every 21 blocks.
- Elections are valid if more than 20% of all NEO tokens participate in voting. The candidates with the most votes are selected as committee members and consensus nodes.

2. Committee:

- The top 21 candidates with the most votes are elected as committee members. This committee is responsible for governing the network, including electing node roles like Oracle nodes, StateRoot consensus nodes, NeoFS Inner Ring nodes, and consensus nodes.
- The seven members with the highest votes also serve as consensus nodes, responsible for proposing and generating new blocks. Consensus nodes are rotated every 21 blocks to maintain security and decentralization.
- Committee proposals require more than 50% agreement for approval, allowing the committee to update blockchain parameters as needed.

S.5 Incentive Mechanisms and Applicable Fees

The NEO network uses a dual-token model featuring NEO and GAS tokens. NEO serves governance and voting functions, while GAS is used for network operations.

Incentive Mechanisms:

- Supply and Governance: NEO has a maximum supply of 100 million tokens, is indivisible, and is used for governance activities, including electing consensus nodes and adjusting consensus parameters.
- Claiming GAS: NEO holders earn GAS based on their holdings, which allows them to participate in the ecosystem without directly purchasing GAS.
- GAS Token:
 - Utility and Fees: GAS is the network's utility token, with a minimum unit of 0.00000001 (1 Datoshi). GAS is required for network fees, including transfers, asset registration, and smart contract execution. GAS transactions are precise, supporting high granularity for fees.
 - Supply: Unlike NEO, GAS has no maximum supply, and transaction fees paid in GAS are burned, which contributes to supply control.
- GAS Distribution:
 - Block Rewards: Each block generates 5 GAS, distributed to NEO holders, voters, and the Neo Committee.
 - Committee: NEO Holders receive 10%, distributed based on the holding period. Committee & Consensus Nodes receive 10%, with rewards recalculated every 21 blocks based on updated voting. Voters receive 80%, incentivizing voting participation. Rewards are calculated and distributed every epoch (21 blocks), with voters for consensus nodes receiving a higher reward ratio than those voting for non-consensus committee members.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) neo is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Moonbeam

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Moonbeam	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	65700.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Moonbeam employs a Delegated Proof of Stake (DPoS) consensus mechanism combined with the Polkadot relay chain for enhanced scalability, finality, and security. It utilizes collators and validators, with finality provided by the GRANDPA finality gadget, ensuring deterministic block finality.

Key Features of Moonbeam's Consensus Mechanism:

1. Delegated Proof of Stake (DPoS):

- Collators and Validators: In Moonbeam's DPoS system, collators maintain the parachain by collecting transactions from users and producing state transition proofs. The collator set is chosen based on the stake they have, including delegated stake. Delegation: Token holders can delegate their stake to collator candidates. The top collator candidates, including those with delegated stake, join the active set. Collators in the active set are randomly selected to produce blocks.
- Stakes and Block Production: Once a collator is in the active set, their total stake does not impact their chance of being selected to produce blocks.

2. Polkadot Relay Chain Integration:

Moonbeam is built as a parachain on Polkadot, which provides shared security, scalability, and consensus. The relay chain validators ensure that Moonbeam's blocks are validated and secured.

3. GRANDPA Finality:

- Deterministic Finality: Moonbeam relies on Polkadot's GRANDPA finality gadget, which provides fast and deterministic finality for transactions. When a block is finalized, it cannot be reverted except through on-chain governance or forking.

- Parallel Finality: The finality process in Moonbeam occurs simultaneously with block production, unlike Ethereum, which has slower finality. GRANDPA allows for the quick confirmation of blocks, often within a single block on Moonbeam.

4. Block Production:

Blocks are produced by collators who are selected based on their stake and delegated stake, contributing to the network's decentralized nature.

S.5 Incentive Mechanisms and Applicable Fees

Moonbeam incentivizes participation through staking rewards for collators and token holders, alongside transaction fees.

Incentive Mechanism:

1. Collator Rewards:

- Block Rewards: Collators are rewarded with newly minted tokens for successfully producing and validating blocks. These rewards are distributed proportionally to the collators in the active set.
- Transaction Fees: Collators also earn transaction fees from the transactions included in the blocks they produce. These fees are paid by users to prioritize their transactions.

2. Delegation Rewards:

- Delegated Stake: Token holders can delegate their stake to collator candidates. By doing so, they share in the rewards earned by the collators to whom they delegate their tokens. This incentivizes the broader community to participate in governance and block production.
- Voting Power: Token holders who delegate their stake to collators help secure the network and participate in the selection of active collators.

3. Governance Participation:

Voting on Network Proposals: Moonbeam uses its native tokens to allow participants to vote on governance proposals, helping to influence the future direction of the network and incentivizing active involvement in network management.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Transaction fees on Moonbeam are determined based on the complexity and size of the transaction. Users pay these fees in the native token (GLMR), which are distributed to the collators.
- Fee Distribution: The fees are split between collators, incentivizing them to process transactions efficiently. The amount of transaction fees can vary depending on network congestion and the size of the transaction.

2. Staking Fees:

Collator Staking: Collators must stake a certain amount of tokens to be eligible for block production. They are incentivized with staking rewards and transaction fees for ensuring the network's security and functionality.

3. Governance Fees:

Voting Fees: Users may need to pay small fees to participate in governance, such as proposing changes or voting on proposals. These fees ensure governance is utilized effectively and prevents spam on the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These

assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, polkadot, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for NEO

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	NEO	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	65700.00000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

NEO is present on the following networks: Ethereum, Neo.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The NEO blockchain uses a Delegated Byzantine Fault Tolerance (dBFT) consensus mechanism to validate transactions, relying on an elected committee and consensus nodes to maintain security and efficiency.

Core Components of dBFT:

1. Candidates:

- a. Individuals or organizations can register as candidates for committee membership, a process that requires on-chain registration.

- b. NEO holders vote for candidates based on their NEO holdings, with votes calculated every 21 blocks.
 - c. Elections are valid if more than 20% of all NEO tokens participate in voting. The candidates with the most votes are selected as committee members and consensus nodes.
2. Committee:
- a. The top 21 candidates with the most votes are elected as committee members. This committee is responsible for governing the network, including electing node roles like Oracle nodes, StateRoot consensus nodes, NeoFS Inner Ring nodes, and consensus nodes.
 - b. The seven members with the highest votes also serve as consensus nodes, responsible for proposing and generating new blocks. Consensus nodes are rotated every 21 blocks to maintain security and decentralization.
 - c. Committee proposals require more than 50% agreement for approval, allowing the committee to update blockchain parameters as needed.

S.5 Incentive Mechanisms and Applicable Fees

NEO is present on the following networks: Ethereum, Neo.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The NEO network uses a dual-token model featuring NEO and GAS tokens. NEO serves governance and voting functions, while GAS is used for network operations.

Incentive Mechanisms:

- Supply and Governance: NEO has a maximum supply of 100 million tokens, is indivisible, and is used for governance activities, including electing consensus nodes and adjusting consensus parameters.
- Claiming GAS: NEO holders earn GAS based on their holdings, which allows them to participate in the ecosystem without directly purchasing GAS.
- GAS Token:
 - Utility and Fees: GAS is the network's utility token, with a minimum unit of 0.00000001 (1 Datashi). GAS is required for network fees, including transfers, asset registration, and smart contract execution. GAS transactions are precise, supporting high granularity for fees.
 - Supply: Unlike NEO, GAS has no maximum supply, and transaction fees paid in GAS are burned, which contributes to supply control.
- GAS Distribution:
 - Block Rewards: Each block generates 5 GAS, distributed to NEO holders, voters, and the Neo Committee.
 - Committee: NEO Holders receive 10%, distributed based on the holding period. Committee & Consensus Nodes receive 10%, with rewards recalculated every 21 blocks based on updated voting. Voters receive 80%, incentivizing voting participation. Rewards are calculated and

distributed every epoch (21 blocks), with voters for consensus nodes receiving a higher reward ratio than those voting for non-consensus committee members.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, neo is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Osmosis

OSMO | TDS6NVZ46

Quantitative information

Quantitative sustainability indicators for Osmosis

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Osmosis	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	65180.91744	kWh/a

Qualitative information

S.4 Consensus Mechanism

Osmosis is present on the following networks: Cosmos, Osmosis.

The Cosmos network uses the Cosmos SDK, a modular framework that enables developers to build custom, application-specific blockchains. Cosmos SDK chains rely on Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine that supports interoperability and fast transaction finality.

Core Components:

1. Tendermint BFT Consensus with Proof of Stake:
 - Validator Selection: Cosmos validators are selected based on the amount of ATOM they stake or receive from delegators. These validators participate in block proposal and validation through a two-thirds majority voting system.
 - Security Threshold: Tendermint BFT ensures network security as long as fewer than one-third of validators act maliciously.
2. Modular Cosmos SDK Framework:
 - Inter-Blockchain Communication (IBC): The Cosmos SDK supports IBC, allowing seamless interoperability between Cosmos-based blockchains.
 - Application Blockchain Interface (ABCI): This interface separates the consensus layer from the application layer, enabling developers to implement custom logic without modifying the consensus engine.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Osmosis is present on the following networks: Cosmos, Osmosis.

The Cosmos network incentivizes both validators and delegators to secure the network through staking rewards, funded by transaction fees and newly minted ATOM.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ATOM Rewards: Validators earn staking rewards in ATOM tokens for participating in consensus, with rewards shared with delegators who stake ATOM through delegation.

2. Slashing for Accountability:

Penalties for Misconduct: Validators who act maliciously, such as double-signing or staying offline, face slashing penalties, which remove a portion of their staked ATOM. Delegators may also experience slashing if their chosen validator is penalized, encouraging careful selection of trustworthy validators.

Applicable Fees:

1. Transaction Fees:

User-Paid Fees in ATOM: All transactions on the Cosmos Hub incur fees paid in ATOM, compensating validators for transaction processing and helping to prevent network spam.

2. Customizable Fee Model:

Custom Token Fees: Cosmos SDK allows individual chains to define their own transaction fees in tokens other than ATOM, supporting varied application requirements within the ecosystem.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) cosmos, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Gnosis Chain

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Gnosis Chain	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	63072.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

S.5 Incentive Mechanisms and Applicable Fees

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



ChainLink Token

LINK | 3R3J70FDR

Quantitative information

Quantitative sustainability indicators for ChainLink Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ChainLink Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	62850.72854	kWh/a

Qualitative information

S.4 Consensus Mechanism

ChainLink Token is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Optimism, Polygon, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
 - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
 - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
 - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.

- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
 - Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability.
- Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.

2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.
2. Block Production:
 - Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
 - Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.
3. Plasma Framework:
 - Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
 - Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

ChainLink Token is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Optimism, Polygon, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. **Delegated Staking Rewards** Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, gnosis_chain, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Story

IP | BVZJV41L8

Quantitative information

Quantitative sustainability indicators for Story

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVX65	/
S.3 Name of the crypto-asset	Story	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	59130.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Story Blockchain network uses the CometBFT consensus mechanism, which is known for its high performance, scalability, and security and has been proven in the Cosmos ecosystem. CometBFT enables fast block times and instant finality, which is crucial for intellectual property applications.

The network architecture combines the Cosmos SDK for the consensus layer with a modified version of the Geth client as the execution layer to ensure full EVM compatibility. This modular structure allows for seamless integration of new modules and features while optimizing network performance.

S.5 Incentive Mechanisms and Applicable Fees

In the Story network, validators and delegators are incentivized through a structured staking model. Validators, responsible for block production and transaction validation, receive block rewards consisting of newly issued tokens and transaction fees. Delegators can delegate their tokens to validators and in return receive a share of the rewards proportional to their stake. The network supports both flexible and fixed staking periods, with longer lock-in periods offering higher reward multipliers.

Transaction fees follow the EIP-1559 model, in which a base amount is burned, resulting in a deflationary effect. This economic design aims to encourage active participation while ensuring the long-term sustainability of the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


WAX

WAXP | H76QDN5MF

Quantitative information

Quantitative sustainability indicators for WAX

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	WAX	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	54750.00000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The WAXP blockchain utilizes a Delegated Proof of Stake (DPoS) consensus mechanism designed to provide scalability, low latency, and decentralization, while ensuring efficient transaction processing and network security.

Key Features of WAXP's Consensus Mechanism:

1. Delegated Proof of Stake (DPoS):

Token holders vote for block producers (BPs), who are responsible for validating transactions and producing new blocks. The voting power is directly tied to the amount of WAXP tokens held, with token holders able to vote for up to 30 block producers at a time. This system ensures decentralization while maintaining high network throughput.

2. Block Production:

Block producers take turns producing blocks in rounds, with each block producer having an equal chance to validate and produce blocks in their turn. The process ensures that all transactions are processed efficiently, and the network remains fast and scalable.

3. Finality and Security:

Once a block is produced and validated by a sufficient number of block producers, it is finalized and added to the blockchain. This prevents forking and ensures high security and immutability for the transactions.

4. Incentives for Participation:

Block producers receive WAXP tokens and transaction fees as rewards for their participation in block creation and validation. These incentives encourage active participation in maintaining the network's performance, security, and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

WAXP uses a Delegated Proof of Stake (DPoS) consensus mechanism to incentivize network participants.

Incentive Mechanism:

1. Block Producer Rewards:
Block Producers (BPs) earn WAXP tokens and transaction fees for validating and producing blocks. These rewards encourage active participation.
2. Voting and Delegation:
Token Holders vote for block producers and can delegate their votes to trusted producers, earning rewards based on their delegation.
3. Active Participation:
Block producers and voters are rewarded with WAXP tokens and transaction fees, promoting a secure and decentralized network.

Applicable Fees:

1. Transaction Fees:
Transaction fees in WAXP tokens are paid for every transaction, helping incentivize block producers and maintain the network.
2. Network Resources:
Users stake WAXP tokens to access resources like RAM, CPU, and bandwidth for transactions and smart contracts.
3. Fee Redistribution:
Transaction and resource fees are distributed to block producers, rewarding their participation in securing the network.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Monad

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Monad	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	53348.40000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Monad uses a custom Byzantine Fault Tolerant protocol called MonadBFT to achieve network-wide agreement on transaction ordering and block proposals. Consensus proceeds with asynchronous coordination across validators, decoupling transaction execution from block ordering to increase throughput.

S.5 Incentive Mechanisms and Applicable Fees

The native token MON is used to pay network transaction (gas) fees, which compensate validators for including and processing transactions.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on

assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**kaia**

KAIA | CRM_Kaia

Quantitative information

Quantitative sustainability indicators for kaia

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	kaia	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	52560.00000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Kaia employs an optimized version of the Istanbul Byzantine Fault Tolerance (IBFT) consensus mechanism, which is a variant of Practical Byzantine Fault Tolerance (PBFT). The process involves the election of a proposer and a committee using a Verifiable Random Function (VRF), followed by block generation by the proposer and subsequent verification and signing by the committee members.

S.5 Incentive Mechanisms and Applicable Fees

Kaia's token economy is designed to create sustainable funding structures for empowering its ecosystem, growth initiatives, and strategic investments. With every new block, newly issued KAIA tokens and the sum of transaction fees used in the block. Transaction fees on the Kaia network are determined by a dynamic gas fee model, which adjusts fees based on network congestion to maintain low costs and protect against spam attacks. A portion of these fees is automatically burned to control token supply and support the token's value.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When

calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



XLM | ZCN8SR2H7

Quantitative information

Quantitative sustainability indicators for Stellar Lumen

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Stellar Lumen	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	52560.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Stellar uses a unique consensus mechanism known as the Stellar Consensus Protocol (SCP).

Core Concepts:

1. Federated Byzantine Agreement (FBA):
 - SCP is built on the principles of Federated Byzantine Agreement (FBA), which allows decentralized, leaderless consensus without the need for a closed system of trusted participants.
 - Quorum Slices: Each node in the network selects a set of other nodes (quorum slice) that it trusts. Consensus is achieved when these slices overlap and collectively agree on the transaction state.
2. Nodes and Validators:
 - Nodes: Nodes running the Stellar software participate in the network by validating transactions and maintaining the ledger.
 - Validators: Nodes that are responsible for validating transactions and reaching consensus on the state of the ledger. Consensus Process
3. Transaction Validation:

Transactions are submitted to the network and nodes validate them based on predetermined rules, such as sufficient balances and valid signatures.
4. Nomination Phase:
 - Nomination: Nodes nominate values (proposed transactions) that they believe should be included in the next ledger. Nodes communicate their nominations to their quorum slices.

- Agreement on Nominations: Nodes vote on the nominated values, and through a process of voting and federated agreement, a set of candidate values emerges. This phase continues until nodes agree on a single value or a set of values.
- 5. Ballot Protocol (Voting and Acceptance): Balloting:
 - The agreed-upon values from the nomination phase are then put into ballots. Each ballot goes through multiple rounds of voting, where nodes vote to either accept or reject the proposed values.
 - Federated Voting: Nodes exchange votes within their quorum slices, and if a value receives sufficient votes across overlapping slices, it moves to the next stage.
 - Acceptance and Confirmation: If a value gathers enough votes through multiple stages (prepare, confirm, externalize), it is accepted and externalized as the next state of the ledger.
- 6. Ledger Update:

Once consensus is reached, the new transactions are recorded in the ledger. Nodes update their copies of the ledger to reflect the new state. Security and Economic Incentives
- 7. Trust and Quorum Slices:

Nodes are free to choose their own quorum slices, which provides flexibility and decentralization. The overlapping nature of quorum slices ensures that the network can reach consensus even if some nodes are faulty or malicious.
- 8. Stability and Security:

SCP ensures that the network can achieve consensus efficiently without relying on energy-intensive mining processes. This makes it environmentally friendly and suitable for high-throughput applications.
- 9. Incentive Mechanisms:

Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, the network incentivizes participation through the intrinsic value of maintaining a secure, efficient, and reliable payment network.

S.5 Incentive Mechanisms and Applicable Fees

Stellar's consensus mechanism, the Stellar Consensus Protocol (SCP), is designed to achieve decentralized and secure transaction validation through a federated Byzantine agreement (FBA) model. Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, it ensures network security and transaction validation through intrinsic network mechanisms and transaction fees.

Incentive Mechanisms:

1. Quorum Slices and Trust:
 - Quorum Slices: Each node in the Stellar network selects other nodes it trusts to form a quorum slice. Consensus is achieved through the intersection of these slices, creating a robust and decentralized trust network.
 - Federated Voting: Nodes communicate their votes within their quorum slices, and through multiple rounds of federated voting, they agree on the transaction state. This process ensures that even if some nodes are compromised, the network can still achieve consensus securely.
2. Intrinsic Value and Participation:
 - Network Value: The intrinsic value of participating in a secure, efficient, and reliable payment network incentivizes nodes to act honestly and maintain network security. Organizations and individuals running nodes benefit from the network's functionality and the ability to facilitate transactions.
 - Decentralization: By allowing nodes to choose their own quorum slices, Stellar promotes decentralization, reducing the risk of central points of failure and making the network more resilient to attacks. Fees on the Stellar Blockchain

3. Transaction Fees:

- Flat Fee Structure: Each transaction on the Stellar network incurs a flat fee of 0.00001 XLM (known as a base fee). This low and predictable fee structure makes Stellar suitable for micropayments and high-volume transactions.
- Spam Prevention: The transaction fee serves as a deterrent against spam attacks. By requiring a small fee for each transaction, Stellar ensures that the network remains efficient and that resources are not wasted on processing malicious or frivolous transactions.

4. Operational Costs:

Minimal Fees: The minimal transaction fees on Stellar not only prevent spam but also cover the operational costs of running the network. This ensures that the network can sustain itself without placing a significant financial burden on users.

5. Reserve Requirements:

- Account Reserves: To create a new account on the Stellar network, a minimum balance of 1 XLM is required. This reserve requirement prevents the creation of an excessive number of accounts, further protecting the network from spam and ensuring efficient resource usage.
- Trustline and Offer Reserves: Additional reserve requirements exist for creating trustlines and offers on the Stellar decentralized exchange (DEX). These reserves help maintain network integrity and prevent abuse.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for DYDX

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	DYDX	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	44938.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

DYDX is present on the following networks: Dydx Chain, Osmosis.

Consensus is achieved through a delegated Proof-of-Stake (dPoS) model, where validators are elected based on the total tokens staked with them, either via self-staking or delegation. The active validator set is limited to the top validators, ranked by stake. Validators are responsible for proposing new blocks. A block is committed when at least two-thirds of the validator set, weighted by stake, reaches agreement. This structure is designed with the intention to promote both security and decentralisation, though validator concentration or coordination failures can affect the resilience of the system. Slashing mechanisms apply to discourage misbehaviour, such as downtime, double-signing, or deviation from consensus rules.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.

- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

DYDX is present on the following networks: Dydx Chain, Osmosis.

The incentive structure of the dYdX Chain is based on the redistribution of network revenues. Validators and their delegators are compensated with staking rewards derived from 40% of the net trading and transaction fees, which are collected predominantly in USDC. These rewards are distributed automatically on a block-by-block basis and proportionally according to the staked tokens and validator commission rates. Validators are free to set commission fees within a configurable range. In addition, traders on the network may receive token-denominated trading rewards, with up to 90% of their paid fees returned in DYDX tokens. Transactions on the network require token-based staking actions and governance deposits, while a slashing module penalises validator misbehaviour by reducing both validator and delegator stakes. The parameters of these mechanisms, including validator set size, reward percentages, and commission structures, are subject to modification through on-chain governance.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The

information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


MovieBloc

MBL | CRM_MovieBloc

Quantitative information

Quantitative sustainability indicators for MovieBloc

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	MovieBloc	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	44495.32500	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Ontology operates on a Verifiable Byzantine Fault Tolerance (VBFT) consensus mechanism, which combines Proof of Stake (PoS), Verifiable Random Function (VRF), and Byzantine Fault Tolerance (BFT) to deliver a secure and efficient consensus process.

Core Components:

- VBFT Hybrid Consensus: Combines PoS for staking, VRF for randomness in node selection, and BFT for transaction finality, ensuring both security and efficiency in the network.
- Node Selection via VRF: A Verifiable Random Function ensures randomness in selecting consensus nodes, making it difficult for adversaries to predict or manipulate the selection process.
- Stake-Based Voting: Nodes with higher stakes have greater voting power in the consensus process, aligning their incentives with the network's security and stability.

S.5 Incentive Mechanisms and Applicable Fees

Ontology employs a dual-token system and a comprehensive fee-sharing model to incentivize participation and ensure the network's sustainability.

Incentive Mechanisms:

- Staking Rewards: ONT holders can stake their tokens to earn ONG rewards. This incentivizes long-term commitment and active participation in governance and network stability.

- Governance Participation: ONT holders have voting rights in network governance decisions, enabling them to influence protocol upgrades and other critical parameters.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in ONG for transactions and smart contract executions. Fees are relatively low, making Ontology suitable for microtransactions and complex applications.
- Fee-Sharing Model: A portion of transaction fees is distributed to stakers and node operators, aligning the interests of all network participants and supporting the ecosystem's sustainability.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ontology is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for VeChain

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	VeChain	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	39946.49940	kWh/a

Qualitative information

S.4 Consensus Mechanism

VeChain is present on the following networks: Binance Smart Chain, Vechain.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

VeChain employs a Proof of Authority (PoA) 2.0 consensus mechanism, where trusted Authority Masternodes are responsible for validating transactions, providing both security and efficiency for enterprise applications.

Core Components of VeChain's Consensus:

1. Proof of Authority (PoA) 2.0:
Trusted Authority Masternodes: VeChain's PoA 2.0 relies on a set of pre-approved Authority Masternodes to validate blocks and confirm transactions. These nodes are selected based on their reputation and reliability, ensuring network integrity and trustworthiness.
2. Finality and Security:
Immediate Transaction Finality: Once a block is validated under PoA 2.0, it is final, reducing the likelihood of forks. This immediate finality enhances the security and reliability of the network, making it suitable for enterprise-grade applications.

S.5 Incentive Mechanisms and Applicable Fees

VeChain is present on the following networks: Binance Smart Chain, VeChain.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

VeChain's incentive model utilizes a dual-token system to support staking, transaction processing, and economic stability, helping to ensure predictable costs for network users.

Incentive Mechanisms:

1. Dual-Token Model:

- VET (VeChain Token): VET is used primarily for value transfer and staking on the network. VET holders can stake their tokens to generate VTHO, which serves as "gas" for transactions.
- VTHO (VeThor Token): VTHO is used to pay for transaction fees, providing a buffer against fluctuations in VET's market price. This setup decouples transaction costs from VET's volatility, allowing for stable and predictable transaction fees.

2. Staking Rewards:

VET Staking to Generate VTHO: By staking VET, holders automatically generate VTHO tokens, which can be used to cover transaction costs. This staking mechanism incentivizes VET holders to participate in the network and secure its operations.

Applicable Fees:

Transaction Fees in VTHO: Transaction fees on VeChain are paid in VTHO, keeping costs stable and predictable for users regardless of VET's market price. This predictable fee model makes the network appealing for enterprises and high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Celo

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Celo	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	39420.00000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Celo is present on the following networks: Celo, Near Protocol.

Celo uses a Proof of Stake (PoS) consensus model, which supports a decentralized, community-driven approach to governance and network security.

Core Components of Celo's Consensus:

1. Proof of Stake (PoS):

Validator Role: Validators are responsible for creating new blocks, validating transactions, and maintaining the security and integrity of the network. Validators are selected based on the amount of CELO tokens they hold and stake, incentivizing honest participation and network reliability.

2. Decentralized Governance:

Community Voting: Governance on Celo is decentralized, allowing CELO token holders to vote on proposals and changes to the network. This community-driven approach ensures that token holders have a say in the network's development and strategic direction.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

S.5 Incentive Mechanisms and Applicable Fees

Celo is present on the following networks: Celo, Near Protocol.

Celo's incentive model rewards validators and prioritizes accessibility with minimal transaction fees, especially for cross-border payments, supporting a flexible and user-friendly ecosystem.

Incentive Mechanisms:

1. Validator Rewards:

Transaction Fees and Newly Minted Tokens: Validators earn rewards from transaction fees as well as newly minted CELO tokens. This dual-source reward system provides a continuous financial incentive for validators to act honestly and secure the network.

2. Transaction Flexibility and Gas Price:

- **Gas Limit and Price Control:** Each transaction specifies a maximum gas limit, ensuring that users are not excessively charged if a transaction fails. Users can also set a gas price to prioritize transactions, allowing faster processing for higher fees.
- **Payment Flexibility with Multiple Currencies:** Unlike many blockchains, Celo allows transaction fees to be paid in various ERC-20 tokens, providing flexibility for users. This approach improves accessibility, especially for individuals with limited access to traditional banking.

3. Minimal Fee Structure for Accessibility:

- Designed for Low-Cost Transactions: Celo's fee structure is intentionally minimal, particularly for cross-border payments, making it ideal for users who may not have traditional banking options. This focus on accessibility aligns with Celo's mission to bring blockchain technology to underserved communities.

Applicable Fees:

Transaction Fees: Fees are calculated based on gas usage, with a maximum gas limit set per transaction. This limit protects users from excessive costs, while the option to pay in multiple currencies enhances flexibility.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) celo, near_protocol is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Ronin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Ronin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	39420.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):
 - Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.
 - Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.
2. Incentive-Driven Voting System:
 - Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

S.5 Incentive Mechanisms and Applicable Fees

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:

- Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.
- Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.

2. Slashing Mechanism for Accountability:

- Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.
- Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.

3. Governance Participation:

RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


MANTRA

MANTRA | 11B60HRDS

Quantitative information

Quantitative sustainability indicators for MANTRA

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	MANTRA	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	33375.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

MANTRA Chain is a Layer 1 blockchain built using the Cosmos SDK and employs the Tendermint Byzantine Fault Tolerant (BFT) consensus mechanism. It operates under a Proof-of-Stake (PoS) model, where validators are selected based on the amount of OM tokens they stake.

S.5 Incentive Mechanisms and Applicable Fees

MANTRA is present on the following networks: Mantra Oma.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are

assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Lisk

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Lisk	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	32850.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Lisk employs a Delegated Proof of Stake (DPoS) consensus mechanism to maintain a balance between decentralization, security, and efficiency in block production and transaction validation.

Core Components of Lisk's Consensus:

1. Delegated Proof of Stake (DPoS):

Community-Elected Delegates: Lisk operates with a fixed set of 101 active delegates, chosen by token holders through a voting process. Lisk holders vote for delegates by staking their LSK tokens, and the top 101 delegates with the highest votes are selected for block production and validation.

2. Block Production:

Fair Rotational System: Active delegates take turns producing blocks at fixed intervals, ensuring fair participation and equal opportunity for all elected delegates. This rotation system promotes decentralization and prevents single entities from dominating block production.

3. Finality and Security:

Reduced Fork Risk: The fixed number of reputable delegates provides a fast confirmation time for blocks and minimizes the likelihood of forks or attacks, enhancing overall network security and stability.

S.5 Incentive Mechanisms and Applicable Fees

Lisk's incentive model rewards both active delegates and token holders, ensuring secure and consistent network performance while managing inflation.

Incentive Mechanisms:

1. Rewards for Delegates:

- Block Rewards: Delegates receive rewards in LSK tokens for producing blocks, incentivizing them to actively participate in securing and maintaining the network. This reward structure encourages reliable block production from the community-elected delegates.
- Transaction Fees: Delegates also earn transaction fees paid in LSK tokens for each transaction they validate within blocks. This provides an additional source of income and incentivizes efficient transaction processing.

2. Voting Incentives for Token Holders:

Supporting Reliable Delegates: Lisk token holders benefit indirectly by voting for trustworthy and stable delegates, as these delegates help secure the network. Token holders play an active role in network governance by supporting reliable participants.

3. Reward Reduction Over Time:

Sustainable Token Economy: Lisk's block rewards decrease over time to control inflation and ensure the long-term sustainability of the token economy. This gradual reduction in rewards aligns with Lisk's goal of managing token supply and maintaining a healthy economic structure.

Applicable Fees:

1. Fixed Fee Structure:

Predictable Transaction Costs: Lisk employs a fixed fee structure for standard transactions, providing users with predictability in transaction costs and making the network accessible and user-friendly.

2. Two-Cost Structure for Mainnet Transactions:

Layer 2 Execution Fee and Layer 1 Data Fee: Every transaction on Lisk's Mainnet has two associated costs: an L2 execution fee and an L1 data fee. This dual-fee model aligns with Lisk's Layer 2 architecture and its reliance on Ethereum for security and data storage.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Secret

SCRT | 93XJT88VH

Quantitative information

Quantitative sustainability indicators for Secret

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Secret	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	31536.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Secret utilizes the Proof of Stake (PoS) consensus mechanism to secure its network, with an emphasis on privacy-preserving features. The blockchain is built on the Cosmos SDK, allowing it to interoperate with other blockchains while maintaining the ability to offer confidential transactions.

Key Features of Secret Blockchain's Consensus Mechanism:

1. Proof of Stake (PoS):

Validators are selected to produce and validate blocks based on the number of SCRT tokens they stake. Stakers, also known as validators, secure the network by participating in the consensus process, ensuring transaction validation and block production. The greater the amount of SCRT tokens staked, the higher the chances of being selected to validate the next block.

2. Privacy by Default:

Secret Network uses encryption and trusted execution environments (TEEs) to ensure that data is kept private. This is in contrast to most blockchains that publicly display all transaction data. The network supports private smart contracts, meaning that the details of transactions, including the sender, recipient, and amount, are confidential by default.

3. Validator and Delegator Structure:

Validators in the network are responsible for producing blocks, validating transactions, and maintaining network security. Token holders who do not wish to operate their own validator node can delegate their SCRT tokens to a validator. Delegators share in the rewards of validators based on the amount of SCRT tokens they delegate.

4. Cosmos-SDK & Tendermint Core:

The Cosmos-SDK and Tendermint Core provide the underlying infrastructure for Secret's PoS consensus. This enables fast finality and low-latency transaction processing, ensuring the network is both scalable and secure.

S.5 Incentive Mechanisms and Applicable Fees

Incentive Mechanism:

1. Validator Rewards:

Validators are rewarded in SCRT tokens for producing blocks, validating transactions, and maintaining network security. These rewards are proportional to the amount of stake a validator holds. Validators are selected based on the amount of SCRT tokens staked, and the greater the stake, the higher the chances of being selected to validate the next block.

2. Delegator Rewards:

Token holders who delegate their SCRT tokens to a validator receive a share of the rewards earned by that validator. The more SCRT a delegator contributes, the larger their share of the rewards. This incentivizes the broader community to participate in the network's staking process without needing to operate their own validator nodes.

3. Staking and Delegation:

Staking is essential for network participation and security, and it is the primary mechanism through which both validators and delegators earn rewards. This staking model aligns participants' interests with the network's success and integrity. Validators and delegators are motivated to act honestly because they face slashing penalties if they fail to perform their duties correctly, such as participating in double-signing or other malicious activities.

Applicable Fees:

1. Transaction Fees:

Users pay transaction fees in SCRT tokens to process transactions on the network. These fees are used to incentivize validators for validating and including transactions in blocks. Fees are determined dynamically based on network demand and transaction complexity. In periods of high congestion, users may need to pay higher fees for quicker transaction processing.

2. Smart Contract Fees:

Secret supports private smart contracts, and users must pay fees for executing these contracts. These fees are also paid in SCRT tokens and are distributed to validators who process the execution. The fees associated with smart contract execution are based on the resources consumed by the contract, including computational power and storage.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, cosmos, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital

Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Axelar

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Axelar	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	29753.77211	kWh/a

Qualitative information

S.4 Consensus Mechanism

Axelar is present on the following networks: Arbitrum, Avalanche, Axelar, Base, Binance Smart Chain, Ethereum, Fantom, Linea, Mantle, Optimism, Osmosis, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The Axelar network operates a Proof-of-Stake consensus mechanism based on CometBFT, formerly Tendermint consensus. CometBFT is a Byzantine Fault Tolerant consensus algorithm designed to provide deterministic block finality and consistent state replication among validators. Consensus participants are validators who bond the native crypto-asset AXL and obtain voting power based on their bonded stake, including AXL delegated to them by third parties. Validators participate in block production and consensus by proposing blocks, verifying transactions, and broadcasting cryptographic votes. Token holders may delegate AXL to validators, thereby contributing to the validator's voting power without operating validator infrastructure themselves. Consensus proceeds in rounds, each consisting of a block proposal followed by two voting phases, commonly referred to as pre-vote and pre-commit. A block is finalised and committed once more than two-thirds of the total validator voting power pre-commits to the same block in the same round. This mechanism provides deterministic finality for the Axelar blockchain and does not rely on probabilistic fork resolution. In addition to base-layer block consensus, Axelar uses threshold signature schemes for cross-chain authorisation. Validators participate in multi-party cryptographic processes that allow the network to authorise commands on connected external chains. Under this model, gateway signing authority is divided into key shares held by validators, and cross-chain execution requires participation by the required threshold of validator voting power. Axelar validators may also verify events from connected external blockchains. For this purpose, validators may run or access nodes for supported external chains and use those sources to confirm that relevant events have occurred

before voting on their validity within the Axelar network. Cross-chain messages therefore depend both on Axelar's own consensus finality and on the finality properties of the source chain from which a message originates. CometBFT provides Byzantine Fault Tolerance, meaning that the network is designed to remain safe and consistent as long as less than one-third of total validator voting power behaves maliciously or fails. For cross-chain actions, Axelar additionally relies on threshold cryptography and validator participation requirements to reduce the risk that a single validator or operator can unilaterally authorise transactions on connected chains.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators

and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.

9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):

- Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:

- Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

Mantle is a Layer-2 rollup built on top of Ethereum, designed to leverage Ethereum's security and Proof-of-Stake (PoS) consensus without an independent consensus layer.

Core Components of Mantle's Consensus:

1. Ethereum PoS Inheritance:

Layer-2 Rollup Model: Mantle does not operate its own consensus mechanism; instead, it relies on Ethereum's PoS for transaction finalization and network security. As a rollup on Ethereum, Mantle inherits the security guarantees of Ethereum's established PoS model.

2. Rollup Type Options:

Optimistic Rollups or Zero-Knowledge Rollups: Depending on its configuration, Mantle may use either Optimistic Rollups or Zero-Knowledge Rollups (zk-Rollups) to batch transactions. These rollup methods allow Mantle to achieve efficient off-chain processing and on-chain finality by periodically committing transaction data to Ethereum's mainnet.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Axelar is present on the following networks: Arbitrum, Avalanche, Axelar, Base, Binance Smart Chain, Ethereum, Fantom, Linea, Mantle, Optimism, Osmosis, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.

- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The Axelar network secures its Proof-of-Stake consensus mechanism through staking rewards, transaction fees, and penalties. Validators and delegators are incentivised to participate honestly in block production, transaction validation, and cross-chain message verification. Validators and delegators may receive rewards in AXL. These rewards are generally derived from inflationary issuance and applicable network fees and are distributed in proportion to bonded stake, subject to validator commission rates and network parameters. Validators may also receive additional incentives for supporting external blockchain connections, including by operating or accessing infrastructure required to verify cross-chain events. Users pay transaction fees for activity on the Axelar network. Cross-chain transactions may also require fees for source-chain execution, Axelar network processing, relay activity, and destination-chain execution. These fees may be handled through the Axelar Gas Service, which is used to support payment and execution across connected chains. Collected fees may be distributed to validators and delegators, allocated to network-controlled pools, or burned, depending on the applicable protocol rules and governance-approved parameters. Bonded AXL may be subject to slashing or other penalties where validators fail to comply with protocol rules, including downtime, double-signing, or other conduct that affects consensus or cross-chain security.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

Mantle aims to reduce transaction fees for users by utilizing Ethereum compatibility, rollup technology, and transaction bundling, offering a cost-effective Layer-2 solution.

Incentive Mechanisms:

1. Gas Fee Model:

Ethereum Compatibility: Mantle is EVM-compatible, meaning it shares Ethereum's gas fee model. Transactions require users to pay fees in units of gas, with costs varying based on transaction complexity and computational demand.

2. Lower Transaction Costs:

- Off-Chain Processing with Bundling: By processing transactions off-chain and settling data on Ethereum only periodically, Mantle reduces individual transaction costs. This method results in significantly lower fees compared to the Ethereum mainnet.
- Economies of Scale: Through transaction bundling, Mantle can spread the cost of Ethereum's on-chain settlement across multiple transactions, allowing users to pay only a fraction of the gas fees they would incur directly on Ethereum.

Applicable Fees:

Layer-2 Gas Fees: While Mantle's gas fees are lower than those on Ethereum, they are still measured in units of gas and depend on transaction complexity. The fees reflect the cost of executing transactions in Mantle's Layer-2 environment while benefiting from reduced overall gas consumption due to batching.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- **Transaction Ordering:** Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- **Economic Incentives:** Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- **Assumption of Validity:** In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- **Challenge Mechanism:** Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- **Challenge Rewards:** Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- **Fraud Proof Penalties:** If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- **Inactivity and Misbehavior:** Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- **Layer 2 Transaction Fees:** Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- **Cost Efficiency:** By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- **Posting Batches to Ethereum:** Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- **Cost Sharing:** The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, base, binance_smart_chain, ethereum, fantom, linea, mantle, optimism, osmosis, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for THORChain

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	THORChain	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	26805.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

THORChain utilizes the Tendermint Byzantine Fault Tolerant (BFT) consensus protocol combined with Proof of Stake (PoS), where validator nodes stake RUNE to secure the network.

Core Components of THORChain's Consensus:

1. Tendermint Consensus Protocol:

THORChain uses the Tendermint consensus protocol, a BFT algorithm that enables high-speed and secure consensus across distributed nodes. This protocol is designed to achieve consensus even if some validators behave maliciously, as long as a majority act honestly.

2. Proof of Stake (PoS) Mechanism:

- **Staking Requirements:** Validator nodes are required to stake RUNE, the native token of THORChain, to participate in the consensus process. Staking serves as collateral, incentivizing validators to act honestly and discouraging malicious behavior through economic penalties.
- **Validator Rotation:** THORChain regularly rotates its validators, ensuring that only the most actively engaged and well-staked nodes maintain validator status. This competitive environment encourages decentralization, as nodes must continuously stake RUNE to secure a spot in the validator set.

3. Slashing for Security:

Validators can be penalized (slashed) if they fail to fulfill their responsibilities or act dishonestly. Slashing serves as a deterrent against malicious behavior, ensuring validators remain reliable and maintain the integrity of the network.

S.5 Incentive Mechanisms and Applicable Fees

THORChain employs staking rewards, transaction fees, and slashing penalties to maintain security and incentivize validator participation.

Incentive Mechanisms:

1. Staking Rewards:

Validators earn staking rewards for participating in network security and consensus. These rewards are paid in RUNE, THORChain's native token, and are proportional to the amount staked. This incentivizes nodes to lock up RUNE and remain active in the network.

2. Transaction Fees:

Validators also earn a portion of the transaction fees generated within the network. These fees are distributed among validators as additional rewards, providing an ongoing incentive to process transactions efficiently.

3. Decentralization through Node Rotation:

The regular rotation of validator nodes means that participants must continuously compete for positions by staking RUNE. This mechanism enhances network security and promotes decentralization, preventing any single entity from dominating the network.

4. Slashing Mechanism:

To maintain network integrity, THORChain employs a slashing mechanism, penalizing validators that act maliciously or fail to meet their responsibilities. This encourages validators to act in the network's best interest.

Applicable Fees:

Transaction fees on THORChain are paid in RUNE and vary based on network activity and transaction type. These fees help compensate validators and support the network's operational costs.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Moonriver

MOVR | KW2NCBQ6M

Quantitative information

Quantitative sustainability indicators for Moonriver

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Moonriver	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	26280.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Moonriver operates on a Proof of Stake (PoS) consensus mechanism, enhanced by Polkadot's Nominated Proof of Stake (NPoS) model. This structure ensures secure, scalable, and decentralized transaction processing, leveraging the robust Substrate framework.

Core Components:

- Nominated Proof of Stake (NPoS):
Validators are selected through staking by token holders, known as nominators, who delegate their MOVR tokens to trusted validator nodes. Validators with higher stakes and nominations are chosen to validate blocks and secure the network.
- Collator Nodes:
Moonriver employs collator nodes, responsible for aggregating transactions into blocks and submitting them to the Polkadot Relay Chain for final validation. Collators ensure fast block production while relying on Polkadot's shared security.
- Byzantine Fault Tolerance (BFT):
Moonriver integrates BFT properties to handle network disruptions and maintain consensus even if some validators act maliciously or become unavailable.
- Seamless Interoperability:
As a parachain within the Polkadot ecosystem, Moonriver benefits from Polkadot's cross-chain messaging protocols, enabling secure and efficient interoperability with other parachains and external blockchains.

S.5 Incentive Mechanisms and Applicable Fees

Moonriver's incentive model ensures active participation from validators, nominators, and developers while maintaining network security and usability.

Incentive Mechanisms:

- Staking Rewards: Validators and nominators earn MOVR tokens for securing the network and validating transactions.
- Collator Rewards: Collators, who propose blocks, are rewarded with MOVR tokens.
- Inflationary Rewards: New MOVR tokens are minted to fund staking and ecosystem development.
- Developer Incentives: A portion of rewards supports dApp development and ecosystem growth.

Applicable Fees:

- Transaction Fees: Paid in MOVR for transfers and smart contract interactions, distributed to validators and collators.
- Gas Fees: Calculated based on transaction complexity, ensuring predictable costs.
- Fee Burning: A portion of fees is burned, reducing token supply over time to support value retention.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, kusama, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**Zeta**

ZETA | 9BJJBHB21

Quantitative information

Quantitative sustainability indicators for Zeta

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Zeta	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	25537.16383	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Zeta is present on the following networks: Ethereum, Zeta.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

ZetaChain is a Layer 1 blockchain built using the Cosmos SDK and employs the CometBFT consensus engine, a variant of Byzantine Fault Tolerant (BFT) consensus. It operates under a Proof-of-Stake (PoS) model, where validators are selected based on the amount of ZETA tokens they stake.

S.5 Incentive Mechanisms and Applicable Fees

Zeta is present on the following networks: Ethereum, Zeta.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The native token, ZETA, serves multiple functions within the ZetaChain ecosystem, including transaction fee payments, staking, and governance participation. Validators and delegators earn rewards in ZETA tokens for securing the network through staking.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Bittensor

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Bittensor	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	25228.80000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Bittensor employs a Proof-of-Stake consensus mechanism tailored for integrating blockchain technology with decentralized AI, ensuring secure, efficient, and reliable contributions from its participants.

Proof of Stake (PoS) with Neural Consensus:

- Bittensor operates on a PoS consensus model, where validators are selected based on the amount of TAO tokens staked. Validators secure the network by producing and validating blocks, ensuring transaction integrity.
- Neural Consensus Integration: A unique feature of Bittensor is its neural consensus, which evaluates the quality of work performed by AI models on the network. Nodes are incentivized to contribute meaningful computations for tasks like AI training, which are validated through peer review and network-wide voting.
- Dynamic Validator Selection: The network dynamically adjusts validator participation, prioritizing nodes that contribute both computational and staking resources effectively.
- Scalability and Security: The combined PoS and neural consensus model ensures scalability for AI-centric workloads while maintaining blockchain-level security.

S.5 Incentive Mechanisms and Applicable Fees

Bittensor incentivizes network participants through token rewards for securing the network and contributing to its AI capabilities, with a fee structure designed to sustain network operations and encourage participation.

Incentive Mechanism:

- TAO Rewards for Validators: Validators earn TAO tokens as rewards for securing the network, validating transactions, and maintaining blockchain integrity. Rewards are distributed based on the validator's staked TAO tokens and performance in the consensus process.
- AI Contribution Rewards: Nodes contributing to the network's AI computations (e.g., training models) are rewarded in TAO tokens. Rewards are determined by the quality and relevance of contributions, as evaluated through the neural consensus mechanism.
- Delegation Rewards: TAO holders who delegate their tokens to validators earn a share of staking rewards, encouraging broader participation in network security and governance.
- Dynamic Incentive Structure: Rewards are dynamically allocated based on network activity and AI workloads, promoting sustained contribution and high-quality participation.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in TAO tokens for processing transactions on the network. Fees are distributed to validators as additional compensation.
- AI Service Fees: Applications utilizing Bittensor's AI services pay fees in TAO tokens, incentivizing nodes to perform computations and contribute resources.
- Low-Cost Fee Model: The network employs a cost-efficient fee structure to attract developers and users while ensuring sustainability for validators and contributors.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**Chiliz**

CHZ | KNS06KRXQ

Quantitative information

Quantitative sustainability indicators for Chiliz

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Chiliz	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	23234.88436	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Chiliz is present on the following networks: Chiliz, Ethereum.

The Chiliz Chain operates on a Proof of Staked Authority (PoSA) consensus model, a hybrid that combines Proof of Stake (PoS) and Proof of Authority (PoA) to secure the network through both economic and reputational incentives.

Core Components:

- Proof of Staked Authority (PoSA) Validator Selection: Validators are selected based on their stake of CHZ tokens and their reputation within the network, enhancing security and trustworthiness.
- Collateral Requirement: Validators must lock a portion of CHZ as collateral, which can be slashed if they act maliciously or fail to meet network standards, ensuring alignment with network security.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Chiliz is present on the following networks: Chiliz, Ethereum.

Chiliz incentivizes validators and delegators to contribute to network security through rewards and transaction fees in CHZ.

Incentive Mechanisms:

- Staking Rewards Validator Rewards: Validators earn CHZ tokens for validating transactions and maintaining network integrity.
- Delegator Rewards: CHZ holders who delegate their tokens to validators share in staking rewards, allowing passive participation in network security.

Applicable Fees:

Transaction Fees CHZ-Based Fees: Transaction fees are paid in CHZ and are distributed to validators as additional compensation, supporting validator incentives and covering network operational costs.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally

Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Metis Token

METIS | RCGXTQ3G0

Quantitative information

Quantitative sustainability indicators for Metis Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Metis Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	21127.90258	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Metis Token is present on the following networks: Ethereum, Metis.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Metis is an Ethereum Layer-2 scaling solution that utilizes Optimistic Rollup technology to enhance transaction throughput and reduce costs. In this architecture, a sequencer is responsible for aggregating and submitting batches of transactions to the Ethereum mainnet. Metis is transitioning towards a decentralized sequencer model, incorporating a Proof of Stake (PoS) consensus layer based on Tendermint.

This model involves multiple sequencers participating in transaction processing, with roles assigned through a staking mechanism. The decentralized sequencer system is designed to prevent single points of failure and ensure continuous network uptime.

S.5 Incentive Mechanisms and Applicable Fees

Metis Token is present on the following networks: Ethereum, Metis.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Within the Metis ecosystem, users pay transaction fees in the form of METIS tokens for operations conducted on the Layer-2 network. These fees are distributed among sequencers and validators as rewards for their participation in processing transactions and maintaining network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, metis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


scroll

SCR | CRM_Scroll

Quantitative information

Quantitative sustainability indicators for scroll

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	scroll	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	20235.60000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Scroll utilizes a Zero-Knowledge Rollup (ZK-Rollup) consensus mechanism built on top of Ethereum's Layer 1 blockchain. ZK-Rollups bundle multiple transactions into a single batch, generating a cryptographic proof (known as a validity proof) to verify the correctness of all transactions in the batch. This proof is then submitted to the Ethereum mainnet, ensuring the integrity and security of the processed transactions. The mechanism offloads computation and storage from Layer 1 while relying on Ethereum's security guarantees for finality.

S.5 Incentive Mechanisms and Applicable Fees

The Scroll network's incentive structures revolve around transaction processing and the maintenance of zk-provers, which are responsible for generating validity proofs. Users pay transaction fees to have their operations included in the network, and these fees cover the computational and storage costs associated with batching and proving transactions. Fees may fluctuate based on the complexity of transactions and network usage. Validators and operators of zk-provers receive compensation to ensure the continued functionality and security of the rollup mechanism.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites,

open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Boba Token

BOBA | L7CKSKP8K

Quantitative information

Quantitative sustainability indicators for Boba Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Boba Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	19899.42348	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Boba Token is present on the following networks: Boba Network, Ethereum.

Boba Network operates as an Ethereum Layer 2 solution using an Optimistic Rollup architecture to improve scalability and reduce transaction costs.

Core Components:

- Optimistic Rollup: Processes transactions off-chain, aggregates them, and submits condensed proofs to the Ethereum mainnet for finalization.
- Sequencer Role: A sequencer organizes and bundles transactions off-chain before submitting the batched data to Ethereum. This enhances transaction throughput and reduces latency.
- Fraud Proofs: Maintains security by allowing users to challenge suspicious transactions. If a transaction is deemed fraudulent, it is corrected on the mainnet, ensuring integrity.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but

face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Boba Token is present on the following networks: Boba Network, Ethereum.

The Boba Network incentivizes participation and ensures affordability with flexible fee payment options and staking rewards.

Incentive Mechanisms:

- Staking Rewards: BOBA token holders can stake their tokens to participate in governance and earn staking rewards, encouraging long-term engagement and network growth.
- Sequencer Revenue: The sequencer earns fees for bundling and submitting transactions, incentivizing efficient network operation.

Applicable Fees:

- Dual-Fee Token System: Users can pay transaction fees in BOBA tokens or the base blockchain token (e.g., ETH), offering flexibility.
- Low Transaction Costs: By batching transactions off-chain, Boba significantly reduces the gas fees users pay compared to directly using the Ethereum mainnet.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, ethereum, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The

information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Contentos

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Contentos	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	14979.60000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Contentos is present on the following networks: Binance Beacon Chain, Contentos.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

Contentos employs a self-adaptive Byzantine Fault Tolerance (saBFT) consensus mechanism, combining Delegated Proof-of-Stake (DPoS) with Byzantine Fault Tolerance (BFT).

S.5 Incentive Mechanisms and Applicable Fees

Contentos is present on the following networks: Binance Beacon Chain, Contentos.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee

structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

The native token, COS, serves multiple functions within the Contentos ecosystem. Content creators earn COS through content mining.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_beacon_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Plasma

XPL | ZC0VHB8ZB

Quantitative information

Quantitative sustainability indicators for Plasma

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Plasma	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	13402.80000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Plasma Chain uses PlasmaBFT, a consensus protocol based on Fast HotStuff with pipelined execution. Validators are selected through a simplified Proof-of-Stake mechanism and participate in block production and finalization. Misbehavior does not lead to full slashing of stake but results in reduced rewards.

S.5 Incentive Mechanisms and Applicable Fees

Validators receive a share of transaction fees and protocol rewards for signing blocks. If validators fail to participate correctly, their reward share is reduced. The protocol is designed to balance participation incentives while limiting financial penalties.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The

information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Astar

ASTR | 87L5SX99N

Quantitative information

Quantitative sustainability indicators for Astar

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Astar	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	13140.00000	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Astar uses a hybrid consensus mechanism that combines Proof of Stake (PoS) and Delegated Proof of Stake (DPoS), with the added feature of Sharded Multichain capabilities. The primary goal is to provide a scalable, interoperable, and decentralized platform for building decentralized applications (dApps), which can run on multiple blockchains in parallel.

Key Features of Astar's Consensus Mechanism:

1. **Proof of Stake (PoS):** In Astar, validators participate by staking ASTR tokens, the native currency of the network. The more tokens staked, the higher the chances of being selected as a validator. Validators are responsible for validating transactions and securing the network. Validators receive block rewards for their efforts, which are paid in ASTR tokens.
2. **Delegated Proof of Stake (DPoS):** Astar incorporates DPoS to allow ASTR token holders to vote for validators. Token holders delegate their voting power to trusted validators, who then produce blocks and validate transactions. This ensures greater decentralization by allowing the community to have a direct say in who validates the network. Delegators receive a share of the block rewards earned by their selected validators.
3. **Sharded Multichain:** Astar's consensus mechanism allows for multichain execution via Parachains in the Polkadot ecosystem, enabling Astar to process multiple parallel chains and increase scalability. This sharding mechanism ensures that Astar can scale effectively, maintaining high throughput while decentralizing the network.
4. **Finality:** Astar leverages Polkadot's GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) finality gadget for fast and deterministic finality. Once a block is finalized, it is irreversible, ensuring the integrity and security of transactions.

S.5 Incentive Mechanisms and Applicable Fees

Astar incentivizes network participation through block rewards, transaction fees, and staking rewards while encouraging governance via delegated voting.

Incentive Mechanism:

1. Staking Rewards: Validators earn ASTR tokens for validating transactions and securing the network. The more tokens staked, the higher the chances of validating blocks.
2. Delegated Proof of Stake (DPoS): ASTR token holders can delegate their tokens to validators, sharing in the rewards based on the performance of their chosen validators.
3. Cross-Chain dApp Rewards: Developers deploying dApps on Astar earn rewards for using the network's multichain capabilities.
4. Governance Participation: ASTR token holders participate in on-chain governance to vote on proposals and protocol changes.

Applicable Fees:

1. Transaction Fees: Users pay fees in ASTR tokens for transactions. These are collected by validators who process the transactions.
2. dApp Execution Fees: Developers pay for smart contract execution based on resource demands.
3. Cross-Chain Fees: Additional fees apply for asset transfers and interactions between different blockchain networks.
4. Parachain Slot Fees: Astar incurs fees for its parachain slot on the Polkadot network to ensure interoperability.

S.9 Energy consumption sources and methodologies

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. Due to the structure of this network, it is not only the mainnet that is responsible for energy consumption. In order to calculate the structure adequately, a proportion of the energy consumption of the connected network, polkadot, must also be taken into account, because the connected network is also responsible for security. This proportion is determined on the basis of gas consumption. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for ZKsync

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	ZKsync	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	6570.49105	kWh/a

Qualitative information

S.4 Consensus Mechanism

zkSync operates as a Layer 2 scaling solution for Ethereum, leveraging zero-knowledge rollups (ZK-Rollups) to enable fast, cost-effective, and secure transactions. This consensus mechanism allows zkSync to offload transaction computation from Ethereum's Layer 1, ensuring scalability while maintaining Ethereum's base-layer security.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):
zkSync aggregates multiple transactions off-chain and processes them in batches. A cryptographic proof, called a validity proof, is generated for each batch and submitted to the Ethereum mainnet. This ensures that all transactions are valid and compliant with Ethereum's rules without processing them individually on Layer 1.
- Validity Proofs:
zkSync uses zk-SNARKs (Succinct Non-Interactive Arguments of Knowledge) for its validity proofs. These proofs provide mathematical guarantees that transactions within a batch are valid, eliminating the need for Ethereum nodes to re-execute off-chain transactions.
- Sequencers:
Transactions on zkSync are ordered and processed by sequencers, which bundle transactions into batches. Sequencers maintain network efficiency and provide fast confirmations.
- Fraud Resistance:
Unlike Optimistic Rollups, zkSync relies on validity proofs rather than fraud proofs, meaning that transactions are final and secure as soon as the validity proof is accepted by Ethereum.

- Data Availability:

All transaction data is stored on-chain, ensuring that the network remains decentralized and users can reconstruct the state of zkSync at any time.

S.5 Incentive Mechanisms and Applicable Fees

zkSync incentivizes network participants through a streamlined fee structure and role-based rewards, designed to ensure security, scalability, and usability for both users and validators.

Incentive Mechanism:

- Validator Rewards: Validators, who generate validity proofs and secure the network, are compensated through transaction fees paid by users. Their role ensures that batches of transactions are processed efficiently and accurately.
- Sequencer Incentives: Sequencers are responsible for bundling and ordering transactions off-chain. They earn a share of the transaction fees for maintaining network performance and fast processing times.
- Ecosystem Growth Rewards: zkSync allocates resources to incentivize developers and projects building on its platform, fostering a robust ecosystem of dApps, DeFi protocols, and NFT marketplaces.

Applicable Fees:

- Transaction Fees: Users pay fees in Ether (ETH) for transactions on zkSync. These fees are significantly lower than Ethereum Layer 1 fees, as zkSync processes transactions off-chain and submits only aggregated proofs to the Ethereum mainnet.
- Fee Model: Fees are dynamically calculated based on the complexity of transactions (e.g., token transfers, smart contract interactions) and the cost of submitting validity proofs to Ethereum.
- Scalability Benefits: zkSync's efficient rollup architecture reduces gas fees for users while ensuring that validators and sequencers are appropriately compensated for their roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) zksync is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Plume

PLUME | FRZQZJ7BL

Quantitative information

Quantitative sustainability indicators for Plume

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Plume	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	6343.08853	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Plume is present on the following networks: Ethereum, Plume.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Plume is described as relying on an architecture aligned with optimistic rollup technology within the Arbitrum Orbit framework. Under this design, transaction ordering is typically performed by a sequencer, while settlement and finality are achieved via anchoring to Ethereum. Economic incentives and protocol rules are generally designed to encourage timely submission of fraud proofs (where applicable) within predefined challenge windows. The precise security guarantees and finality characteristics depend on the rollup configuration, the sequencer setup, and Ethereum's underlying security assumptions.

S.5 Incentive Mechanisms and Applicable Fees

Plume is present on the following networks: Ethereum, Plume.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The network is described as applying transaction fees as a core economic mechanism to support network operation and security. Fee flows may be used to remunerate relevant network roles (for example, sequencer- or validator-related functions, if and to the extent such roles exist in the deployed architecture). In addition, PLUME is described as being used in connection with incentive and participation mechanisms, including potential staking-related arrangements and interaction with DeFi applications. Any yields, rewards, or other economic benefits are contingent on protocol parameters, market conditions, and user behaviour, and may be changed by governance or technical updates, or may not materialise as expected.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary

principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Paxos Gold

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Paxos Gold	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	4670.64732	kWh/a

Qualitative information

S.4 Consensus Mechanism

Paxos Gold is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Paxos Gold is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Uniswap

UNI | XMB84LZBZ

Quantitative information

Quantitative sustainability indicators for Uniswap

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Uniswap	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	3570.39470	kWh/a

Qualitative information

S.4 Consensus Mechanism

Uniswap is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Uniswap is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.

- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Ondo

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Ondo	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	3449.57973	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


manta

MANTA | CRM_Manta_Network_

Quantitative information

Quantitative sustainability indicators for manta

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	manta	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	3373.49215	kWh/ a

Qualitative information

S.4 Consensus Mechanism

manta is present on the following networks: Ethereum, Manta.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Manta Pacific operates as a Layer 2 rollup on Ethereum and does not implement its own independent consensus mechanism. Transaction ordering and execution are handled off-chain, while final settlement and security are inherited from Ethereum's Proof-of-Stake consensus. The rollup design uses validity or fraud-proof mechanisms to ensure correctness before state updates are finalized on the base layer.

S.5 Incentive Mechanisms and Applicable Fees

manta is present on the following networks: Ethereum, Manta.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Transaction fees on Manta Pacific are paid by users for executing transactions and are generally lower than on Ethereum due to off-chain processing. Fees are collected by the network's sequencer and used to support execution and infrastructure. The native token can be used for ecosystem incentives and governance, while the underlying economic security is anchored in Ethereum.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, manta is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Aave Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Aave Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2571.19594	kWh/a

Qualitative information

S.4 Consensus Mechanism

Aave Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Huobi, Near Protocol, Polygon, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- **Two-Layer Structure** Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- **Layer 2: Gnosis xDai Chain** processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. **Validator Role and Staking** Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). **Cross-Layer Security** Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. **Validator Selection:** HECO supports up to 21 validators, selected based on their stake in the network.
2. **Transaction Processing:** Validators are responsible for processing transactions and adding blocks to the blockchain.
3. **Transaction Finality:** The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. **Energy Efficiency:** By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Aave Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Huobi, Near Protocol, Polygon, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- **Slashing:** Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- **Uptime Requirements:** Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- **Dynamic Fees:** Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- **Fee Burning:** A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:

Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.

2. Staking Participation:

Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):

Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.

2. Smart Contract Execution Fees:

Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.

- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

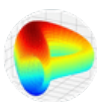
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, huobi, near_protocol, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Curve DAO Token

CRV | P8DXFQ5LD

Quantitative information

Quantitative sustainability indicators for Curve DAO Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Curve DAO Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2528.50317	kWh/a

Qualitative information

S.4 Consensus Mechanism

Curve DAO Token is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):

- Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:

- Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
 - Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability.
- Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-

secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

- Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Curve DAO Token is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.

- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, fantom, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Cetus Protocol

CETUS | WMW834RP9

Quantitative information

Quantitative sustainability indicators for Cetus Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Cetus Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2379.55157	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:

- The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
- Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
- Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:

Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.

3. Optimistic Execution:

Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:

The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5. Fault Tolerance:

The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:

Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.

2. Slashing:

Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.

3. Delegation:

Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:

Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.

2. Dynamic Fee Model:

The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



DeepBook Token

DEEP | B41HCBXWK

Quantitative information

Quantitative sustainability indicators for DeepBook Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	DeepBook Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2239.57793	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:

- The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
- Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
- Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:

Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.

3. Optimistic Execution:

Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:

The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5. Fault Tolerance:

The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:

Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.

2. Slashing:

Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.

3. Delegation:

Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:

Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.

2. Dynamic Fee Model:

The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Walrus

WAL | VDK0388GB

Quantitative information

Quantitative sustainability indicators for Walrus

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Walrus	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2239.57793	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The Sui blockchain utilizes a Byzantine Fault Tolerant (BFT) consensus mechanism optimized for high throughput and low latency.

Core Components:

1. Mysten Consensus Protocol:

- The Sui consensus is based on Mysten Labs' Byzantine Fault Tolerance (BFT) protocol, which builds on principles of Practical Byzantine Fault Tolerance (pBFT) but introduces key optimizations for performance.
- Leaderless Design: Unlike traditional BFT models, Sui does not rely on a single leader to propose blocks. Validators can propose blocks simultaneously, increasing efficiency and reducing the risks associated with leader failure or attacks.
- Parallel Processing: Transactions can be processed in parallel, maximizing network throughput by utilizing multiple cores and threads. This allows for faster confirmation of transactions and high scalability.

2. Transaction Validation:

Validators are responsible for receiving transaction requests from clients and processing them. Each transaction includes digital signatures and must meet the network's rules to be considered valid. Validators can propose transactions simultaneously, unlike many other networks that require a sequential, leader-driven process.

3. Optimistic Execution:

Optimistic Consensus: Sui allows validators to process certain non-contentious, independent transactions without waiting for full consensus. This is known as optimistic execution and helps reduce transaction latency for many use cases, allowing for fast finality in most cases.

4. Finality and Latency:

The system only requires three rounds of communication between validators to finalize a transaction. This results in low-latency consensus and rapid transaction confirmation times, achieving scalability while maintaining security.

5. Fault Tolerance:

The system can tolerate up to one-third of validators being faulty or malicious without compromising the integrity of the consensus process.

S.5 Incentive Mechanisms and Applicable Fees

Security and Economic Incentives:

1. Validators:

Validators stake SUI tokens to participate in the consensus process. They earn rewards for validating transactions and securing the network.

2. Slashing:

Validators can be penalized (slashed) for malicious behavior, such as double-signing or failing to properly validate transactions. This helps maintain network security and incentivizes honest behavior.

3. Delegation:

Token holders can delegate their SUI tokens to trusted validators. In return, they share in the rewards earned by validators. This encourages widespread participation in securing the network.

Fees on the SUI Blockchain:

1. Transaction Fees:

Users pay transaction fees to validators for processing and confirming transactions. These fees are calculated based on the computational resources required to process the transaction. Fees are paid in SUI tokens, which is the native cryptocurrency of the Sui blockchain.

2. Dynamic Fee Model:

The transaction fees on Sui are dynamic, meaning they adjust based on network demand and the complexity of the transactions being processed.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) sui is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Xai

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Xai	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2036.31230	kWh/a

Qualitative information

S.4 Consensus Mechanism

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
 - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
 - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
 - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
 - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
 - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
 - Assumption of Validity: Transactions are assumed to be valid by default.
 - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
 - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
 - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
 - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
 - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
 - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
 - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
 - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
 - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
 - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.

- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pepe

PEPE | J41R6PF81

Quantitative information

Quantitative sustainability indicators for Pepe

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Pepe	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1953.63813	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for ENA

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ENA	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1936.81783	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


SHIBA INU

SHIB | M4HFTFNPC

Quantitative information

Quantitative sustainability indicators for SHIBA INU

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SHIBA INU	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1816.73371	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pendle

PENDLE | 5RJT6339X

Quantitative information

Quantitative sustainability indicators for Pendle

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pendle	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1792.13218	kWh/a

Qualitative information

S.4 Consensus Mechanism

Pendle is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Pendle is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for cyber

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	cyber	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1686.02534	kWh/a

Qualitative information

S.4 Consensus Mechanism

cyber is present on the following networks: Binance Smart Chain, Cyber, Ethereum, Optimism.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Cyber operates as a Layer 2 network built on the Ethereum ecosystem, utilizing the OP Stack from Optimism and integrating EigenDA for data availability. The network employs a decentralized sequencer and verifier architecture.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. **Optimistic Rollups:**
 - **Rollup Blocks:** Transactions are batched into rollup blocks and processed off-chain.
 - **State Commitments:** The state of these transactions is periodically committed to the Ethereum main chain.
2. **Sequencers:**
 - **Transaction Ordering:** Sequencers are responsible for ordering transactions and creating batches.
 - **State Updates:** Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
 - **Block Production:** They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

cyber is present on the following networks: Binance Smart Chain, Cyber, Ethereum, Optimism.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The native token, CYBER, serves multiple functions within the Cyber ecosystem. CYBER holders can participate in governance decisions, influencing protocol parameters and development directions. Staking CYBER tokens enables users to secure the network and earn rewards.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.

- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
- 2. Validators and Fraud Proofs:
 - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
 - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
 - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
- 3. Economic Penalties:
 - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
 - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
 - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
 - Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.
2. L1 Data Fees:
 - Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
 - Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.
3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, cyber, ethereum, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for PancakeSwap

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	PancakeSwap	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1668.02105	kWh/a

Qualitative information

S.4 Consensus Mechanism

PancakeSwap is present on the following networks: Aptos Coin, Arbitrum, Base, Binance Smart Chain, Ethereum, Linea, Zksync.

Aptos utilizes a Proof-of-Stake approach combined with a BFT consensus protocol to ensure high throughput, low latency, and secure transaction processing.

Core Components:

- Parallel Execution: Transactions are processed concurrently using Block-STM, a parallel execution engine, enabling high performance and scalability.
- Leader-Based BFT: A leader is selected among validators to propose blocks, while others validate and finalize transactions.
- Dynamic Validator Rotation: Validators are rotated regularly, enhancing decentralization and preventing collusion.
- Instant Finality: Transactions achieve finality once validated, ensuring that they are irreversible.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.

- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.

6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Linea Network uses a Zero-Knowledge Rollup (ZK-Rollup) architecture with a zkEVM for Ethereum compatibility, and its consensus is derived from Ethereum's own proof-of-stake security. While the Network has components like a sequencer for ordering transactions and a coordinator for network management, its consensus mechanism is fundamentally linked to the proof and verification process of zero-knowledge proofs and the security of the Ethereum mainnet. Instead of a typical decentralized consensus on a separate blockchain, the Network inherits its security and state finality from Ethereum.

zkSync operates as a Layer 2 scaling solution for Ethereum, leveraging zero-knowledge rollups (ZK-Rollups) to enable fast, cost-effective, and secure transactions. This consensus mechanism allows zkSync to offload transaction computation from Ethereum's Layer 1, ensuring scalability while maintaining Ethereum's base-layer security.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):
zkSync aggregates multiple transactions off-chain and processes them in batches. A cryptographic proof, called a validity proof, is generated for each batch and submitted to the Ethereum mainnet. This ensures that all transactions are valid and compliant with Ethereum's rules without processing them individually on Layer 1.
- Validity Proofs:
zkSync uses zk-SNARKs (Succinct Non-Interactive Arguments of Knowledge) for its validity proofs. These proofs provide mathematical guarantees that transactions within a batch are valid, eliminating the need for Ethereum nodes to re-execute off-chain transactions.
- Sequencers:
Transactions on zkSync are ordered and processed by sequencers, which bundle transactions into batches. Sequencers maintain network efficiency and provide fast confirmations.

- Fraud Resistance:

Unlike Optimistic Rollups, zkSync relies on validity proofs rather than fraud proofs, meaning that transactions are final and secure as soon as the validity proof is accepted by Ethereum.

- Data Availability:

All transaction data is stored on-chain, ensuring that the network remains decentralized and users can reconstruct the state of zkSync at any time.

S.5 Incentive Mechanisms and Applicable Fees

PancakeSwap is present on the following networks: Aptos Coin, Arbitrum, Base, Binance Smart Chain, Ethereum, Linea, Zksync.

Incentive Mechanism:

- Validator Rewards: Validators earn rewards in APT tokens for validating transactions and producing blocks. Rewards are distributed proportionally based on the stake of validators and their delegators.
- Delegator Participation: APT token holders can delegate their tokens to validators, earning a share of the staking rewards without running their own nodes.
- Slashing Mechanism: Validators face penalties, such as losing staked tokens, for malicious actions or prolonged inactivity, ensuring accountability and network security.

Applicable Fees:

- Transaction Fees: Users pay transaction fees in APT tokens for sending transactions and interacting with smart contracts.
- Dynamic Fee Adjustment: Fees are dynamically adjusted based on network activity and resource usage, ensuring cost efficiency and preventing congestion.
- Fee Distribution: Transaction fees are distributed among validators and delegators, providing an additional incentive for network participation.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Like Ethereum, the Network uses a gas system, where gas is the unit of computational effort required to process a transaction. All gas fees on the Network are paid in Ether (ETH). The Network has a base fee that is designed to stabilize at 7 wei. The base fee still decreases or increases based on network traffic, similar to Ethereum, but it does not go below 7 wei. The Network does not require token staking for transaction validation purposes and thus provides no staking rewards. It does not offer incentives for running a full network node. It does charge fees collected by the sequencer for transaction processing. Those fees are paid in ETH, 20% of which are immediately burned while the remaining 80% are converted to Tokens and then burned.

zkSync incentivizes network participants through a streamlined fee structure and role-based rewards, designed to ensure security, scalability, and usability for both users and validators.

Incentive Mechanism:

- Validator Rewards: Validators, who generate validity proofs and secure the network, are compensated through transaction fees paid by users. Their role ensures that batches of transactions are processed efficiently and accurately.
- Sequencer Incentives: Sequencers are responsible for bundling and ordering transactions off-chain. They earn a share of the transaction fees for maintaining network performance and fast processing times.
- Ecosystem Growth Rewards: zkSync allocates resources to incentivize developers and projects building on its platform, fostering a robust ecosystem of dApps, DeFi protocols, and NFT marketplaces.

Applicable Fees:

- Transaction Fees: Users pay fees in Ether (ETH) for transactions on zkSync. These fees are significantly lower than Ethereum Layer 1 fees, as zkSync processes transactions off-chain and submits only aggregated proofs to the Ethereum mainnet.
- Fee Model: Fees are dynamically calculated based on the complexity of transactions (e.g., token transfers, smart contract interactions) and the cost of submitting validity proofs to Ethereum.
- Scalability Benefits: zkSync's efficient rollup architecture reduces gas fees for users while ensuring that validators and sequencers are appropriately compensated for their roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) aptos_coin, arbitrum, base, binance_smart_chain, ethereum, linea, zksync is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Pump.fun

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pump.fun	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1457.07950	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**BIO**

BIO | TBR0XDRN8

Quantitative information

Quantitative sustainability indicators for BIO

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	BIO	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1322.43462	kWh/a

Qualitative information

S.4 Consensus Mechanism

BIO is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

BIO is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Sweat Economy

SWEAT | DFK01RSF7

Quantitative information

Quantitative sustainability indicators for Sweat Economy

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Sweat Economy	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1215.03559	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Optimism

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Optimism	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1142.06671	kWh/a

Qualitative information

S.4 Consensus Mechanism

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
 - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
 - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
 - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
 - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
 - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
 - Assumption of Validity: Transactions are assumed to be valid by default.
 - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
 - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:
 - Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
 - Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.
2. Validators and Fraud Proofs:
 - Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
 - Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
 - Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.
3. Economic Penalties:
 - Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
 - Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:
 - Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.

- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


SPX6900

SPX | V9FVRLGKC

Quantitative information

Quantitative sustainability indicators for SPX6900

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	SPX6900	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1141.55399	kWh/a

Qualitative information

S.4 Consensus Mechanism

SPX6900 is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

SPX6900 is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Fartcoin

FARTCOIN | Z673VT588

Quantitative information

Quantitative sustainability indicators for Fartcoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Fartcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1078.03580	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



ApeCoin
APE | 7WKVRWPNR

Quantitative information

Quantitative sustainability indicators for ApeCoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	ApeCoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1071.59718	kWh/a

Qualitative information

S.4 Consensus Mechanism

ApeCoin is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. **Proof of Stake (PoS):**
 - **Validator Selection:** Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - **Delegation:** Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. **Plasma Chains:**
 - **Off-Chain Scaling:** Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - **Fraud Proofs:** Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

ApeCoin is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Centrifuge

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Centrifuge	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1041.15491	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for AKT

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	AKT	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	977.61600	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



SKY Governance Token

SKY | G4GDNF84C

Quantitative information

Quantitative sustainability indicators for SKY Governance Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	SKY Governance Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	963.65381	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Onyxcoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Onyxcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	943.64690	kWh/a

Qualitative information

S.4 Consensus Mechanism

Onyxcoin is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. **Consensus Process**
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. **Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Onyxcoin is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, `binance_smart_chain`, `ethereum` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Mog Coin

MOG | C4044KDRD

Quantitative information

Quantitative sustainability indicators for Mog Coin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Mog Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	917.66415	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Lido DAO Token

LDO | 8W8GLGL65

Quantitative information

Quantitative sustainability indicators for Lido DAO Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Lido DAO Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	902.87657	kWh/a

Qualitative information

S.4 Consensus Mechanism

Lido DAO Token is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Solana, Terra Classic.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.

- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

- Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

Terra blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, which ensures fast, scalable, and secure transaction processing.

Core Components:

- Delegated Proof of Stake (DPoS):
 - Validators: A limited set of validators are responsible for validating transactions, proposing blocks, and securing the network. Validators are selected based on the amount of LUNA tokens staked, either directly or delegated by token holders.
 - Delegation: LUNA holders can delegate their tokens to validators, allowing them to participate in staking rewards without running their own validator nodes.
 - Rotational Leadership: Validators are selected in a round-robin manner to propose new blocks, ensuring fairness and efficiency in block production.
- Tendermint BFT (Byzantine Fault Tolerance):
 - Terra integrates the Tendermint Core consensus engine, providing fast block finality and resilience against up to one-third of malicious or faulty validators.
 - Finality: Transactions are confirmed once a block is added, reducing the risk of chain reorganizations and ensuring immediate finality.
 - Governance Integration: LUNA token holders participate in governance by voting on proposals related to protocol upgrades, parameter changes, and community decisions, aligning stakeholder incentives with network health.

S.5 Incentive Mechanisms and Applicable Fees

Lido DAO Token is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Solana, Terra Classic.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more

tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

The Terra blockchain's incentive structure is designed to reward network participants, ensure security, and sustain ecosystem growth, while its fee model aligns with its focus on scalability and cost-efficiency.

Incentive Mechanisms:

- Validators: Validators earn staking rewards for their role in securing the network and validating transactions. Rewards are distributed in LUNA tokens, derived from transaction fees and seigniorage revenue.
- Delegators: LUNA holders who delegate their tokens to validators receive a share of staking rewards, proportional to the amount delegated, incentivizing broad participation.
- Seigniorage Rewards: Validators and delegators benefit from seigniorage revenue, generated when new stablecoins (e.g., TerraUSD) are minted. A portion of this revenue is allocated to reward LUNA stakers.
- Stability Incentives: LUNA token holders are incentivized to stake and participate in governance to maintain the stability of Terra's ecosystem and its algorithmic stablecoins.

- Governance Participation Rewards: Validators and delegators have governance voting rights, enabling them to shape the network's future. Participation in governance aligns incentives with long-term ecosystem health.

Applicable Fees:

- Transaction Fees: Users pay fees in LUNA or stablecoins for transactions such as fund transfers, smart contract execution, and staking. These fees are distributed among validators and delegators, providing additional incentives for network security and functionality.
- Dynamic Fee Model: Transaction fees are dynamically adjusted based on network congestion and transaction size. This ensures efficient resource allocation while keeping fees affordable for users.
- Seigniorage Fee: A portion of revenue from stablecoin minting is directed to the treasury and distributed to stakers, reinforcing network participation and development.
- Burning Mechanism: A portion of fees and seigniorage revenue may be burned, reducing LUNA supply over time and contributing to its deflationary tokenomics.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, solana, terra_classic is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


SUNDOG

SUNDOG | CRM_SUNDOG_group

Quantitative information

Quantitative sustainability indicators for SUNDOG

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SUNDOG	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	901.94347	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing

new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



World Liberty Financial

WLFI | 3XVWCVFSX

Quantitative information

Quantitative sustainability indicators for World Liberty Financial

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	World Liberty Financial	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	876.24442	kWh/a

Qualitative information

S.4 Consensus Mechanism

World Liberty Financial is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

World Liberty Financial is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Bonk

BONK | H6KJTT0CP

Quantitative information

Quantitative sustainability indicators for Bonk

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Bonk	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	859.16175	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Euro Coin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Euro Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	843.35677	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Axie Infinity Shard

AXS | RTTDS5MHT

Quantitative information

Quantitative sustainability indicators for Axie Infinity Shard

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Axie Infinity Shard	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	840.98595	kWh/a

Qualitative information

S.4 Consensus Mechanism

Axie Infinity Shard is present on the following networks: Binance Smart Chain, Ethereum, Harmony One, Ronin, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):
 - Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
 - Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.
2. Sharding with PBFT Finality:
 - Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
 - Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):

- Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.
- Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.

2. Incentive-Driven Voting System:

Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Axie Infinity Shard is present on the following networks: Binance Smart Chain, Ethereum, Harmony One, Ronin, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.

2. Decentralization Penalty for High Stake:

Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:

Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:

- Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.
- Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.

2. Slashing Mechanism for Accountability:

- Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.
- Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.

3. Governance Participation:

RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, harmony_one, ronin, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Eigen

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Eigen	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	825.18802	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for StorjToken

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	StorjToken	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	805.03205	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Morpho Token

MORPHO | CH7NXRXR1

Quantitative information

Quantitative sustainability indicators for Morpho Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Morpho Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	684.58974	kWh/a

Qualitative information

S.4 Consensus Mechanism

Morpho Token is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Morpho Token is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Arbitrum

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Arbitrum	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	677.27780	kWh/a

Qualitative information

S.4 Consensus Mechanism

Arbitrum is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Arbitrum is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.

- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Quant

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Quant	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	671.17942	kWh/a

Qualitative information

S.4 Consensus Mechanism

Quant is present on the following networks: Energi, Ethereum.

Energi operates on a Proof of Stake (PoS) consensus mechanism supported by a masternode system. Validators, or "stakers," secure the network by locking up NRG tokens to validate transactions and maintain network integrity.

Core Components:

1. Proof of Stake (PoS):
Validators lock up NRG tokens and earn rewards for confirming transactions based on their staked amount, ensuring active participation in network security.
2. Masternode System:
 - Collateral Requirement: To operate a masternode, users must lock up 1,000 NRG as collateral. Masternodes contribute to transaction validation, security, and governance, playing a central role in network functionality.
 - Governance Participation: Masternodes vote on network proposals, protocol changes, and community initiatives, enabling decentralized decision-making.
3. Self-Funding Treasury:
A portion of block rewards funds the treasury, which supports development, marketing, and community projects, ensuring Energi's growth and development over time

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is

randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Quant is present on the following networks: Energi, Ethereum.

Energi incentivizes both stakers and masternodes with block rewards, supporting network security and governance. Transaction fees contribute to network sustainability.

Incentive Mechanisms:

Staking and Masternode Rewards:

- Staker Rewards: Validators earn a portion of block rewards for transaction validation.
- Masternode Rewards: Masternodes receive rewards for their roles in governance and network support, ensuring active engagement in network development.

Applicable Fees:

1. Transaction Fees:

Low Cost: Users pay transaction fees in NRG, which are generally low and provide additional rewards for validators and masternodes, supporting network operations.

2. Balanced Reward Structure:

Inflation Control: Energi's rewards structure is designed to maintain inflation balance with sustainable rewards, incentivizing long-term network participation.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) energi, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally

Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Convex Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Convex Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	665.71459	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



OFFICIAL TRUMP

TRUMP | LJDPGNXXK

Quantitative information

Quantitative sustainability indicators for OFFICIAL TRUMP

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	OFFICIAL TRUMP	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	615.36751	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



StarkNet Token

STRK | NLWPNNWQZ

Quantitative information

Quantitative sustainability indicators for StarkNet Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	StarkNet Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	614.33108	kWh/a

Qualitative information

S.4 Consensus Mechanism

StarkNet Token is present on the following networks: Ethereum, Starknet.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Starknet employs zero-knowledge rollups (ZK-Rollups) for transaction aggregation and scalability, ensuring efficiency and security through succinct proof submissions to Ethereum.

Core Components:

- Zero-Knowledge Rollups (ZK-Rollups):
Aggregates multiple off-chain transactions into a single proof, which is submitted to Ethereum's mainnet, reducing computational load and gas costs.
- Sequencer and Prover Roles:
 - Sequencers: Order and batch transactions for efficient processing.

- Provers: Generate validity proofs ensuring the correctness of processed batches.
- Instant Finality:
Transactions are final once a proof is verified and accepted on Ethereum, minimizing the risk of chain reorganizations and enhancing reliability.

S.5 Incentive Mechanisms and Applicable Fees

StarkNet Token is present on the following networks: Ethereum, Starknet.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Starknet's incentive model combines transaction fees and plans for future staking rewards to support network operations and security.

Incentive Mechanisms:

- Transaction Fees: Users pay fees in Ether (ETH) to compensate sequencers and cover the cost of proof submission and storage on Ethereum.
- Dynamic Fee Model: Fees adjust based on transaction complexity and resource requirements, ensuring fair cost distribution and efficient network usage.
- Future Staking Rewards: Planned staking mechanisms will incentivize participants to lock their STARK tokens, enhancing network security and governance.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, starknet is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Worldcoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Worldcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	606.73640	kWh/a

Qualitative information

S.4 Consensus Mechanism

Worldcoin is present on the following networks: Ethereum, Optimism.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

S.5 Incentive Mechanisms and Applicable Fees

Worldcoin is present on the following networks: Ethereum, Optimism.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, optimism is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Clearpool

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Clearpool	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	595.94941	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Gala

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Gala	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	577.42579	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Aethir Token

ATH | 1SL20Z9P1

Quantitative information

Quantitative sustainability indicators for Aethir Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Aethir Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	534.06208	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Virtual Protocol

VIRTUAL | 7WMBV0R29

Quantitative information

Quantitative sustainability indicators for Virtual Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Virtual Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	526.29307	kWh/a

Qualitative information

S.4 Consensus Mechanism

Virtual Protocol is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Virtual Protocol is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



1INCH Token

1INCH | SVRFHQZRN

Quantitative information

Quantitative sustainability indicators for 1INCH Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	1INCH Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	519.59431	kWh/a

Qualitative information

S.4 Consensus Mechanism

1INCH Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- **Two-Layer Structure** Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- **Layer 2: Gnosis xDai Chain** processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. **Validator Role and Staking** Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). **Cross-Layer Security** Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Dooomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

1INCH Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.

- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the

network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Ethereum Name Service

ENS | B70SMJ5DQ

Quantitative information

Quantitative sustainability indicators for Ethereum Name Service

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Ethereum Name Service	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	507.94449	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ethereum Name Service is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a

verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Ethereum Name Service is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SAND

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SAND	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	482.68874	kWh/ a

Qualitative information

S.4 Consensus Mechanism

SAND is present on the following networks: Ethereum, Polygon, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

SAND is present on the following networks: Ethereum, Polygon, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for StargateToken

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	StargateToken	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	481.59278	kWh/a

Qualitative information

S.4 Consensus Mechanism

StargateToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
 - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
 - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
 - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.

- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

StargateToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.

- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

- Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Graph Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Graph Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	481.20655	kWh/a

Qualitative information

S.4 Consensus Mechanism

Graph Token is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Graph Token is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.

- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Render Token

RNDR | XR0JSKLNZ

Quantitative information

Quantitative sustainability indicators for Render Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Render Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	479.08179	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Render Token is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a

verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Render Token is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SushiSwap

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SushiSwap	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	474.09032	kWh/a

Qualitative information

S.4 Consensus Mechanism

SushiSwap is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Harmony One, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):

- Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:

- Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
 - Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability.
- Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-

secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):

- Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
- Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.

2. Sharding with PBFT Finality:

- Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
- Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

SushiSwap is present on the following networks: Arbitrum, Ethereum, Fantom, Gnosis Chain, Harmony One, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.

- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:
ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.
2. Decentralization Penalty for High Stake:
Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:
Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, fantom, gnosis_chain, harmony_one, polygon is calculated first. For the energy

consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for JasmyCoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	JasmyCoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	459.18693	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Reserve Rights

RSR | DQT9BWGCF

Quantitative information

Quantitative sustainability indicators for Reserve Rights

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Reserve Rights	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	458.21358	kWh/a

Qualitative information

S.4 Consensus Mechanism

Reserve Rights is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. **Consensus Process**
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. **Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Reserve Rights is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for VeThor

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	VeThor	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	439.40160	kWh/a

Qualitative information

S.4 Consensus Mechanism

VeChain employs a Proof of Authority (PoA) 2.0 consensus mechanism, where trusted Authority Masternodes are responsible for validating transactions, providing both security and efficiency for enterprise applications.

Core Components of VeChain's Consensus:

1. Proof of Authority (PoA) 2.0:

Trusted Authority Masternodes: VeChain's PoA 2.0 relies on a set of pre-approved Authority Masternodes to validate blocks and confirm transactions. These nodes are selected based on their reputation and reliability, ensuring network integrity and trustworthiness.

2. Finality and Security:

Immediate Transaction Finality: Once a block is validated under PoA 2.0, it is final, reducing the likelihood of forks. This immediate finality enhances the security and reliability of the network, making it suitable for enterprise-grade applications.

S.5 Incentive Mechanisms and Applicable Fees

VeChain's incentive model utilizes a dual-token system to support staking, transaction processing, and economic stability, helping to ensure predictable costs for network users.

Incentive Mechanisms:

1. Dual-Token Model:

- VET (VeChain Token): VET is used primarily for value transfer and staking on the network. VET holders can stake their tokens to generate VTHO, which serves as "gas" for transactions.
- VTHO (VeThor Token): VTHO is used to pay for transaction fees, providing a buffer against fluctuations in VET's market price. This setup decouples transaction costs from VET's volatility, allowing for stable and predictable transaction fees.

2. Staking Rewards:

VET Staking to Generate VTHO: By staking VET, holders automatically generate VTHO tokens, which can be used to cover transaction costs. This staking mechanism incentivizes VET holders to participate in the network and secure its operations.

Applicable Fees:

Transaction Fees in VTHO: Transaction fees on VeChain are paid in VTHO, keeping costs stable and predictable for users regardless of VET's market price. This predictable fee model makes the network appealing for enterprises and high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) vechain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Aerodrome

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Aerodrome	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	425.17738	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for LayerZero

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	LayerZero	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	411.85721	kWh/a

Qualitative information

S.4 Consensus Mechanism

LayerZero is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

LayerZero is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.

- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**Bancor**

BNT | HXXRZB3CB

Quantitative information

Quantitative sustainability indicators for Bancor

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Bancor	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	389.20883	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Bancor is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an

integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Bancor is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Compound

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Compound	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	387.57409	kWh/a

Qualitative information

S.4 Consensus Mechanism

Compound is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- **Two-Layer Structure** Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- **Layer 2: Gnosis xDai Chain** processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability.
- Validator Role and Staking** Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2).
- Cross-Layer Security** Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Compound is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.

- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the

network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for FLOKI

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	FLOKI	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	368.38762	kWh/a

Qualitative information

S.4 Consensus Mechanism

FLOKI is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

FLOKI is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for AIOZ Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	AIOZ Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	365.64622	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Raydium

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Raydium	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	351.83117	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



IMX | 9LJ0XLJBT

Quantitative information

Quantitative sustainability indicators for Immutable X

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Immutable X	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	349.03885	kWh/a

Qualitative information

S.4 Consensus Mechanism

Immutable X is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Immutable X is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
- Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
- Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
- Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
- Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SuperVerse

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SuperVerse	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	348.54204	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



JoeToken

JOE | WV204Q4J4

Quantitative information

Quantitative sustainability indicators for JoeToken

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	JoeToken	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	347.86441	kWh/a

Qualitative information

S.4 Consensus Mechanism

JoeToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

JoeToken is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
 - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
 - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
 - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
 - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
 - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
 - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
 - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.

- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for BitTorrent-New

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	BitTorrent-New	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	343.35076	kWh/a

Qualitative information

S.4 Consensus Mechanism

BitTorrent-New is present on the following networks: Binance Smart Chain, Ethereum, Tron.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. **Delegated Proof of Stake (DPoS):** Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. **Block Production:** The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. **Voting and Governance:** Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to

stake. This provides a governance system where the community can actively participate in decision-making.

4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

BitTorrent-New is present on the following networks: Binance Smart Chain, Ethereum, Tron.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction

- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.
- 2. Storage Fees:
Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.
- 3. Energy and Bandwidth:
Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



ether.fi governance token

ETHFI | RJTJR45MC

Quantitative information

Quantitative sustainability indicators for ether.fi governance token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ether.fi governance token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	326.39887	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pudgy Penguins

PENGU | 13JBPT88T

Quantitative information

Quantitative sustainability indicators for Pudgy Penguins

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pudgy Penguins	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	325.38528	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Dexe

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Dexe	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	325.04803	kWh/a

Qualitative information

S.4 Consensus Mechanism

Dexe is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Dexe is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



CoW Protocol Token

COW | SF0HRQBH7

Quantitative information

Quantitative sustainability indicators for CoW Protocol Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	CoW Protocol Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	316.67575	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Synthetix Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Synthetix Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	315.03200	kWh/a

Qualitative information

S.4 Consensus Mechanism

Synthetix Network is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Fantom, Near Protocol, Optimism, Polygon, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):

- Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:

- Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Dooomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.

2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.

3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.

4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.

- Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.

- Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
- 5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.

- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Synthetix Network is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Fantom, Near Protocol, Optimism, Polygon, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, fantom, near_protocol, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



LoopringCoin V2

LRC | NZCPF6J82

Quantitative information

Quantitative sustainability indicators for LoopringCoin V2

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	LoopringCoin V2	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	310.07538	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Fetch

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Fetch	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	294.33600	kWh/a

Qualitative information

S.4 Consensus Mechanism

Cronos operates on a Proof of Stake (PoS) model integrated with Tendermint's Byzantine Fault Tolerant (BFT) consensus, designed for decentralization, security, and interoperability. This model enables validators to be selected based on staking power, rewarding them for securing and validating the network.

Core Components:

- Proof of Stake (PoS) with Tendermint BFT Validator Selection: Validators are chosen based on the amount of CRO tokens staked, securing the network and producing blocks.
- Delegation Model: Token holders can delegate their CRO to validators, enabling participation in network security without needing to run a validator node.
- Cosmos SDK and Inter-Blockchain Communication (IBC) Cross-Chain Connectivity: Built on the Cosmos SDK, Cronos enables cross-chain communication, connecting to other Cosmos blockchains and ecosystems such as Ethereum and Binance Smart Chain.

S.5 Incentive Mechanisms and Applicable Fees

Cronos incentivizes validators and delegators with staking rewards and transaction fees, aligning economic incentives with network security and growth.

Incentive Mechanisms:

- Staking Rewards Validators and Delegators: Both groups earn CRO rewards for supporting network security. Delegators earn a portion of the validator rewards, promoting broader network participation.
- Deflationary Mechanism Token Burning: A portion of transaction fees and staking rewards may be periodically burned, reducing CRO supply over time and potentially increasing token value.

Applicable Fees:

- Transaction and Smart Contract Fees Standard Transactions: Users pay CRO for network transactions and dApp interactions, providing a steady income for validators.
- Ethereum-Compatible Gas Fees: Executing Ethereum-compatible smart contracts incurs gas fees, similar to Ethereum, payable in CRO.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) cronos is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Ankr

ANKR | BL90MVXW4

Quantitative information

Quantitative sustainability indicators for Ankr

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Ankr	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	288.59715	kWh/a

Qualitative information

S.4 Consensus Mechanism

Ankr is present on the following networks: Arbitrum, Avalanche, Binance Beacon Chain, Binance Smart Chain, Ethereum, Fantom, Optimism, Polygon, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through

staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
 - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.

- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
- 2. Event Blocks and Instant Finality:
 - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
 - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:
 - Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
 - State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.
2. Sequencers:
 - Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
 - State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
 - Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.
3. Fraud Proofs:
 - Assumption of Validity: Transactions are assumed to be valid by default.
 - Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
 - Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.

5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

- Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Ankr is present on the following networks: Arbitrum, Avalanche, Binance Beacon Chain, Binance Smart Chain, Ethereum, Fantom, Optimism, Polygon, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.

- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.

- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_beacon_chain, binance_smart_chain, ethereum, fantom, optimism, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Arkham

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Arkham	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	286.72569	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



DUSK | CRM_Dusk

Quantitative information

Quantitative sustainability indicators for Dusk Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Dusk Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	278.51903	kWh/a

Qualitative information

S.4 Consensus Mechanism

Dusk Network is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Dusk Network is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Trace Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Trace Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	278.49297	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Paal AI

PAAL | CRM_paal_ai

Quantitative information

Quantitative sustainability indicators for Paal AI

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Paal AI	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	277.42840	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**Blur**

BLUR | R91SVKW99

Quantitative information

Quantitative sustainability indicators for Blur

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Blur	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	276.00896	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Smooth Love Potion

SLP | 1JMZBTS1G

Quantitative information

Quantitative sustainability indicators for Smooth Love Potion

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Smooth Love Potion	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	275.33084	kWh/a

Qualitative information

S.4 Consensus Mechanism

Smooth Love Potion is present on the following networks: Ethereum, Ronin.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):

- Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.

- Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.

2. Incentive-Driven Voting System:

Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

S.5 Incentive Mechanisms and Applicable Fees

Smooth Love Potion is present on the following networks: Ethereum, Ronin.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:

- Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.
- Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.

2. Slashing Mechanism for Accountability:

- Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.
- Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.

3. Governance Participation:

RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, ronin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Decentraland

MANA | 21C6LF4SP

Quantitative information

Quantitative sustainability indicators for Decentraland

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Decentraland	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	272.16974	kWh/a

Qualitative information

S.4 Consensus Mechanism

Decentraland is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an

integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Decentraland is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


API3

API3 | 9PJW29SF7

Quantitative information

Quantitative sustainability indicators for API3

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	API3	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	266.00195	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Turbo

TURBO | 3GCHWJSWC

Quantitative information

Quantitative sustainability indicators for Turbo

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVX65	/
S.3 Name of the crypto-asset	Turbo	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	265.00835	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Banana

BANANA | 5WZXL33SN

Quantitative information

Quantitative sustainability indicators for Banana

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Banana	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	260.67907	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for usual

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	usual	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	257.98215	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Telcoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Telcoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	246.56080	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Telcoin is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Telcoin is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Safe Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Safe Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	242.36837	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Kamino Finance

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Kamino Finance	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	240.43098	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for VELO

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	VELO	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	239.83902	kWh/a

Qualitative information

S.4 Consensus Mechanism

VELO is present on the following networks: Binance Smart Chain, Stellar.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Stellar uses a unique consensus mechanism known as the Stellar Consensus Protocol (SCP).

Core Concepts:

1. Federated Byzantine Agreement (FBA):
 - SCP is built on the principles of Federated Byzantine Agreement (FBA), which allows decentralized, leaderless consensus without the need for a closed system of trusted participants.
 - Quorum Slices: Each node in the network selects a set of other nodes (quorum slice) that it trusts. Consensus is achieved when these slices overlap and collectively agree on the transaction state.
2. Nodes and Validators:
 - Nodes: Nodes running the Stellar software participate in the network by validating transactions and maintaining the ledger.
 - Validators: Nodes that are responsible for validating transactions and reaching consensus on the state of the ledger.
3. Transaction Validation:

Transactions are submitted to the network and nodes validate them based on predetermined rules, such as sufficient balances and valid signatures.
4. Nomination Phase:
 - Nomination: Nodes nominate values (proposed transactions) that they believe should be included in the next ledger. Nodes communicate their nominations to their quorum slices.
 - Agreement on Nominations: Nodes vote on the nominated values, and through a process of voting and federated agreement, a set of candidate values emerges. This phase continues until nodes agree on a single value or a set of values.
5. Ballot Protocol (Voting and Acceptance):
 - Balloting:
 - The agreed-upon values from the nomination phase are then put into ballots. Each ballot goes through multiple rounds of voting, where nodes vote to either accept or reject the proposed values.
 - Federated Voting: Nodes exchange votes within their quorum slices, and if a value receives sufficient votes across overlapping slices, it moves to the next stage.

- Acceptance and Confirmation: If a value gathers enough votes through multiple stages (prepare, confirm, externalize), it is accepted and externalized as the next state of the ledger.
- 6. Ledger Update:
Once consensus is reached, the new transactions are recorded in the ledger. Nodes update their copies of the ledger to reflect the new state. Security and Economic Incentives
- 7. Trust and Quorum Slices:
Nodes are free to choose their own quorum slices, which provides flexibility and decentralization. The overlapping nature of quorum slices ensures that the network can reach consensus even if some nodes are faulty or malicious.
- 8. Stability and Security:
SCP ensures that the network can achieve consensus efficiently without relying on energy-intensive mining processes. This makes it environmentally friendly and suitable for high-throughput applications.
- 9. Incentive Mechanisms:
Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, the network incentivizes participation through the intrinsic value of maintaining a secure, efficient, and reliable payment network.

S.5 Incentive Mechanisms and Applicable Fees

VELO is present on the following networks: Binance Smart Chain, Stellar.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Stellar's consensus mechanism, the Stellar Consensus Protocol (SCP), is designed to achieve decentralized and secure transaction validation through a federated Byzantine agreement (FBA) model. Unlike Proof of Work (PoW) or Proof of Stake (PoS) systems, Stellar does not rely on direct economic incentives like mining rewards. Instead, it ensures network security and transaction validation through intrinsic network mechanisms and transaction fees.

Incentive Mechanisms:

1. Quorum Slices and Trust:

- Quorum Slices: Each node in the Stellar network selects other nodes it trusts to form a quorum slice. Consensus is achieved through the intersection of these slices, creating a robust and decentralized trust network.
- Federated Voting: Nodes communicate their votes within their quorum slices, and through multiple rounds of federated voting, they agree on the transaction state. This process ensures that even if some nodes are compromised, the network can still achieve consensus securely.

2. Intrinsic Value and Participation:

- Network Value: The intrinsic value of participating in a secure, efficient, and reliable payment network incentivizes nodes to act honestly and maintain network security. Organizations and individuals running nodes benefit from the network's functionality and the ability to facilitate transactions.
- Decentralization: By allowing nodes to choose their own quorum slices, Stellar promotes decentralization, reducing the risk of central points of failure and making the network more resilient to attacks.

3. Transaction Fees:

- Flat Fee Structure: Each transaction on the Stellar network incurs a flat fee of 0.00001 XLM (known as a base fee). This low and predictable fee structure makes Stellar suitable for micropayments and high-volume transactions.
- Spam Prevention: The transaction fee serves as a deterrent against spam attacks. By requiring a small fee for each transaction, Stellar ensures that the network remains efficient and that resources are not wasted on processing malicious or frivolous transactions.

4. Operational Costs:

Minimal Fees: The minimal transaction fees on Stellar not only prevent spam but also cover the operational costs of running the network. This ensures that the network can sustain itself without placing a significant financial burden on users.

5. Reserve Requirements:

- Account Reserves: To create a new account on the Stellar network, a minimum balance of 1 XLM is required. This reserve requirement prevents the creation of an excessive number of accounts, further protecting the network from spam and ensuring efficient resource usage.
- Trustline and Offer Reserves: Additional reserve requirements exist for creating trustlines and offers on the Stellar decentralized exchange (DEX). These reserves help maintain network integrity and prevent abuse.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, stellar is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Renzo

REZ | 3SPXMRFNC

Quantitative information

Quantitative sustainability indicators for Renzo

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Renzo	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	233.78080	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Basic Attention Token

BAT | 51F8M277P

Quantitative information

Quantitative sustainability indicators for Basic Attention Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Basic Attention Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	231.01460	kWh/a

Qualitative information

S.4 Consensus Mechanism

Basic Attention Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- **Two-Layer Structure** Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- **Layer 2: Gnosis xDai Chain** processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability.
- Validator Role and Staking** Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Doomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Doomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Doomslug protocol.
- Doomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Basic Attention Token is present on the following networks: Avalanche, Binance Smart Chain, Ethereum, Gnosis Chain, Near Protocol, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.

- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum, gnosis_chain, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the

network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Status Network Token

SNT | X41MS94D1

Quantitative information

Quantitative sustainability indicators for Status Network Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Status Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	222.21241	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Beam

BEAM | X70FVW3GT

Quantitative information

Quantitative sustainability indicators for Beam

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Beam	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	217.48934	kWh/a

Qualitative information

S.4 Consensus Mechanism

Beam is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Beam is present on the following networks: Avalanche, Binance Smart Chain, Ethereum.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- **Slashing:** Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- **Uptime Requirements:** Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
- 2. Block Rewards:
Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
- 3. Cross-Chain Fees:
Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
- 4. Smart Contract Fees:
Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



UMA Voting Token v1

UMA | JM4LKD71T

Quantitative information

Quantitative sustainability indicators for UMA Voting Token v1

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	UMA Voting Token v1	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	214.90232	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Big Time

TIME | DM8NPMHHW

Quantitative information

Quantitative sustainability indicators for Big Time

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Big Time	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	212.84414	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Illuvium

ILV | 1J74CCB0S

Quantitative information

Quantitative sustainability indicators for Illuvium

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Illuvium	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	210.78596	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Illuvium is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a

verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Illuvium is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Syrup Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Syrup Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	210.71499	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Orderly Network

ORDER | CRM_Orderly-Network_group

Quantitative information

Quantitative sustainability indicators for Orderly Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Orderly Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	209.29556	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for yearn.finance

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	yearn.finance	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	208.20579	kWh/a

Qualitative information

S.4 Consensus Mechanism

yearn.finance is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Huobi, Near Protocol, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
 - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
 - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
 - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.

- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
 - Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability.
- Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. Validator Selection: HECO supports up to 21 validators, selected based on their stake in the network.
2. Transaction Processing: Validators are responsible for processing transactions and adding blocks to the blockchain.
3. Transaction Finality: The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. Energy Efficiency: By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Dooomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Dooomslug and Proof of Stake:
 - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Dooomslug protocol.
 - Dooomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under DooMLug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

yearn.finance is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Fantom, Gnosis Chain, Huobi, Near Protocol, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.

- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:

Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.

2. Staking Participation:

Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):

Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.

2. Smart Contract Execution Fees:

Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, fantom, gnosis_chain, huobi, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of

the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



POPCAT

POPCAT | CPLCKVT11

Quantitative information

Quantitative sustainability indicators for POPCAT

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	POPCAT	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	204.07072	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



dogwifhat

WIF | 10G31SK86

Quantitative information

Quantitative sustainability indicators for dogwifhat

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	dogwifhat	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	203.01713	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Swell Governance Token

SWELL | G2M3R6WBH

Quantitative information

Quantitative sustainability indicators for Swell Governance Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Swell Governance Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	200.49507	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Tellor Tributes

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Tellor Tributes	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	197.15940	kWh/a

Qualitative information

S.4 Consensus Mechanism

Tellor Tributes is present on the following networks: Arbitrum, Ethereum, Gnosis Chain, Optimism, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- **Two-Layer Structure** Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- **Layer 2: Gnosis xDai Chain** processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. **Validator Role and Staking** Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). **Cross-Layer Security** Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. **Optimistic Rollups:**
 - **Rollup Blocks:** Transactions are batched into rollup blocks and processed off-chain.
 - **State Commitments:** The state of these transactions is periodically committed to the Ethereum main chain.
2. **Sequencers:**
 - **Transaction Ordering:** Sequencers are responsible for ordering transactions and creating batches.
 - **State Updates:** Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
 - **Block Production:** They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Tellor Tributes is present on the following networks: Arbitrum, Ethereum, Gnosis Chain, Optimism, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.

- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.

- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.

- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, gnosis_chain, optimism, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Audius

AUDIO | QZMN0FP41

Quantitative information

Quantitative sustainability indicators for Audius

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Audius	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	196.82938	kWh/a

Qualitative information

S.4 Consensus Mechanism

Audius is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an

integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Audius is present on the following networks: Ethereum, Gnosis Chain, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

**Amp**

AMP | BCR85DWDR

Quantitative information

Quantitative sustainability indicators for Amp

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Amp	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	195.88191	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Amp is present on the following networks: Ethereum, Near Protocol, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Dooomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Dooomslug and Proof of Stake:

- NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Dooomslug protocol.

- Doomsplug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.

2. Sharding with Nightshade:

- NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.
- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Doomsplug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Amp is present on the following networks: Ethereum, Near Protocol, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- **Staking Rewards:** Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- **Transaction Fees:** Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, near_protocol, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Realio Network

RIO | CRM_realio_network

Quantitative information

Quantitative sustainability indicators for Realio Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Realio Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	184.79618	kWh/a

Qualitative information

S.4 Consensus Mechanism

Realio Network is present on the following networks: Binance Smart Chain, Ethereum, Osmosis, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.
- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Realio Network is present on the following networks: Binance Smart Chain, Ethereum, Osmosis, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, osmosis, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Orca

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Orca	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	183.28693	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Layer3

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Layer3	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	180.97785	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



double_zero

2Z | CRM_double_zero

Quantitative information

Quantitative sustainability indicators for double_zero

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	double_zero	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	177.37469	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Useless Coin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Useless Coin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	173.83385	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



0x Protocol Token

ZRX | HX56HH1ZX

Quantitative information

Quantitative sustainability indicators for 0x Protocol Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	0x Protocol Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	173.61044	kWh/a

Qualitative information

S.4 Consensus Mechanism

0x Protocol Token is present on the following networks: Avalanche, Ethereum, Gnosis Chain, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- **Two-Layer Structure** **Layer 1: Gnosis Beacon Chain** The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- **Layer 2: Gnosis xDai Chain** processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. **Validator Role and Staking** Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). **Cross-Layer Security** Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- **Time-Stamped Transactions:** PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- **Verifiable Delay Function:** PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

0x Protocol Token is present on the following networks: Avalanche, Ethereum, Gnosis Chain, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- **Slashing:** Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- **Uptime Requirements:** Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- **Dynamic Fees:** Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- **Fee Burning:** A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, ethereum, gnosis_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Wormhole Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Wormhole Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	171.33629	kWh/a

Qualitative information

S.4 Consensus Mechanism

Wormhole Token is present on the following networks: Arbitrum, Ethereum, Optimism, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.

- Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
- 5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.
2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.
3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.
4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:
 - Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
 - Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

- Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Wormhole Token is present on the following networks: Arbitrum, Ethereum, Optimism, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, optimism, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Highstreet Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Highstreet Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	171.14917	kWh/a

Qualitative information

S.4 Consensus Mechanism

Highstreet Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Highstreet Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



puffer

PUFFER | CRM_puffer

Quantitative information

Quantitative sustainability indicators for puffer

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	puffer	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	169.62238	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Echelon Prime

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Echelon Prime	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	165.36981	kWh/a

Qualitative information

S.4 Consensus Mechanism

Echelon Prime is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Echelon Prime is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SPACE ID

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	SPACE ID	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	163.72567	kWh/a

Qualitative information

S.4 Consensus Mechanism

SPACE ID is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

SPACE ID is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


SUN

SUN | DRSV113K4

Quantitative information

Quantitative sustainability indicators for SUN

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	SUN	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	163.13550	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing

new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Kyber Network Crystal v2

KNC | LODZSBLVZ

Quantitative information

Quantitative sustainability indicators for Kyber Network Crystal v2

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Kyber Network Crystal v2	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	162.65526	kWh/a

Qualitative information

S.4 Consensus Mechanism

Kyber Network Crystal v2 is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Optimism, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Kyber Network Crystal v2 is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum, Optimism, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.
- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum, optimism, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for JUST

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	JUST	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	160.56932	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing

new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for tokenfi

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	tokenfi	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	156.22303	kWh/a

Qualitative information

S.4 Consensus Mechanism

tokenfi is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

tokenfi is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Memecoin

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Memecoin	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	153.86666	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pixels

PIXEL | 5HPLWBHDP

Quantitative information

Quantitative sustainability indicators for Pixels

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pixels	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	152.68602	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Pixels is present on the following networks: Ethereum, Ronin.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):

- Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.

- Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.

2. Incentive-Driven Voting System:

Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

S.5 Incentive Mechanisms and Applicable Fees

Pixels is present on the following networks: Ethereum, Ronin.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:

- Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.
- Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.

2. Slashing Mechanism for Accountability:

- Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.
- Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.

3. Governance Participation:

RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, ronin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Helium

HNT | 4GX02L80B

Quantitative information

Quantitative sustainability indicators for Helium

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Helium	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	149.10207	kWh/a

Qualitative information

S.4 Consensus Mechanism

Helium is present on the following networks: Helium, Solana.

Helium operates on a unique consensus model called Proof of Coverage (PoC), optimized for decentralized, location-based verification and low-power wireless IoT networks.

Core Components of Helium's Consensus:

1. Proof of Coverage (PoC):
 - Hotspot Verification: PoC is a consensus protocol designed specifically for Helium, ensuring that network nodes, known as hotspots, provide valid wireless coverage in their claimed location.
 - Challenge System: Hotspots are randomly selected to participate in PoC challenges involving three roles:
 - Challenger: Initiates the verification process.
 - Transmitter: Broadcasts signals to other hotspots.
 - Witness: Confirms signal receipt, verifying that coverage is active in a specific location.
 - Off-Chain Processing on Solana: Helium's PoC is processed off-chain on Solana, with results stored on Solana's blockchain to reduce on-chain resource usage while maintaining decentralized verification. Solana itself is secured through a Proof-of-Stake (PoS) mechanism.
2. LongFi Protocol: Helium utilizes LongFi, a protocol that integrates LoRaWAN technology with blockchain. This protocol supports low-power, long-range communication ideal for IoT devices, optimizing for low bandwidth and extensive range applications.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Helium is present on the following networks: Helium, Solana.

Helium's incentive structure rewards hotspot operators for verifying coverage and transmitting IoT data, aligning rewards with network participation and actual service provision.

Incentive Mechanisms:

1. Hotspot Operator Rewards:

Hotspot operators earn Helium's native HNT tokens as rewards for participating in PoC challenges and transmitting IoT data. The amount of HNT earned depends on the PoC verification results and the volume of data transmitted through their hotspots.

2. Solana Validators:

Validators on Solana's network process Helium transactions and receive staking rewards in Solana's native token, SOL, contributing to Helium's transaction verification.

Applicable Fees:

- Usage Fees with DC: IoT device operators pay for network usage with Data Credits, which are generated by burning HNT tokens. This model decouples usage costs from HNT's market price, keeping transaction costs stable.
- HNT Burn Mechanism: The burning of HNT to generate Data Credits ties network utility to HNT token demand, creating a feedback loop that supports token stability and incentivizes participation in network services.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.

- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for zigchain

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	zigchain	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	148.85031	kWh/a

Qualitative information

S.4 Consensus Mechanism

zigchain is present on the following networks: Binance Smart Chain, Ethereum, Polygon, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

zigchain is present on the following networks: Binance Smart Chain, Ethereum, Polygon, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Alchemy

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Alchemy	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	144.80939	kWh/a

Qualitative information

S.4 Consensus Mechanism

Alchemy is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Alchemy is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Civic

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Civic	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	142.18023	kWh/a

Qualitative information

S.4 Consensus Mechanism

Civic is present on the following networks: Ethereum, Tron.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to

the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.

2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

Civic is present on the following networks: Ethereum, Tron.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:
 - Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
 - Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.
2. Voting and Delegation:
 - TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
 - Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
 - Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens. Transaction
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Rocket Pool

RPL | 69Q6NLJ3M

Quantitative information

Quantitative sustainability indicators for Rocket Pool

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Rocket Pool	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	142.08535	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Rocket Pool is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Rocket Pool is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Request Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Request Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	138.18191	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Livepeer

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Livepeer	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	136.40762	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Livepeer is present on the following networks: Ethereum, Harmony One.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):

- Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
- Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.

2. Sharding with PBFT Finality:

- Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
- Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

S.5 Incentive Mechanisms and Applicable Fees

Livepeer is present on the following networks: Ethereum, Harmony One.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.

2. Decentralization Penalty for High Stake:

Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:

Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, harmony_one is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Jito

JTO | D3XB6KZ00

Quantitative information

Quantitative sustainability indicators for Jito

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Jito	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	133.64688	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for galxe

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	galxe	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	133.35613	kWh/a

Qualitative information

S.4 Consensus Mechanism

galxe is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. **Consensus Process**
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. **Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

galxe is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Liquity

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Liquity	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	131.43960	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Mask Network

MASK | VTV046TSP

Quantitative information

Quantitative sustainability indicators for Mask Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Mask Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	131.03545	kWh/a

Qualitative information

S.4 Consensus Mechanism

Mask Network is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Mask Network is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



AltLayer Token

ALT | B7HS0LP5T

Quantitative information

Quantitative sustainability indicators for AltLayer Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	AltLayer Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	125.37357	kWh/a

Qualitative information

S.4 Consensus Mechanism

AltLayer Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

AltLayer Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

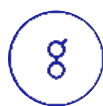
Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Golem Network Token

GLM | XRWVBJL68

Quantitative information

Quantitative sustainability indicators for Golem Network Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Golem Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	120.86481	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for ssv network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	ssv network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	120.43898	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pyth Network

PYTH | 3980Q2CPS

Quantitative information

Quantitative sustainability indicators for Pyth Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pyth Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	120.38982	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Numeraire

NMR | TCRZ9GZRF

Quantitative information

Quantitative sustainability indicators for Numeraire

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Numeraire	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	120.29704	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for zentry

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	zentry	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	116.45389	kWh/ a

Qualitative information

S.4 Consensus Mechanism

zentry is present on the following networks: Ethereum, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a

verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

zentry is present on the following networks: Ethereum, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for PowerLedger

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	PowerLedger	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	115.11611	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Yield Guild Games Token

YGG | WV93P8B45

Quantitative information

Quantitative sustainability indicators for Yield Guild Games Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Yield Guild Games Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	114.00870	kWh/a

Qualitative information

S.4 Consensus Mechanism

Yield Guild Games Token is present on the following networks: Ethereum, Harmony One, Ronin, Solana.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):

- Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.

- Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.

2. Sharding with PBFT Finality:

- Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
- Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Ronin utilizes a Delegated Proof of Stake (DPoS) consensus mechanism, where community-elected validators are responsible for securing the network and validating transactions.

Core Components of Ronin's Consensus:

1. Delegated Proof of Stake (DPoS):

- Community Voting for Validator Selection: RON token holders delegate their tokens to vote for validators, who are then selected to produce blocks, validate transactions, and maintain network security. Validators with the most votes are chosen to participate in consensus.
- Periodic Validator Rotation: Validators are regularly rotated based on community votes, enhancing decentralization and preventing long-term control by any single validator group. This rotation supports both security and fairness.

2. Incentive-Driven Voting System:

Alignment with Community Interests: The voting system ensures that validators remain aligned with community goals. Validators that fail to perform adequately or act against network interests may lose votes and be replaced by more trusted participants.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Yield Guild Games Token is present on the following networks: Ethereum, Harmony One, Ronin, Solana.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.

2. Decentralization Penalty for High Stake:

Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:

Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Ronin's incentive model combines rewards, slashing mechanisms, and governance features to support network security and encourage active community participation.

Incentive Mechanisms:

1. Rewards for Validators and Delegators:

- Staking Rewards for Validators: Validators earn RON tokens as rewards for successfully producing blocks and validating transactions. These rewards incentivize validators to fulfill their duties diligently, maintaining network stability.

- Delegator Rewards: Delegators who stake their tokens with selected validators also earn a portion of the staking rewards. This sharing of rewards promotes broad participation from token holders in network security and governance.

2. Slashing Mechanism for Accountability:

- Penalty for Malicious Behavior: A slashing mechanism penalizes validators who act dishonestly or fail to meet performance standards by cutting a portion of their staked RON tokens. This deters misbehavior and encourages responsible participation.

- Delegator Risk: Delegators who stake with misbehaving validators are also subject to slashing, which encourages them to choose trustworthy validators and monitor performance carefully.

3. Governance Participation:

RON Token for Governance: Beyond staking and transaction fees, the RON token enables token holders to participate in governance. This includes voting on network upgrades, validator selection, and other protocol decisions, giving token holders a voice in network direction and policy.

Applicable Fees:

Transaction Fees: Fees are paid in RON tokens, contributing to validator rewards and helping to maintain network operations. These fees are designed to be affordable, ensuring accessibility for users while supporting validators' roles.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, harmony_one, ronin, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and

the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Polyhedra Network Token

ZKJ | WBRGJ0BFP

Quantitative information

Quantitative sustainability indicators for Polyhedra Network Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Polyhedra Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	112.13529	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Aster

ASTER | H8BH7VR5W

Quantitative information

Quantitative sustainability indicators for Aster

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Aster	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	110.17152	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Gluwa Creditcoin Vesting Token

GCRE | CJC8G9C3

Quantitative information

Quantitative sustainability indicators for Gluwa Creditcoin Vesting Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Gluwa Creditcoin Vesting Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	103.83160	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Spell Token

SPELL | 2D7W0LVCF

Quantitative information

Quantitative sustainability indicators for Spell Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Spell Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	100.71111	kWh/a

Qualitative information

S.4 Consensus Mechanism

Spell Token is present on the following networks: Arbitrum, Avalanche, Ethereum, Fantom.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):

- Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.

- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
- 2. Event Blocks and Instant Finality:
 - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
 - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

S.5 Incentive Mechanisms and Applicable Fees

Spell Token is present on the following networks: Arbitrum, Avalanche, Ethereum, Fantom.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:
 - Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
 - Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.
2. Fraud Proofs:
 - Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
 - Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
 - Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.
3. Economic Incentives:
 - Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
 - Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:
 - Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
 - Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, ethereum, fantom is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and

the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SKALE

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SKALE	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	98.57970	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

Zora
token
ZORA

Zora

ZORA | M4DCVM90D

Quantitative information

Quantitative sustainability indicators for Zora

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Zora	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	98.17407	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Wootrade Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Wootrade Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	97.78667	kWh/a

Qualitative information

S.4 Consensus Mechanism

Wootrade Network is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Near Protocol, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial

role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The NEAR Protocol uses a unique consensus mechanism combining Proof of Stake (PoS) and a novel approach called Dooomslug, which enables high efficiency, fast transaction processing, and secure finality in its operations.

Core Concepts:

1. Dooomslug and Proof of Stake:
 - NEAR's consensus mechanism primarily revolves around PoS, where validators stake NEAR tokens to participate in securing the network. However, NEAR's implementation is enhanced with the Dooomslug protocol.
 - Dooomslug allows the network to achieve fast block finality by requiring blocks to be confirmed in two stages. Validators propose blocks in the first step, and finalization occurs when two-thirds of validators approve the block, ensuring rapid transaction confirmation.
2. Sharding with Nightshade:
 - NEAR uses a dynamic sharding technique called Nightshade. This method splits the network into multiple shards, enabling parallel processing of transactions across the network, thus

significantly increasing throughput. Each shard processes a portion of transactions, and the outcomes are merged into a single "snapshot" block.

- This sharding approach ensures scalability, allowing the network to grow and handle increasing demand efficiently.

Consensus Process:

1. Validator Selection:

- Validators are selected to propose and validate blocks based on the amount of NEAR tokens staked. This selection process is designed to ensure that only validators with significant stakes and community trust participate in securing the network.

2. Transaction Finality:

- NEAR achieves transaction finality through its PoS-based system, where validators vote on blocks. Once two-thirds of validators approve a block, it reaches finality under Dooomslug, meaning that no forks can alter the confirmed state.

3. Epochs and Rotation:

- Validators are rotated in epochs to ensure fairness and decentralization. Epochs are intervals in which validators are reshuffled, and new block proposers are selected, ensuring a balance between performance and decentralization.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Wootrade Network is present on the following networks: Arbitrum, Avalanche, Binance Smart Chain, Ethereum, Near Protocol, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.

- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

NEAR Protocol employs several economic mechanisms to secure the network and incentivize participation.

Incentive Mechanisms to Secure Transactions:

1. Staking Rewards:

Validators and delegators secure the network by staking NEAR tokens. Validators earn around 5% annual inflation, with 90% of newly minted tokens distributed as staking rewards. Validators propose blocks, validate transactions, and receive a share of these rewards based on their staked tokens. Delegators earn rewards proportional to their delegation, encouraging broad participation.

2. Delegation:

Token holders can delegate their NEAR tokens to validators to increase the validator's stake and improve the chances of being selected to validate transactions. Delegators share in the validator's rewards based on their delegated tokens, incentivizing users to support reliable validators.

3. Slashing and Economic Penalties:

Validators face penalties for malicious behavior, such as failing to validate correctly or acting dishonestly. The slashing mechanism enforces security by deducting a portion of their staked tokens, ensuring validators follow the network's best interests.

4. Epoch Rotation and Validator Selection:

Validators are rotated regularly during epochs to ensure fairness and prevent centralization. Each epoch reshuffles validators, allowing the protocol to balance decentralization with performance.

Fees on the NEAR Blockchain:

1. Transaction Fees:

Users pay fees in NEAR tokens for transaction processing, which are burned to reduce the total circulating supply, introducing a potential deflationary effect over time. Validators also receive a portion of transaction fees as additional rewards, providing an ongoing incentive for network maintenance.

2. Storage Fees:

NEAR Protocol charges storage fees based on the amount of blockchain storage consumed by accounts, contracts, and data. This requires users to hold NEAR tokens as a deposit proportional to their storage usage, ensuring the efficient use of network resources.

3. Redistribution and Burning:

A portion of the transaction fees (burned NEAR tokens) reduces the overall supply, while the rest is distributed to validators as compensation for their work. The burning mechanism helps maintain long-term economic sustainability and potential value appreciation for NEAR holders.

4. Reserve Requirement:

Users must maintain a minimum account balance and reserves for data storage, encouraging efficient use of resources and preventing spam attacks.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- **Staking Rewards:** Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- **Block Production:** Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- **Checkpointing:** Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- **Delegation:** Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- **Shared Rewards:** Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- **Slashing:** Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- **Bond Requirements:** Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche, binance_smart_chain, ethereum, near_protocol, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


AINFT

NFT | 4MH0C4BL6

Quantitative information

Quantitative sustainability indicators for AINFT

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	AINFT	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	97.66985	kWh/a

Qualitative information

S.4 Consensus Mechanism

AINFT is present on the following networks: Binance Smart Chain, Ethereum, Huobi, Tron.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Key Features of HECO's Consensus Mechanism:

1. **Validator Selection:** HECO supports up to 21 validators, selected based on their stake in the network.
2. **Transaction Processing:** Validators are responsible for processing transactions and adding blocks to the blockchain.
3. **Transaction Finality:** The consensus mechanism ensures quick finality, allowing for rapid confirmation of transactions.
4. **Energy Efficiency:** By utilizing PoS elements, HECO reduces energy consumption compared to traditional Proof-of-Work systems.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

AINFT is present on the following networks: Binance Smart Chain, Ethereum, Huobi, Tron.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.

- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Huobi Eco Chain (HECO) blockchain employs a Hybrid-Proof-of-Stake (HPoS) consensus mechanism, combining elements of Proof-of-Stake (PoS) to enhance transaction efficiency and scalability.

Incentive Mechanism:

1. Validator Rewards:

Validators are selected based on their stake in the network. They process transactions and add blocks to the blockchain. Validators receive rewards in the form of transaction fees for their role in maintaining the blockchain's integrity.

2. Staking Participation:

Users can stake Huobi Token (HT) to become validators or delegate their tokens to existing validators. Staking helps secure the network and, in return, participants receive a portion of the transaction fees as rewards.

Applicable Fees:

1. Transaction Fees (Gas Fees):

Users pay gas fees in HT tokens to execute transactions and interact with smart contracts on the HECO network. These fees compensate validators for processing and validating transactions.

2. Smart Contract Execution Fees:

Deploying and interacting with smart contracts incur additional fees, which are also paid in HT tokens. These fees cover the computational resources required to execute contract code.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, huobi, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Cartesi Token

CTSI | BL44WHVKM

Quantitative information

Quantitative sustainability indicators for Cartesi Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Cartesi Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	93.54071	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for BENQI

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	BENQI	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	91.35981	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.

- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for sentient

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	sentient	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	86.15965	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for synfutures

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	synfutures	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	84.27473	kWh/a

Qualitative information

S.4 Consensus Mechanism

synfutures is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

synfutures is present on the following networks: Base, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Stader

SD | T1CP5RKGN

Quantitative information

Quantitative sustainability indicators for Stader

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Stader	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	84.24341	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for DIA

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	DIA	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	82.75301	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for COTI Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	COTI Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	82.28514	kWh/a

Qualitative information

S.4 Consensus Mechanism

COTI Token is present on the following networks: Binance Beacon Chain, Binance Smart Chain, Ethereum.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through

staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

COTI Token is present on the following networks: Binance Beacon Chain, Binance Smart Chain, Ethereum.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees

were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_beacon_chain`, `binance_smart_chain`, `ethereum` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Zebec Network

ZBCN | DHV5NRJCF

Quantitative information

Quantitative sustainability indicators for Zebec Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Zebec Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	81.53581	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Orbs

ORBS | XW3GWJ75G

Quantitative information

Quantitative sustainability indicators for Orbs

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Orbs	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	78.15877	kWh/a

Qualitative information

S.4 Consensus Mechanism

Orbs is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Orbs is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Threshold Network Token

T | LTSB7W5CZ

Quantitative information

Quantitative sustainability indicators for Threshold Network Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Threshold Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	77.14624	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Gods Unchained

GODS | 56SF1DNGQ

Quantitative information

Quantitative sustainability indicators for Gods Unchained

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Gods Unchained	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	72.32017	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Biconomy Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Biconomy Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	71.53948	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


TARS AI

TAI | STW1X0J38

Quantitative information

Quantitative sustainability indicators for TARS AI

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	TARS AI	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	71.40921	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

NYM
token
—

NYM

NYM | CRM_NYM

Quantitative information

Quantitative sustainability indicators for NYM

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	NYM	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	71.39754	kWh/a

Qualitative information

S.4 Consensus Mechanism

NYM is present on the following networks: Ethereum, Osmosis.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Osmosis operates on a Proof of Stake (PoS) consensus mechanism, leveraging the Cosmos SDK and Tendermint Core to provide secure, decentralized, and scalable transaction processing.

Core Components:

- Proof of Stake (PoS): Validators are chosen based on the amount of OSMO tokens they stake or are delegated by other token holders. Validators are responsible for validating transactions, producing blocks, and maintaining network security.

- Cosmos SDK and Tendermint Core: Osmosis uses Tendermint Core for Byzantine Fault Tolerant (BFT) consensus, ensuring fast finality and resistance to attacks as long as less than one-third of validators are malicious.
- Decentralized Governance: OSMO token holders can participate in governance by voting on protocol upgrades and network parameters, fostering a community-driven approach to network development.

S.5 Incentive Mechanisms and Applicable Fees

NYM is present on the following networks: Ethereum, Osmosis.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Osmosis incentivizes validators, delegators, and liquidity providers through a combination of staking rewards, transaction fees, and liquidity incentives.

Incentive Mechanisms:

- Validator Rewards: Validators earn rewards from transaction fees and block rewards, distributed in OSMO tokens, for their role in securing the network and processing transactions. Delegators who stake their OSMO tokens with validators receive a share of these rewards.
- Liquidity Provider Rewards: Users providing liquidity to Osmosis pools earn swap fees and may receive additional incentives in the form of OSMO tokens to encourage liquidity provision.
- Superfluid Staking: Liquidity providers can participate in superfluid staking, staking a portion of their OSMO tokens within liquidity pools. This mechanism allows users to earn staking rewards while maintaining liquidity in the pools

Applicable Fees:

Transaction Fees: Users pay transaction fees in OSMO tokens for network activities, including swaps, staking, and governance participation. These fees are distributed to validators and delegators, incentivizing their continued participation and support for network security.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, osmosis is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the

Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Bounce Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Bounce Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	68.30392	kWh/a

Qualitative information

S.4 Consensus Mechanism

Bounce Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Bounce Token is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Chainflip

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Chainflip	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	67.84895	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Vanar

VANRY | CRM_Vanar

Quantitative information

Quantitative sustainability indicators for Vanar

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Vanar	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	66.79826	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Vanar is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Vanar is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



aixbt by Virtuals

AIXBT | 8762TQWQ6

Quantitative information

Quantitative sustainability indicators for aixbt by Virtuals

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	aixbt by Virtuals	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	66.58481	kWh/a

Qualitative information

S.4 Consensus Mechanism

aixbt by Virtuals is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

aixbt by Virtuals is present on the following networks: Base, Ethereum, Solana.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Grass

GRASS | MNCR2MKHP

Quantitative information

Quantitative sustainability indicators for Grass

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Grass	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	64.69352	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Hashflow

HFT | N3K1P14QN

Quantitative information

Quantitative sustainability indicators for Hashflow

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Hashflow	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	64.15842	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for HoloToken

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	HoloToken	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	64.15842	kWh/a

Qualitative information

S.4 Consensus Mechanism

HoloToken is present on the following networks: Ethereum, Gnosis Chain.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Gnosis Chain – Consensus Mechanism Gnosis Chain employs a dual-layer structure to balance scalability and security, using Proof of Stake (PoS) for its core consensus and transaction finality.

Core Components:

- Two-Layer Structure Layer 1: Gnosis Beacon Chain The Gnosis Beacon Chain operates on a Proof of Stake (PoS) mechanism, acting as the security and consensus backbone. Validators stake GNO tokens on the Beacon Chain and validate transactions, ensuring network security and finality.
- Layer 2: Gnosis xDai Chain processes transactions and dApp interactions, providing high-speed, low-cost transactions. Layer 2 transaction data is finalized on the Gnosis Beacon Chain, creating an

integrated framework where Layer 1 ensures security and finality, and Layer 2 enhances scalability. Validator Role and Staking Validators on the Gnosis Beacon Chain stake GNO tokens and participate in consensus by validating blocks. This setup ensures that validators have an economic interest in maintaining the security and integrity of both the Beacon Chain (Layer 1) and the xDai Chain (Layer 2). Cross-Layer Security Transactions on Layer 2 are ultimately finalized on Layer 1, providing security and finality to all activities on the Gnosis Chain. This architecture allows Gnosis Chain to combine the speed and cost efficiency of Layer 2 with the security guarantees of a PoS-secured Layer 1, making it suitable for both high-frequency applications and secure asset management.

S.5 Incentive Mechanisms and Applicable Fees

HoloToken is present on the following networks: Ethereum, Gnosis Chain.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

The Gnosis Chain's incentive and fee models encourage both validator participation and network accessibility, using a dual-token system to maintain low transaction costs and effective staking rewards.

Incentive Mechanisms:

- Staking Rewards for Validators GNO Rewards: Validators earn staking rewards in GNO tokens for their participation in consensus and securing the network.
- Delegation Model: GNO holders who do not operate validator nodes can delegate their GNO tokens to validators, allowing them to share in staking rewards and encouraging broader participation in network security.
- Dual-Token Model GNO: Used for staking, governance, and validator rewards, GNO aligns long-term network security incentives with token holders' economic interests.
- xDai: Serves as the primary transaction currency, providing stable and low-cost transactions. The use of a stable token (xDai) for fees minimizes volatility and offers predictable costs for users and developers.

Applicable Fees:

Transaction Fees in xDai Users pay transaction fees in xDai, the stable fee token, making costs affordable and predictable. This model is especially suited for high-frequency applications and dApps where low transaction fees are essential. xDai transaction fees are redistributed to validators as part of their compensation, aligning their rewards with network activity. Delegated Staking Rewards Through delegated staking, GNO holders can earn a share of staking rewards by delegating their tokens to active validators, promoting user participation in network security without requiring direct involvement in consensus operations.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, gnosis_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Synapse

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Synapse	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	62.81932	kWh/a

Qualitative information

S.4 Consensus Mechanism

Synapse is present on the following networks: Arbitrum, Aurora, Avalanche, Binance Smart Chain, Boba Network, Ethereum, Fantom, Harmony One, Moonriver, Optimism, Polygon.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Aurora functions as an Ethereum Virtual Machine (EVM) compatible environment operating atop the NEAR Protocol. It does not possess an independent consensus mechanism but relies on NEAR's Proof-of-Stake (PoS) consensus for transaction validation and network security.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Boba Network operates as an Ethereum Layer 2 solution using an Optimistic Rollup architecture to improve scalability and reduce transaction costs.

Core Components:

- **Optimistic Rollup:** Processes transactions off-chain, aggregates them, and submits condensed proofs to the Ethereum mainnet for finalization.
- **Sequencer Role:** A sequencer organizes and bundles transactions off-chain before submitting the batched data to Ethereum. This enhances transaction throughput and reduces latency.
- **Fraud Proofs:** Maintains security by allowing users to challenge suspicious transactions. If a transaction is deemed fraudulent, it is corrected on the mainnet, ensuring integrity.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):

- Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
- DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.

2. Event Blocks and Instant Finality:

- Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
- Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

Harmony operates on a consensus mechanism called Effective Proof of Stake (EPoS), designed to balance validator influence and enhance network security while improving transaction scalability.

Core Components:

1. Effective Proof of Stake (EPoS):

- Validator Diversity: EPoS allows a large number of validators to participate and limits the influence of high-stake validators, promoting decentralization and preventing stake centralization.
- Staking Across Shards: Multiple validators compete within each shard, distributing staking power more broadly and enhancing network security.

2. Sharding with PBFT Finality:

- Parallel Transaction Processing: Harmony's four shards enable independent processing of transactions and smart contracts, enhancing scalability and throughput.
- Fast Finality with PBFT: Each shard uses a modified Practical Byzantine Fault Tolerance (PBFT) model, ensuring immediate finality once blocks are validated and achieving high transaction speeds.

Moonriver operates on a Proof of Stake (PoS) consensus mechanism, enhanced by Polkadot's Nominated Proof of Stake (NPoS) model. This structure ensures secure, scalable, and decentralized transaction processing, leveraging the robust Substrate framework.

Core Components:

- Nominated Proof of Stake (NPoS):

Validators are selected through staking by token holders, known as nominators, who delegate their MOVR tokens to trusted validator nodes. Validators with higher stakes and nominations are chosen to validate blocks and secure the network.

- Collator Nodes:

Moonriver employs collator nodes, responsible for aggregating transactions into blocks and submitting them to the Polkadot Relay Chain for final validation. Collators ensure fast block production while relying on Polkadot's shared security.

- Byzantine Fault Tolerance (BFT):

Moonriver integrates BFT properties to handle network disruptions and maintain consensus even if some validators act maliciously or become unavailable.

- Seamless Interoperability:

As a parachain within the Polkadot ecosystem, Moonriver benefits from Polkadot's cross-chain messaging protocols, enabling secure and efficient interoperability with other parachains and external blockchains.

Optimism is a Layer 2 scaling solution for Ethereum that uses Optimistic Rollups to increase transaction throughput and reduce costs while inheriting the security of the Ethereum main chain.

Core Components:

1. Optimistic Rollups:

- Rollup Blocks: Transactions are batched into rollup blocks and processed off-chain.
- State Commitments: The state of these transactions is periodically committed to the Ethereum main chain.

2. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering transactions and creating batches.
- State Updates: Sequencers update the state of the rollup and submit these updates to the Ethereum main chain.
- Block Production: They construct and execute Layer 2 blocks, which are then posted to Ethereum.

3. Fraud Proofs:

- Assumption of Validity: Transactions are assumed to be valid by default.
- Challenge Period: A specific time window during which anyone can challenge a transaction by submitting a fraud proof.
- Dispute Resolution: If a transaction is challenged, an interactive verification game is played to determine its validity. If fraud is detected, the invalid state is rolled back, and the dishonest participant is penalized.

Consensus Process:

1. Transaction Submission: Users submit transactions to the sequencer, which orders them into batches.
2. Batch Processing: The sequencer processes these transactions off-chain, updating the Layer 2 state.
3. State Commitment: The updated state and the batch of transactions are periodically committed to the Ethereum main chain. This is done by posting the state root (a cryptographic hash representing the state) and transaction data as calldata on Ethereum.
4. Fraud Proofs and Challenges: Once a batch is posted, there is a challenge period during which anyone can submit a fraud proof if they believe a transaction is invalid.
 - Interactive Verification: The dispute is resolved through an interactive verification game, which involves breaking down the transaction into smaller steps to identify the exact point of fraud.
 - Rollbacks and Penalties: If fraud is proven, the batch is rolled back, and the dishonest actor loses their staked collateral as a penalty.
5. Finality: After the challenge period, if no fraud proof is submitted, the batch is considered final. This means the transactions are accepted as valid, and the state updates are permanent.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Synapse is present on the following networks: Arbitrum, Aurora, Avalanche, Binance Smart Chain, Boba Network, Ethereum, Fantom, Harmony One, Moonriver, Optimism, Polygon.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The Aurora network utilizes the AURORA token for governance and staking purposes. Token holders can participate in network governance through the AuroraDAO, influencing protocol decisions and developments.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- **Slashing:** Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- **Uptime Requirements:** Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- **Dynamic Fees:** Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- **Fee Burning:** A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The Boba Network incentivizes participation and ensures affordability with flexible fee payment options and staking rewards.

Incentive Mechanisms:

- Staking Rewards: BOBA token holders can stake their tokens to participate in governance and earn staking rewards, encouraging long-term engagement and network growth.
- Sequencer Revenue: The sequencer earns fees for bundling and submitting transactions, incentivizing efficient network operation.

Applicable Fees:

- Dual-Fee Token System: Users can pay transaction fees in BOBA tokens or the base blockchain token (e.g., ETH), offering flexibility.
- Low Transaction Costs: By batching transactions off-chain, Boba significantly reduces the gas fees users pay compared to directly using the Ethereum mainnet.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

Harmony incentivizes validators and delegators to participate in network security and performance through staking rewards, transaction fees, and a unique reward structure promoting decentralization.

Incentive Mechanisms:

1. Staking Rewards for Validators and Delegators:

ONE Token Rewards: Validators earn ONE tokens for validating transactions and securing the network, with a share of these rewards distributed to delegators based on the amount staked.

2. Decentralization Penalty for High Stake:

Reward Adjustment for Large Stakeholders: Validators with an excessive delegated stake experience reduced rewards, preventing centralization and encouraging a fair distribution of staking power.

Applicable Fees:

1. Transaction Fees:

Harmony charges minimal transaction fees in ONE tokens, benefiting high-frequency applications and providing validators with additional rewards.

Moonriver's incentive model ensures active participation from validators, nominators, and developers while maintaining network security and usability.

Incentive Mechanisms:

- Staking Rewards: Validators and nominators earn MOVR tokens for securing the network and validating transactions.
- Collator Rewards: Collators, who propose blocks, are rewarded with MOVR tokens.
- Inflationary Rewards: New MOVR tokens are minted to fund staking and ecosystem development.
- Developer Incentives: A portion of rewards supports dApp development and ecosystem growth.

Applicable Fees:

- Transaction Fees: Paid in MOVR for transfers and smart contract interactions, distributed to validators and collators.
- Gas Fees: Calculated based on transaction complexity, ensuring predictable costs.
- Fee Burning: A portion of fees is burned, reducing token supply over time to support value retention.

Optimism, an Ethereum Layer 2 scaling solution, uses Optimistic Rollups to increase transaction throughput and reduce costs while maintaining security and decentralization.

Incentive Mechanisms:

1. Sequencers:

- Transaction Ordering: Sequencers are responsible for ordering and batching transactions off-chain. They play a critical role in maintaining the efficiency and speed of the network.
- Economic Incentives: Sequencers earn transaction fees from users. These fees incentivize sequencers to process transactions quickly and accurately.

2. Validators and Fraud Proofs:

- Assumption of Validity: In Optimistic Rollups, transactions are assumed to be valid by default. This allows for quick transaction finality.
- Challenge Mechanism: Validators (or anyone) can challenge the validity of a transaction by submitting a fraud proof during a specified challenge period. This mechanism ensures that invalid transactions are detected and reverted.
- Challenge Rewards: Successful challengers are rewarded for identifying and proving fraudulent transactions. This incentivizes participants to actively monitor the network for invalid transactions, thereby enhancing security.

3. Economic Penalties:

- Fraud Proof Penalties: If a sequencer includes an invalid transaction and it is successfully challenged, they face economic penalties, such as losing a portion of their staked collateral. This discourages dishonest behavior.

- Inactivity and Misbehavior: Validators and sequencers are also incentivized to remain active and behave correctly, as inactivity or misbehavior can lead to penalties and loss of rewards.

Fees Applicable on the Optimism Layer 2 Protocol:

1. Transaction Fees:

- Layer 2 Transaction Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are generally lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Cost Efficiency: By batching multiple transactions into a single batch, Optimism reduces the overall cost per transaction, making it more economical for users.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee known as the L1 data fee, which covers the gas cost of publishing these state updates on Ethereum.
- Cost Sharing: The fixed costs of posting state updates to Ethereum are spread across multiple transactions within a batch, reducing the cost burden on individual transactions.

3. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts on Optimism are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.

- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, aurora, avalanche, binance_smart_chain, boba_network, ethereum, fantom, harmony_one, moonriver, optimism, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Flux

FLUX | 4DF5G5HFZ

Quantitative information

Quantitative sustainability indicators for Flux

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Flux	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	60.28597	kWh/a

Qualitative information

S.4 Consensus Mechanism

Flux is present on the following networks: Binance Smart Chain, Ethereum, Solana, Tron.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. **Proof of History (PoH):**
 - **Time-Stamped Transactions:** PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - **Verifiable Delay Function:** PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. **Proof of Stake (PoS):**
 - **Validator Selection:** Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - **Delegation:** Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.

2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

Flux is present on the following networks: Binance Smart Chain, Ethereum, Solana, Tron.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.

- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties. Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- **Block Rewards:** Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- **Transaction Fees:** In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- **TRX Staking:** TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- **Delegator Rewards:** Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- **Incentivizing Participation:** The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- **Fee Calculation:** Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- **Fee Distribution:** Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive \energy

5.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana, tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



ConstitutionDAO

PEOPLE | M69M29HTV

Quantitative information

Quantitative sustainability indicators for ConstitutionDAO

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ConstitutionDAO	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	59.40332	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Limewire

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Limewire	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	57.75380	kWh/a

Qualitative information

S.4 Consensus Mechanism

Limewire is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of

being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.

3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. **Consensus Process**
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. **Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Limewire is present on the following networks: Base, Binance Smart Chain, Ethereum.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



cat in a dogs world

MEW | 5Z3NS3NDB

Quantitative information

Quantitative sustainability indicators for cat in a dogs world

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	cat in a dogs world	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	57.52304	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



APEX Token

APEX | SHV8KFQSK

Quantitative information

Quantitative sustainability indicators for APEX Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	APEX Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	55.78461	kWh/a

Qualitative information

S.4 Consensus Mechanism

APEX Token is present on the following networks: Arbitrum, Ethereum, Mantle.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Mantle is a Layer-2 rollup built on top of Ethereum, designed to leverage Ethereum's security and Proof-of-Stake (PoS) consensus without an independent consensus layer.

Core Components of Mantle's Consensus:

1. Ethereum PoS Inheritance:

Layer-2 Rollup Model: Mantle does not operate its own consensus mechanism; instead, it relies on Ethereum's PoS for transaction finalization and network security. As a rollup on Ethereum, Mantle inherits the security guarantees of Ethereum's established PoS model.

2. Rollup Type Options:

Optimistic Rollups or Zero-Knowledge Rollups: Depending on its configuration, Mantle may use either Optimistic Rollups or Zero-Knowledge Rollups (zk-Rollups) to batch transactions. These rollup methods allow Mantle to achieve efficient off-chain processing and on-chain finality by periodically committing transaction data to Ethereum's mainnet.

S.5 Incentive Mechanisms and Applicable Fees

APEX Token is present on the following networks: Arbitrum, Ethereum, Mantle.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Mantle aims to reduce transaction fees for users by utilizing Ethereum compatibility, rollup technology, and transaction bundling, offering a cost-effective Layer-2 solution.

Incentive Mechanisms:

1. Gas Fee Model:

Ethereum Compatibility: Mantle is EVM-compatible, meaning it shares Ethereum's gas fee model. Transactions require users to pay fees in units of gas, with costs varying based on transaction complexity and computational demand.

2. Lower Transaction Costs:

- Off-Chain Processing with Bundling: By processing transactions off-chain and settling data on Ethereum only periodically, Mantle reduces individual transaction costs. This method results in significantly lower fees compared to the Ethereum mainnet.
- Economies of Scale: Through transaction bundling, Mantle can spread the cost of Ethereum's on-chain settlement across multiple transactions, allowing users to pay only a fraction of the gas fees they would incur directly on Ethereum.

Applicable Fees:

Layer-2 Gas Fees: While Mantle's gas fees are lower than those on Ethereum, they are still measured in units of gas and depend on transaction complexity. The fees reflect the cost of executing transactions in Mantle's Layer-2 environment while benefiting from reduced overall gas consumption due to batching.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum, mantle is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for PORTAL

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	PORTAL	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	55.14501	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Radicale

RAD | 315760HRD

Quantitative information

Quantitative sustainability indicators for Radicle

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Radicale	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	55.14501	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Venice Token

VVV | P0SD47M0W

Quantitative information

Quantitative sustainability indicators for Venice Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Venice Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	54.44614	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Across Protocol Token

ACX | 1J4GM86GD

Quantitative information

Quantitative sustainability indicators for Across Protocol Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Across Protocol Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	54.29335	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for CelerToken

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	CelerToken	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	53.89976	kWh/a

Qualitative information

S.4 Consensus Mechanism

CelerToken is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

CelerToken is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



BOOK OF MEME

BOME | JQCH4ZRFB

Quantitative information

Quantitative sustainability indicators for BOOK OF MEME

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	BOOK OF MEME	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	49.96598	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Chromia

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Chromia	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	48.04784	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



chillguy

CHILLGUY | CRM_chillguy

Quantitative information

Quantitative sustainability indicators for chillguy

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	chillguy	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	45.26002	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


babydoge

BABYDOGE | CRM_babydoge

Quantitative information

Quantitative sustainability indicators for babydoge

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	babydoge	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	44.61823	kWh/a

Qualitative information

S.4 Consensus Mechanism

babydoge is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

babydoge is present on the following networks: Binance Smart Chain, Ethereum, Solana.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.

- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- **Staking Rewards:** Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- **Transaction Fees:** Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- **Delegated Staking:** Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- **Slashing:** Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- **Opportunity Cost:** By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, solana is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Adventure Gold

AGLD | 2QNVF4SDM

Quantitative information

Quantitative sustainability indicators for Adventure Gold

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Adventure Gold	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	41.16359	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Prom

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Prom	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	39.54801	kWh/a

Qualitative information

S.4 Consensus Mechanism

Prom is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Prom is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Vulcan Forged PYR Token

PYR | CPQX5D6RN

Quantitative information

Quantitative sustainability indicators for Vulcan Forged PYR Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Vulcan Forged PYR Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	38.59641	kWh/a

Qualitative information

S.4 Consensus Mechanism

Vulcan Forged PYR Token is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Vulcan Forged PYR Token is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Marlin POND

POND | QFL8HTJ6P

Quantitative information

Quantitative sustainability indicators for Marlin POND

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Marlin POND	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	37.90416	kWh/a

Qualitative information

S.4 Consensus Mechanism

Marlin POND is present on the following networks: Arbitrum, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Marlin POND is present on the following networks: Arbitrum, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.

- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for GMX

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	GMX	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	37.21898	kWh/a

Qualitative information

S.4 Consensus Mechanism

GMX is present on the following networks: Arbitrum, Avalanche.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus. Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

S.5 Incentive Mechanisms and Applicable Fees

GMX is present on the following networks: Arbitrum, Avalanche.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.

- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, avalanche is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Moo Deng

MOODENG | H3X85BK7M

Quantitative information

Quantitative sustainability indicators for Moo Deng

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Moo Deng	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	35.76903	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

- Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
- Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Goatseus Maximus

GOAT | 7FS1WX5VK

Quantitative information

Quantitative sustainability indicators for Goatseus Maximus

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Goatseus Maximus	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	33.21464	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



iEx ec Network Token

RLC | XFRDT01VR

Quantitative information

Quantitative sustainability indicators for iEx ec Network Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	iEx ec Network Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	30.16297	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Magic Eden

ME | 7987R7S6H

Quantitative information

Quantitative sustainability indicators for Magic Eden

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Magic Eden	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	29.93260	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for BandToken

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	BandToken	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	28.03287	kWh/a

Qualitative information

S.4 Consensus Mechanism

BandToken is present on the following networks: Binance Smart Chain, Ethereum, Fantom.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Fantom operates on the Lachesis Protocol, an Asynchronous Byzantine Fault Tolerant (aBFT) consensus mechanism designed for fast, secure, and scalable transactions.

Core Components of Fantom's Consensus:

1. Lachesis Protocol (aBFT):
 - Asynchronous and Leaderless: Lachesis allows nodes to reach consensus independently without relying on a central leader, enhancing decentralization and speed.
 - DAG Structure: Instead of a linear blockchain, Lachesis uses a Directed Acyclic Graph (DAG) structure, allowing multiple transactions to be processed in parallel across nodes. This structure supports high throughput, making the network suitable for applications requiring rapid transaction processing.
2. Event Blocks and Instant Finality:
 - Event Blocks: Transactions are grouped into event blocks, which are validated asynchronously by multiple validators. When enough validators confirm an event block, it becomes part of the Fantom network's history.
 - Instant Finality: Transactions on Fantom achieve immediate finality, meaning they are confirmed and cannot be reversed. This property is ideal for applications requiring fast and irreversible transactions.

S.5 Incentive Mechanisms and Applicable Fees

BandToken is present on the following networks: Binance Smart Chain, Ethereum, Fantom.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Fantom's incentive model promotes network security through staking rewards, transaction fees, and delegation options, encouraging broad participation.

Incentive Mechanisms:

1. Staking Rewards for Validators:

- Earning Rewards in FTM: Validators who participate in the consensus process earn rewards in FTM tokens, proportional to the amount they have staked. This incentivizes validators to actively secure the network.
- Dynamic Staking Rate: Fantom's staking reward rate is dynamic, adjusting based on total FTM staked across the network. As more FTM is staked, individual rewards may decrease, maintaining a balanced reward structure that supports long-term network security.

2. Delegation for Token Holders:

Delegated Staking: Users who do not operate validator nodes can delegate their FTM tokens to validators. In return, they share in the staking rewards, encouraging wider participation in securing the network.

Applicable Fees:

- Transaction Fees in FTM: Users pay transaction fees in FTM tokens. The network's high throughput and DAG structure keep fees low, making Fantom ideal for decentralized applications (dApps) requiring frequent transactions.
- Efficient Fee Model: The low fees and scalability of the network make it cost-effective for users, fostering a favorable environment for high-volume applications.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, fantom is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SuperRare

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SuperRare	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	27.96285	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



ARPA Token

ARPA | XM59GZ001

Quantitative information

Quantitative sustainability indicators for ARPA Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	ARPA Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	27.64117	kWh/a

Qualitative information

S.4 Consensus Mechanism

ARPA Token is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. **Proof of Stake (PoS):**
 - **Validator Selection:** Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - **Delegation:** Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. **Plasma Chains:**
 - **Off-Chain Scaling:** Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - **Fraud Proofs:** Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

ARPA Token is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Gmt

GMT | CRM_GMT

Quantitative information

Quantitative sustainability indicators for Gmt

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Gmt	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	26.93100	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Open Campus

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Open Campus	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	26.23816	kWh/a

Qualitative information

S.4 Consensus Mechanism

Open Campus is present on the following networks: Binance Smart Chain, Edu Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. **Block Production:** The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. **Transaction Finality:** BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives**
7. **Staking:** Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. **Delegation and Rewards:** Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. **Transaction Fees:** BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Open Campus is present on the following networks: Binance Smart Chain, Edu Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. **Validators:**
 - **Staking Rewards:** Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - **Selection Process:** Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. **Delegators:**
 - **Delegated Staking:** Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Coin98

C98 | HP7M2N1QF

Quantitative information

Quantitative sustainability indicators for Coin98

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Coin98	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	26.22237	kWh/a

Qualitative information

S.4 Consensus Mechanism

Coin98 is present on the following networks: Avalanche, Binance Smart Chain, Solana.

The Avalanche blockchain network employs a unique Proof-of-Stake consensus mechanism called Avalanche Consensus, which involves three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly samples a small, constant-sized subset of other validators.
- Repeated Polling: Validators repeatedly poll the sampled validators to determine the preferred transaction.
- Confidence Counters: Validators maintain confidence counters for each transaction, incrementing them each time a sampled validator supports their preferred transaction.
- Decision Threshold: Once the confidence counter exceeds a pre-defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Enhances the Snowball protocol by incorporating a binary decision process. Validators decide between two conflicting transactions.
- Binary Confidence: Confidence counters are used to track the preferred binary decision.
- Finality: When a binary decision reaches a certain confidence level, it becomes final.

3. Avalanche Protocol:

- DAG Structure: Uses a Directed Acyclic Graph (DAG) structure to organize transactions, allowing for parallel processing and higher throughput.
- Transaction Ordering: Transactions are added to the DAG based on their dependencies, ensuring a consistent order.
- Consensus on DAG: While most Proof-of-Stake Protocols use a Byzantine Fault Tolerant (BFT) consensus, Avalanche uses the Avalanche Consensus, Validators reach consensus on the structure and contents of the DAG through repeated Snowball and Snowflake.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization.
- Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.

- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Coin98 is present on the following networks: Avalanche, Binance Smart Chain, Solana.

Avalanche uses a consensus mechanism known as Avalanche Consensus, which relies on a combination of validators, staking, and a novel approach to consensus to ensure the network's security and integrity.

1. Validators:

Staking: Validators on the Avalanche network are required to stake AVAX tokens. The amount staked influences their probability of being selected to propose or validate new blocks.

Rewards: Validators earn rewards for their participation in the consensus process. These rewards are proportional to the amount of AVAX staked and their uptime and performance in validating transactions.

Delegation: Validators can also accept delegations from other token holders. Delegators share in the rewards based on the amount they delegate, which incentivizes smaller holders to participate indirectly in securing the network.

2. Economic Incentives:

Block Rewards: Validators receive block rewards for proposing and validating blocks. These rewards are distributed from the network's inflationary issuance of AVAX tokens.

Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This includes fees for simple transactions, smart contract interactions, and the creation of new assets on the network.

3. Penalties:

- Slashing: Unlike some other PoS systems, Avalanche does not employ slashing (i.e., the confiscation of staked tokens) as a penalty for misbehavior. Instead, the network relies on the financial disincentive of lost future rewards for validators who are not consistently online or act maliciously.
- Uptime Requirements: Validators must maintain a high level of uptime and correctly validate transactions to continue earning rewards. Poor performance or malicious actions result in missed rewards, providing a strong economic incentive to act honestly.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Transaction fees on Avalanche are dynamic, varying based on network demand and the complexity of the transactions. This ensures that fees remain fair and proportional to the network's usage.
- Fee Burning: A portion of the transaction fees is burned, permanently removing them from circulation. This deflationary mechanism helps to balance the inflation from block rewards and incentivizes token holders by potentially increasing the value of AVAX over time.

2. Smart Contract Fees:

Execution Costs: Fees for deploying and interacting with smart contracts are determined by the computational resources required. These fees ensure that the network remains efficient and that resources are used responsibly.

3. Asset Creation Fees:

New Asset Creation: There are fees associated with creating new assets (tokens) on the Avalanche network. These fees help to prevent spam and ensure that only serious projects use the network's resources.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) avalanche, binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Horizen

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Horizen	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	25.83895	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pirate Nation Token

PIRATE | 70H2X3L01

Quantitative information

Quantitative sustainability indicators for Pirate Nation Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pirate Nation Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	23.91746	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Open Loot

OL | CRM_open_loot

Quantitative information

Quantitative sustainability indicators for Open Loot

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Open Loot	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	23.63358	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for deBridge

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	deBridge	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	23.47461	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Enzyme

MLN | CRM_Enzyme

Quantitative information

Quantitative sustainability indicators for Enzyme

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Enzyme	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	23.13709	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Enzyme is present on the following networks: Ethereum, Polygon.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Enzyme is present on the following networks: Ethereum, Polygon.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC

tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum, polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Peanut the Squirrel

PNUT | 75D0KJ7WN

Quantitative information

Quantitative sustainability indicators for Peanut the Squirrel

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Peanut the Squirrel	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	21.73126	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for XMON

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	XMON	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	21.29151	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Parcl

PRCL | JPJ2QRH6R

Quantitative information

Quantitative sustainability indicators for Parcl

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Parcl	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	16.41783	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for IO.NET

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	IO.NET	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	13.66636	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Maverick Protocol

MAV | 50VKK1B1X

Quantitative information

Quantitative sustainability indicators for Maverick Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Maverick Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	12.88732	kWh/a

Qualitative information

S.4 Consensus Mechanism

Maverick Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Maverick Protocol is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Neiro

NEIRO | Q4TK4Q00M

Quantitative information

Quantitative sustainability indicators for Neiro

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Neiro	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	12.34908	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


DODO bird

DODO | SPRN0WLRS

Quantitative information

Quantitative sustainability indicators for DODO bird

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	DODO bird	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	12.34573	kWh/a

Qualitative information

S.4 Consensus Mechanism

DODO bird is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

DODO bird is present on the following networks: Arbitrum, Binance Smart Chain, Ethereum.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid

ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Brett

BRETT | CRM_Brett_group

Quantitative information

Quantitative sustainability indicators for Brett

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Brett	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	11.69948	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Access Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Access Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	11.52886	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for recall

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	recall	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	11.17475	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for ChainGPT

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	ChainGPT	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	10.93981	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Avantis

AVNT | DGJGJJPB

Quantitative information

Quantitative sustainability indicators for Avantis

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Avantis	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	9.87490	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

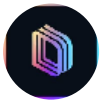
Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Drift

DRIFT | 6RVP9P5TB

Quantitative information

Quantitative sustainability indicators for Drift

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Drift	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	9.48990	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Venus

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Venus	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	9.21099	kWh/a

Qualitative information

S.4 Consensus Mechanism

Venus is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Venus is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Cloud

CLOUD | TP1T71J95

Quantitative information

Quantitative sustainability indicators for Cloud

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVX65	/
S.3 Name of the crypto-asset	Cloud	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	8.97447	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for carv

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	carv	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	8.51516	kWh/a

Qualitative information

S.4 Consensus Mechanism

carv is present on the following networks: Arbitrum, Base, Ethereum, Solana.

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):

- Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
- Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.

2. Proof of Stake (PoS):

- Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

carv is present on the following networks: Arbitrum, Base, Ethereum, Solana.

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum, base, ethereum, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and

the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



TWT | SKLQJRHFV

Quantitative information

Quantitative sustainability indicators for Trust Wallet

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Trust Wallet	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	8.40834	kWh/a

Qualitative information

S.4 Consensus Mechanism

Trust Wallet is present on the following networks: Binance Beacon Chain, Binance Smart Chain, Solana.

Binance Beacon Chain operated on a Delegated Proof of Stake (DPoS) consensus mechanism before its operations were discontinued in fall 2024 and its migration to Binance Smart Chain; validators were elected by token holders through staking and voting, limiting active participation to a manageable number of nodes while maintaining decentralization; validators were selected based on the staking weight of their delegators, ensuring stakeholder interests were proportionally represented in the validation process; regular validator rotation was implemented to promote fairness and decentralization by allowing multiple participants to contribute to the network; the system was designed to tolerate some degree of validator failures while maintaining the network's operational integrity, ensuring resilience.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through

staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.

2. Delegates: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegates earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegates. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegates earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegates share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Trust Wallet is present on the following networks: Binance Beacon Chain, Binance Smart Chain, Solana.

The Binance Beacon Chain incentivized validators and ensured fee transparency before its migration to Binance Smart Chain; validators were rewarded solely through transaction fees, with no block rewards provided, aligning incentives with network usage and transaction volume; transaction fees were calculated and displayed upfront, ensuring clarity for users and promoting trust in the fee structure; a portion of transaction fees collected in BNB was burned, reducing the overall token supply and contributing to a deflationary economic model.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.
- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.

2. Delegators:

- Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.

3. Economic Security:

- Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
- Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Fees Applicable on the Solana Blockchain

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.

2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.

3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.

4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_beacon_chain, binance_smart_chain, solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and

the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Vita Inu

VINU | CRM_vita_inu

Quantitative information

Quantitative sustainability indicators for Vita Inu

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Vita Inu	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	8.20113	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Heima

HEI | 2Q6SRP1GT

Quantitative information

Quantitative sustainability indicators for Heima

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Heima	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	7.94883	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for LeverFi

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	LeverFi	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	7.31009	kWh/ a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Bonfida

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Bonfida	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	7.23870	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for NOT

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	NOT	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	6.45054	kWh/a

Qualitative information

S.4 Consensus Mechanism

Toncoin utilizes a Proof of Stake (PoS) model with the Catchain consensus algorithm to provide a secure, scalable, and efficient multi-chain environment.

Core Components of Toncoin's Consensus:

1. Proof of Stake (PoS) with Validators:
Validator Role: Validators are required to stake Toncoin to participate in consensus. They validate transactions and secure the network by processing blocks and maintaining network integrity.
2. Catchain Consensus Algorithm:
 - High Scalability and Speed: The Catchain consensus protocol is specifically designed for Toncoin's multi-chain architecture, optimizing for fast and scalable operations across multiple shards.
 - Multi-Chain Compatibility: Catchain supports a sharded environment, allowing different chains (or shards) to reach consensus efficiently. This approach enhances the network's ability to process a high volume of transactions in parallel.
3. Byzantine Fault Tolerance (BFT):
Fault Tolerance: The Catchain protocol is Byzantine Fault Tolerant (BFT), meaning it can tolerate some level of malicious or faulty behavior among validators. This BFT compliance ensures that the network remains secure and functional even when a minority of validators act maliciously.
4. Validator Rotation and Slashing:
 - Regular Rotation: Validators are rotated regularly to enhance decentralization and security. This system prevents any single validator or group from maintaining control over consensus indefinitely.

- Slashing for Malicious Behavior: Validators who act maliciously or fail to perform their duties may be penalized through slashing, losing a portion of their staked Toncoin. This discourages dishonest behavior and promotes reliable network participation.

S.5 Incentive Mechanisms and Applicable Fees

Toncoin incentivizes network security, participation, and efficiency through staking rewards, transaction fees, and slashing penalties.

Incentive Mechanisms:

1. Staking Rewards for Validators:

Rewards for Securing the Network: Validators earn staking rewards for actively participating in the network's consensus process and ensuring its security. These rewards are provided in Toncoin and are proportional to each validator's staked amount, encouraging validators to maintain their roles responsibly.

2. Transaction Fees:

Ongoing Income for Validators: Validators also receive a share of transaction fees from the blocks they validate, providing a consistent reward that grows with network usage. This additional income incentivizes validators to process transactions accurately and efficiently.

3. Decentralization through Validator Rotation:

Fair and Balanced Participation: The frequent rotation of validators ensures that new participants can join the validator set, promoting decentralization and preventing monopolization of the network by a small group of validators.

4. Slashing Mechanism:

Penalties for Dishonest Behavior: To maintain security, Toncoin enforces a slashing mechanism that penalizes validators who act maliciously or fail to fulfill their duties. This risk of losing staked Toncoin encourages validators to behave honestly and fulfill their responsibilities.

Applicable Fees:

Transaction Fees: Transaction fees on the TON blockchain are paid in Toncoin. These fees vary based on transaction complexity and network demand, ensuring that validators are compensated for their work and that resources are efficiently utilized.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) toncoin is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Degen

DEGEN | 253CXJJ4H

Quantitative information

Quantitative sustainability indicators for Degen

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Degen	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	5.97935	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Tensor

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Tensor	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	5.73032	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Toshi

TOSHI | WT9GJ1K9R

Quantitative information

Quantitative sustainability indicators for Toshi

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Toshi	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	5.51220	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Jupiter

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Jupiter	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	5.12900	kWh/a

Qualitative information

S.4 Consensus Mechanism

Jupiter is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Jupiter is present on the following networks: Binance Smart Chain, Ethereum.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.

- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:
 - Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
 4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:
 - Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
 - Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.
2. Block Rewards:
 - Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.
3. Cross-Chain Fees:
 - Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.
4. Smart Contract Fees:
 - Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for vision

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	vision	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	4.02294	kWh/a

Qualitative information

S.4 Consensus Mechanism

The Tron blockchain operates on a Delegated Proof of Stake (DPoS) consensus mechanism, designed to improve scalability, transaction speed, and energy efficiency.

Core Components:

1. Delegated Proof of Stake (DPoS): Tron uses DPoS, where token holders vote for a group of delegates known as Super Representatives (SRs) who are responsible for validating transactions and producing new blocks on the network. Token holders can vote for SRs based on their stake in the Tron network, and the top 27 SRs (or more, depending on the protocol version) are selected to participate in the block production process. SRs take turns producing blocks, which are added to the blockchain. This is done on a rotational basis to ensure decentralization and prevent control by a small group of validators.
2. Block Production: The Super Representatives generate new blocks and confirm transactions. The Tron blockchain achieves block finality quickly, with block production occurring every 3 seconds, making it highly efficient and capable of processing thousands of transactions per second.
3. Voting and Governance: Tron's DPoS system also allows token holders to vote on important network decisions, such as protocol upgrades and changes to the system's parameters. Voting power is proportional to the amount of TRX (Tron's native token) that a user holds and chooses to stake. This provides a governance system where the community can actively participate in decision-making.
4. Super Representatives: The Super Representatives play a crucial role in maintaining the security and stability of the Tron blockchain. They are responsible for validating transactions, proposing

new blocks, and ensuring the overall functionality of the network. Super Representatives are incentivized with block rewards (newly minted TRX tokens) and transaction fees for their work.

S.5 Incentive Mechanisms and Applicable Fees

The Tron blockchain uses a Delegated Proof of Stake (DPoS) consensus mechanism to secure its network and incentivize participation.

Incentive Mechanism:

1. Super Representatives (SRs) Rewards:

- Block Rewards: Super Representatives (SRs), who are elected by TRX holders, are rewarded for producing blocks. Each block they produce comes with a block reward in the form of TRX tokens.
- Transaction Fees: In addition to block rewards, SRs receive transaction fees for validating transactions and including them in blocks. This ensures they are incentivized to process transactions efficiently.

2. Voting and Delegation:

- TRX Staking: TRX holders can stake their tokens and vote for Super Representatives (SRs). When TRX holders vote, they delegate their voting power to SRs, which allows SRs to earn rewards in the form of newly minted TRX tokens.
- Delegator Rewards: Token holders who delegate their votes to an SR can also receive a share of the rewards. This means delegators share in the block rewards and transaction fees that the SR earns.
- Incentivizing Participation: The more tokens a user stakes, the more voting power they have, which encourages participation in governance and network security.

3. Incentive for SRs:

SRs are also incentivized to maintain the health and performance of the network. Their reputation and continued election depend on their ability to produce blocks consistently and efficiently process transactions.

Applicable Fees:

1. Transaction Fees:

- Fee Calculation: Users must pay transaction fees to have their transactions processed. The transaction fee varies based on the complexity of the transaction and the network's current demand. This is paid in TRX tokens.
- Fee Distribution: Transaction fees are distributed to Super Representatives (SRs), giving them an ongoing income to maintain and support the network.

2. Storage Fees:

Tron charges storage fees for data storage on the blockchain. This includes storing smart contracts, tokens, and other data on the network. Users are required to pay these fees in TRX tokens to store data.

3. Energy and Bandwidth:

Energy: Tron uses a resource model that allows users to access network resources like bandwidth and energy through staking. Users who stake their TRX tokens receive energy

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) tron is calculated first. For the energy consumption of the token, a fraction of the energy consumption of

the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Subsquid

SQD | S0059SFFN

Quantitative information

Quantitative sustainability indicators for Subsquid

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Subsquid	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	3.23986	kWh/a

Qualitative information

S.4 Consensus Mechanism

Arbitrum is a Layer 2 solution on top of Ethereum that uses Optimistic Rollups to enhance scalability and reduce transaction costs. It assumes that transactions are valid by default and only verifies them if there's a challenge (optimistic).

Core Components:

- Sequencer: Orders transactions and creates batches for processing.
- Bridge: Facilitates asset transfers between Arbitrum and Ethereum.
- Fraud Proofs: Protect against invalid transactions through an interactive verification process.

Verification Process:

1. Transaction Submission: Users submit transactions to the Arbitrum Sequencer, which orders and batches them.
2. State Commitment: These batches are submitted to Ethereum with a state commitment.
3. Challenge Period: Validators have a specific period to challenge the state if they suspect fraud.
4. Dispute Resolution: If a challenge occurs, the dispute is resolved through an iterative process to identify the fraudulent transaction. The final operation is executed on Ethereum to determine the correct state.
5. Rollback and Penalties: If fraud is proven, the state is rolled back, and the dishonest party is penalized.

Security and Efficiency: The combination of the Sequencer, bridge, and interactive fraud proofs ensures that the system remains secure and efficient. By minimizing on-chain data and leveraging off-chain computations, Arbitrum can provide high throughput and low fees.

S.5 Incentive Mechanisms and Applicable Fees

Arbitrum One, a Layer 2 scaling solution for Ethereum, employs several incentive mechanisms to ensure the security and integrity of transactions on its network. The key mechanisms include:

1. Validators and Sequencers:

- Sequencers are responsible for ordering transactions and creating batches that are processed off-chain. They play a critical role in maintaining the efficiency and throughput of the network.
- Validators monitor the sequencers' actions and ensure that transactions are processed correctly. Validators verify the state transitions and ensure that no invalid transactions are included in the batches.

2. Fraud Proofs:

- Assumption of Validity: Transactions processed off-chain are assumed to be valid. This allows for quick transaction finality and high throughput.
- Challenge Period: There is a predefined period during which anyone can challenge the validity of a transaction by submitting a fraud proof. This mechanism acts as a deterrent against malicious behavior.
- Dispute Resolution: If a challenge is raised, an interactive verification process is initiated to pinpoint the exact step where fraud occurred. If the challenge is valid, the fraudulent transaction is reverted, and the dishonest actor is penalized.

3. Economic Incentives:

- Rewards for Honest Behavior: Participants in the network, such as validators and sequencers, are incentivized through rewards for performing their duties honestly and efficiently. These rewards come from transaction fees and potentially other protocol incentives.
- Penalties for Malicious Behavior: Participants who engage in dishonest behavior or submit invalid transactions are penalized. This can include slashing of staked tokens or other forms of economic penalties, which serve to discourage malicious actions.

Fees on the Arbitrum One Blockchain

1. Transaction Fees:

- Layer 2 Fees: Users pay fees for transactions processed on the Layer 2 network. These fees are typically lower than Ethereum mainnet fees due to the reduced computational load on the main chain.
- Arbitrum Transaction Fee: A fee is charged for each transaction processed by the sequencer. This fee covers the cost of processing the transaction and ensuring its inclusion in a batch.

2. L1 Data Fees:

- Posting Batches to Ethereum: Periodically, the state updates from the Layer 2 transactions are posted to the Ethereum mainnet as calldata. This involves a fee, known as the L1 data fee, which accounts for the gas required to publish these state updates on Ethereum.
- Cost Sharing: Because transactions are batched, the fixed costs of posting state updates to Ethereum are spread across multiple transactions, making it more cost-effective for users.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) arbitrum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for SafePal Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	SafePal Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	3.06308	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:
 - Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
 - Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.
2. Delegators:
 - Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
 - Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.
3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.
4. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
 - Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


KAITO

KAITO | Z3JGDP628

Quantitative information

Quantitative sustainability indicators for KAITO

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	KAITO	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2.49284	kWh/a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Mobox

MBOX | LXR46Q0V

Quantitative information

Quantitative sustainability indicators for Mobox

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Mobox	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2.46186	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Automata

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGvjX65	/
S.3 Name of the crypto-asset	Automata	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	2.30877	kWh/a

Qualitative information

S.4 Consensus Mechanism

Automata is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process

4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.
5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus.
- Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Automata is present on the following networks: Binance Smart Chain, Ethereum, Polygon.

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity. Fees on the Polygon Blockchain

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain, ethereum, polygon is calculated first. For the energy consumption of the token,

a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


Edge

EDGE | JG63F041Q

Quantitative information

Quantitative sustainability indicators for Edge

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Edge	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1.94878	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Base is a Layer-2 (L2) solution on Ethereum that was introduced by Coinbase and developed using Optimism's OP Stack. L2 transactions do not have their own consensus mechanism and are only validated by the execution clients. The so-called sequencer regularly bundles stacks of L2 transactions and publishes them on the L1 network, i.e. Ethereum. Ethereum's consensus mechanism (Proof-of-stake) thus indirectly secures all L2 transactions as soon as they are written to L1.

S.5 Incentive Mechanisms and Applicable Fees

Base is a Layer-2 (L2) solution on Ethereum that uses optimistic rollups provided by the OP Stack on which it was developed. Transaction on base are bundled by a, so called, sequencer and the result is regularly submitted as an Layer-1 (L1) transactions. This way many L2 transactions get combined into a single L1 transaction. This lowers the average transaction cost per transaction, because many L2 transactions together fund the transaction cost for the single L1 transaction. This creates incentives to use base rather than the L1, i.e. Ethereum, itself.

To get crypto-assets in and out of base, a special smart contract on Ethereum is used. Since there is no consensus mechanism on L2 an additional mechanism ensures that only existing funds can be withdrawn from L2. When a user wants to withdraw funds, that user needs to submit a withdrawal request on L1. If this request remains unchallenged for a period of time the funds can be withdrawn. During this time period any other user can submit a fault proof, which will start a dispute resolution process. This process is designed with economic incentives for correct behaviour.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) base is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Hooked Protocol

HOOK | 5WC3ZHNC8

Quantitative information

Quantitative sustainability indicators for Hooked Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Hooked Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1.56991	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection**: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Standard Tokenization Protocol

STPT | CRM_Standard-Tokenization_Protocol

Quantitative information

Quantitative sustainability indicators for Standard Tokenization Protocol

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Standard Tokenization Protocol	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1.34846	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Lista USD

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Lista USD	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	1.05286	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Gains Network

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Gains Network	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.86471	kWh/a

Qualitative information

S.4 Consensus Mechanism

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Pundi X Token

NPXS | X088BGGWB

Quantitative information

Quantitative sustainability indicators for Pundi X Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Pundi X Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.85166	kWh/a

Qualitative information

S.4 Consensus Mechanism

The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity.

The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees.

Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity.

This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for BinaryX

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	BinaryX	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.77702	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection**: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) binance_smart_chain is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Tokocrypto Token

TKO | ZC1SP684P

Quantitative information

Quantitative sustainability indicators for Tokocrypto Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Tokocrypto Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.65853	kWh/a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators (so-called "Cabinet Members"):** Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators:** Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates:** Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection:** Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Nakamoto Games

NAKA | CRM_Nakamoto-Games_group

Quantitative information

Quantitative sustainability indicators for Nakamoto Games

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Nakamoto Games	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.58794	kWh/a

Qualitative information

S.4 Consensus Mechanism

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):

- Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.

2. Plasma Chains:

- Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
- Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Shentu

CTK | CRM_Shentu_group

Quantitative information

Quantitative sustainability indicators for Shentu

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	Shentu	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.27519	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. Validators (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. Delegators: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. Candidates: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. Validator Selection: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.


NFPrompt

NFP | CRM_NFPrompt_group

Quantitative information

Quantitative sustainability indicators for NFPrompt

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	NFPrompt	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.11558	kWh/ a

Qualitative information

S.4 Consensus Mechanism

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), which combines elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This method ensures fast block times and low fees while maintaining a level of decentralization and security.

Core Components:

1. **Validators** (so-called "Cabinet Members"): Validators on BSC are responsible for producing new blocks, validating transactions, and maintaining the network's security. To become a validator, an entity must stake a significant amount of BNB (Binance Coin). Validators are selected through staking and voting by token holders. There are 21 active validators at any given time, rotating to ensure decentralization and security.
2. **Delegators**: Token holders who do not wish to run validator nodes can delegate their BNB tokens to validators. This delegation helps validators increase their stake and improves their chances of being selected to produce blocks. Delegators earn a share of the rewards that validators receive, incentivizing broad participation in network security.
3. **Candidates**: Candidates are nodes that have staked the required amount of BNB and are in the pool waiting to become validators. They are essentially potential validators who are not currently active but can be elected to the validator set through community voting. Candidates play a crucial role in ensuring there is always a sufficient pool of nodes ready to take on validation tasks, thus maintaining network resilience and decentralization. Consensus Process
4. **Validator Selection**: Validators are chosen based on the amount of BNB staked and votes received from delegators. The more BNB staked and votes received, the higher the chance of being

selected to validate transactions and produce new blocks. The selection process involves both the current validators and the pool of candidates, ensuring a dynamic and secure rotation of nodes.

5. Block Production: The selected validators take turns producing blocks in a PoA-like manner, ensuring that blocks are generated quickly and efficiently. Validators validate transactions, add them to new blocks, and broadcast these blocks to the network.
6. Transaction Finality: BSC achieves fast block times of around 3 seconds and quick transaction finality. This is achieved through the efficient PoSA mechanism that allows validators to rapidly reach consensus. Security and Economic Incentives
7. Staking: Validators are required to stake a substantial amount of BNB, which acts as collateral to ensure their honest behavior. This staked amount can be slashed if validators act maliciously. Staking incentivizes validators to act in the network's best interest to avoid losing their staked BNB.
8. Delegation and Rewards: Delegators earn rewards proportional to their stake in validators. This incentivizes them to choose reliable validators and participate in the network's security. Validators and delegators share transaction fees as rewards, which provides continuous economic incentives to maintain network security and performance.
9. Transaction Fees: BSC employs low transaction fees, paid in BNB, making it cost-effective for users. These fees are collected by validators as part of their rewards, further incentivizing them to validate transactions accurately and efficiently.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC) uses the Proof of Staked Authority (PoSA) consensus mechanism to ensure network security and incentivize participation from validators and delegators.

Incentive Mechanisms

1. Validators:

- Staking Rewards: Validators must stake a significant amount of BNB to participate in the consensus process. They earn rewards in the form of transaction fees and block rewards.
- Selection Process: Validators are selected based on the amount of BNB staked and the votes received from delegators. The more BNB staked and votes received, the higher the chances of being selected to validate transactions and produce new blocks.

2. Delegators:

- Delegated Staking: Token holders can delegate their BNB to validators. This delegation increases the validator's total stake and improves their chances of being selected to produce blocks.
- Shared Rewards: Delegators earn a portion of the rewards that validators receive. This incentivizes token holders to participate in the network's security and decentralization by choosing reliable validators.

3. Candidates:

Pool of Potential Validators: Candidates are nodes that have staked the required amount of BNB and are waiting to become active validators. They ensure that there is always a sufficient pool of nodes ready to take on validation tasks, maintaining network resilience.

4. Economic Security:

- Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. Penalties include slashing a portion of their staked tokens, ensuring that validators act in the best interest of the network.
- Opportunity Cost: Staking requires validators and delegators to lock up their BNB tokens, providing an economic incentive to act honestly to avoid losing their staked assets.

Fees on the Binance Smart Chain

1. Transaction Fees:

- Low Fees: BSC is known for its low transaction fees compared to other blockchain networks. These fees are paid in BNB and are essential for maintaining network operations and compensating validators.
- Dynamic Fee Structure: Transaction fees can vary based on network congestion and the complexity of the transactions. However, BSC ensures that fees remain significantly lower than those on the Ethereum mainnet.

2. Block Rewards:

Incentivizing Validators: Validators earn block rewards in addition to transaction fees. These rewards are distributed to validators for their role in maintaining the network and processing transactions.

3. Cross-Chain Fees:

Interoperability Costs: BSC supports cross-chain compatibility, allowing assets to be transferred between Binance Chain and Binance Smart Chain. These cross-chain operations incur minimal fees, facilitating seamless asset transfers and improving user experience.

4. Smart Contract Fees:

Deploying and interacting with smart contracts on BSC involves paying fees based on the computational resources required. These fees are also paid in BNB and are designed to be cost-effective, encouraging developers to build on the BSC platform.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) `binance_smart_chain` is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



Quantitative information

Quantitative sustainability indicators for Leo Token

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJX65	/
S.3 Name of the crypto-asset	Leo Token	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Polygon, formerly known as Matic Network, is a Layer 2 scaling solution for Ethereum that employs a hybrid consensus mechanism. Here's a detailed explanation of how Polygon achieves consensus:

Core Concepts:

1. Proof of Stake (PoS):
 - Validator Selection: Validators on the Polygon network are selected based on the number of MATIC tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to validators. Delegators share in the rewards earned by validators.
2. Plasma Chains:
 - Off-Chain Scaling: Plasma is a framework for creating child chains that operate alongside the main Ethereum chain. These child chains can process transactions off-chain and submit only the final state to the Ethereum main chain, significantly increasing throughput and reducing congestion.
 - Fraud Proofs: Plasma uses a fraud-proof mechanism to ensure the security of off-chain transactions. If a fraudulent transaction is detected, it can be challenged and reverted.

Consensus Process:

1. Transaction Validation:

Transactions are first validated by validators who have staked MATIC tokens. These validators confirm the validity of transactions and include them in blocks.

2. Block Production:

- Proposing and Voting: Validators propose new blocks based on their staked tokens and participate in a voting process to reach consensus on the next block. The block with the majority of votes is added to the blockchain.
- Checkpointing: Polygon uses periodic checkpointing, where snapshots of the Polygon sidechain are submitted to the Ethereum main chain. This process ensures the security and finality of transactions on the Polygon network.

3. Plasma Framework:

- Child Chains: Transactions can be processed on child chains created using the Plasma framework. These transactions are validated off-chain and only the final state is submitted to the Ethereum main chain.
- Fraud Proofs: If a fraudulent transaction occurs, it can be challenged within a certain period using fraud proofs. This mechanism ensures the integrity of off-chain transactions.

Security and Economic Incentives:

1. Incentives for Validators:

- Staking Rewards: Validators earn rewards for staking MATIC tokens and participating in the consensus process. These rewards are distributed in MATIC tokens and are proportional to the amount staked and the performance of the validator.
- Transaction Fees: Validators also earn a portion of the transaction fees paid by users. This provides an additional financial incentive to maintain the network's integrity and efficiency.

2. Delegation:

Shared Rewards: Delegators earn a share of the rewards earned by the validators they delegate to. This encourages more token holders to participate in securing the network by choosing reliable validators.

3. Economic Security:

Slashing: Validators can be penalized for malicious behavior or failure to perform their duties. This penalty, known as slashing, involves the loss of a portion of their staked tokens, ensuring that validators act in the best interest of the network.

S.5 Incentive Mechanisms and Applicable Fees

Polygon uses a combination of Proof of Stake (PoS) and the Plasma framework to ensure network security, incentivize participation, and maintain transaction integrity.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators on Polygon secure the network by staking MATIC tokens. They are selected to validate transactions and produce new blocks based on the number of tokens they have staked. Validators earn rewards in the form of newly minted MATIC tokens and transaction fees for their services.
- Block Production: Validators are responsible for proposing and voting on new blocks. The selected validator proposes a block, and other validators verify and validate it. Validators are incentivized to act honestly and efficiently to earn rewards and avoid penalties.
- Checkpointing: Validators periodically submit checkpoints to the Ethereum main chain, ensuring the security and finality of transactions processed on Polygon. This provides an additional layer of security by leveraging Ethereum's robustness.

2. Delegators:

- Delegation: Token holders who do not wish to run a validator node can delegate their MATIC tokens to trusted validators. Delegators earn a portion of the rewards earned by the validators, incentivizing them to choose reliable and performant validators.
- Shared Rewards: Rewards earned by validators are shared with delegators, based on the proportion of tokens delegated. This system encourages widespread participation and enhances the network's decentralization.

3. Economic Security:

- Slashing: Validators can be penalized through a process called slashing if they engage in malicious behavior or fail to perform their duties correctly. This includes double-signing or going offline for extended periods. Slashing results in the loss of a portion of the staked tokens, acting as a strong deterrent against dishonest actions.
- Bond Requirements: Validators are required to bond a significant amount of MATIC tokens to participate in the consensus process, ensuring they have a vested interest in maintaining network security and integrity.

4. Transaction Fees:

- Low Fees: One of Polygon's main advantages is its low transaction fees compared to the Ethereum main chain. The fees are paid in MATIC tokens and are designed to be affordable to encourage high transaction throughput and user adoption.
- Dynamic Fees: Fees on Polygon can vary depending on network congestion and transaction complexity. However, they remain significantly lower than those on Ethereum, making Polygon an attractive option for users and developers.

5. Smart Contract Fees:

Deployment and Execution Costs: Deploying and interacting with smart contracts on Polygon incurs fees based on the computational resources required. These fees are also paid in MATIC tokens and are much lower than on Ethereum, making it cost-effective for developers to build and maintain decentralized applications (dApps) on Polygon.

6. Plasma Framework:

State Transfers and Withdrawals: The Plasma framework allows for off-chain processing of transactions, which are periodically batched and committed to the Ethereum main chain. Fees associated with these processes are also paid in MATIC tokens, and they help reduce the overall cost of using the network.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) polygon is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.



My Neighbor Alice

ALICE | 1S7VZCTZL

Quantitative information

Quantitative sustainability indicators for My Neighbor Alice

Field	Value	Unit
S.1 Name	Finst B.V.	/
S.2 Relevant legal entity identifier	724500UI8UD7HKGJVJX65	/
S.3 Name of the crypto-asset	My Neighbor Alice	/
S.6 Beginning of the period to which the disclosure relates	2025-05-11	/
S.7 End of the period to which the disclosure relates	2026-05-11	/
S.8 Energy consumption	0.00000	kWh/a

Qualitative information

S.4 Consensus Mechanism

Solana uses a unique combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high throughput, low latency, and robust security.

Core Concepts:

1. Proof of History (PoH):
 - Time-Stamped Transactions: PoH is a cryptographic technique that timestamps transactions, creating a historical record that proves that an event has occurred at a specific moment in time.
 - Verifiable Delay Function: PoH uses a Verifiable Delay Function (VDF) to generate a unique hash that includes the transaction and the time it was processed. This sequence of hashes provides a verifiable order of events, enabling the network to efficiently agree on the sequence of transactions.
2. Proof of Stake (PoS):
 - Validator Selection: Validators are chosen to produce new blocks based on the number of SOL tokens they have staked. The more tokens staked, the higher the chance of being selected to validate transactions and produce new blocks.
 - Delegation: Token holders can delegate their SOL tokens to validators, earning rewards proportional to their stake while enhancing the network's security.

Consensus Process:

1. Transaction Validation:

Transactions are broadcast to the network and collected by validators. Each transaction is validated to ensure it meets the network's criteria, such as having correct signatures and sufficient funds.

2. PoH Sequence Generation:

A validator generates a sequence of hashes using PoH, each containing a timestamp and the previous hash. This process creates a historical record of transactions, establishing a cryptographic clock for the network.

3. Block Production:

The network uses PoS to select a leader validator based on their stake. The leader is responsible for bundling the validated transactions into a block. The leader validator uses the PoH sequence to order transactions within the block, ensuring that all transactions are processed in the correct order.

4. Consensus and Finalization:

Other validators verify the block produced by the leader validator. They check the correctness of the PoH sequence and validate the transactions within the block. Once the block is verified, it is added to the blockchain. Validators sign off on the block, and it is considered finalized.

Security and Economic Incentives:

1. Incentives for Validators:

- Block Rewards: Validators earn rewards for producing and validating blocks. These rewards are distributed in SOL tokens and are proportional to the validator's stake and performance.
- Transaction Fees: Validators also earn transaction fees from the transactions included in the blocks they produce. These fees provide an additional incentive for validators to process transactions efficiently.

2. Security:

- Staking: Validators must stake SOL tokens to participate in the consensus process. This staking acts as collateral, incentivizing validators to act honestly. If a validator behaves maliciously or fails to perform, they risk losing their staked tokens.
- Delegated Staking: Token holders can delegate their SOL tokens to validators, enhancing network security and decentralization. Delegators share in the rewards and are incentivized to choose reliable validators.

3. Economic Penalties:

Slashing: Validators can be penalized for malicious behavior, such as double-signing or producing invalid blocks. This penalty, known as slashing, results in the loss of a portion of the staked tokens, discouraging dishonest actions.

S.5 Incentive Mechanisms and Applicable Fees

Solana uses a combination of Proof of History (PoH) and Proof of Stake (PoS) to secure its network and validate transactions.

Incentive Mechanisms:

1. Validators:

- Staking Rewards: Validators are chosen based on the number of SOL tokens they have staked. They earn rewards for producing and validating blocks, which are distributed in SOL. The more tokens staked, the higher the chances of being selected to validate transactions and produce new blocks.

- Transaction Fees: Validators earn a portion of the transaction fees paid by users for the transactions they include in the blocks. This provides an additional financial incentive for validators to process transactions efficiently and maintain the network's integrity.
- 2. Delegators:
 - Delegated Staking: Token holders who do not wish to run a validator node can delegate their SOL tokens to a validator. In return, delegators share in the rewards earned by the validators. This encourages widespread participation in securing the network and ensures decentralization.
- 3. Economic Security:
 - Slashing: Validators can be penalized for malicious behavior, such as producing invalid blocks or being frequently offline. This penalty, known as slashing, involves the loss of a portion of their staked tokens. Slashing deters dishonest actions and ensures that validators act in the best interest of the network.
 - Opportunity Cost: By staking SOL tokens, validators and delegators lock up their tokens, which could otherwise be used or sold. This opportunity cost incentivizes participants to act honestly to earn rewards and avoid penalties.

Transaction Fees:

1. Low and Predictable Fees:

Solana is designed to handle a high throughput of transactions, which helps keep fees low and predictable. The average transaction fee on Solana is significantly lower compared to other blockchains like Ethereum.
2. Fee Structure:

Fees are paid in SOL and are used to compensate validators for the resources they expend to process transactions. This includes computational power and network bandwidth.
3. Rent Fees:

State Storage: Solana charges rent fees for storing data on the blockchain. These fees are designed to discourage inefficient use of state storage and encourage developers to clean up unused state. Rent fees help maintain the efficiency and performance of the network.
4. Smart Contract Fees:

Execution Costs: Similar to transaction fees, fees for deploying and interacting with smart contracts on Solana are based on the computational resources required. This ensures that users are charged proportionally for the resources they consume.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components:

To determine the energy consumption of a token, the energy consumption of the network(s) solana is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.

This report was provided by:

Crypto Risk Metrics

Our Services

ESG data for crypto-assets

Providing of ESG data for crypto-assets in compliance with MiCA regulations. The data is based on ISO-certified measurements, legally robust and easily integrated — trusted by leading regulated players across six jurisdictions.

Risk management

Crypto Risk Metrics provides a MaRisk- and BAIT-compliant SaaS solution that helps financial institutions manage risks in direct & indirect crypto investments by referencing BSI and other recognized standards. Daily reports and a complete audit trail ensure transparent, audit-ready documentation of crypto-asset risks.

Market conformity check

Our module ensures compliance with circular 05/2023 (BA) by automatically verifying the market conformity of crypto trades and flagging non-compliant transactions. Clients receive daily trade reports securely via SFTP or CSV, simplifying regulatory risk management.

White paper for crypto-assets

Crypto Risk Metrics supports CASPs in drafting and maintaining MiCA-compliant white papers, including ESG disclosures, or takes over the entire process through its "White Glove Service" with liability transfer. If the asset issuer does not provide a white paper, the exchange can prepare and submit it to the competent authority.

Compliant price data

Crypto Risk Metrics delivers KARBV-compliant price data for native crypto-assets using a valuation model tailored to non-organized markets like Bitcoin and Ethereum. This ensures accurate asset valuation in line with Sections 27 and 28 of the investment accounting ordinance.

Contact

Crypto Risk Metrics GmbH

Lange Reihe 73
20099 Hamburg
Germany

Tel.: +49 251 981156-4070

Mail: info@crypto-risk-metrics.com

