Sustainability indicators for crypto-assets

Disclosures in accordance with Article 66 (5) MiCAR.

Dieser Bericht wurde von der V-Bank AG unter Einbeziehung der von der Crypto Risk Metrics GmbH bereitgestellten Daten zur Verfügung gestellt.

Preamble

About Crypto Asset Service Provider (CASP)

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About this report

This disclosure serves as evidence of compliance with the regulatory requirements of MiCAR 66 (5). This requirement obliges crypto asset service providers to disclose significant adverse factors affecting the climate and the environment. In particular, this disclosure complies with the requirements of "Commission Regulation (EU) 2025/422 of December 17, 2024, supplementing Regulation (EU) 2023/1114 of the European Parliament and of the Council with regard to regulatory technical standards specifying the content, methods and presentation of information relating to sustainability indicators related to climate-related and other environmental impacts".

This report is valid until material changes occur in the data, which will result in an immediate adjustment of this report.

Overview

This is an overview of the core indicator energy consumption but does not represent the reporting according to MiCAR 66 (5). Please find the full disclosure below.

#	Crypto-Asset	Crypto-Asset FFG	Energy consumption (kWh per calendar year)
1	**Bitcoin**	V15WLZJMF	211,252,668,234.06
2	**Ethereum**	D5RG2FHH0	2,390,166.00
3	**Cardano**	76QS7QCXB	813,123.37
4	**Avalanche**	S6JCBF70N	844,800.82
5	**Litecoin**	D74JZ1VRD	1,209,097,309.66
6	**Polkadot**	SGD9NLTRG	630,738.71
7	**Polygon**	GB8DQ8DWN	89,636.32
8	**Cosmos**	6C7F2WVZH	186,481.17

1. Bitcoin (BTC)

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Bitcoin	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	225,950,418,132.43463	kWh/a
S.10 Renewable energy consumption	29.3064250422	%
S.11 Energy intensity	9.09481	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	93,090,682.32663	tCO2e
S.14 GHG intensity	3.74703	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.

Core Concepts:

1. Nodes and Miners:
   – Nodes: Computers running the Bitcoin software that validate transactions and blocks.
   – Miners: Specialized nodes that create new blocks by solving complex cryptographic puzzles.
2. Blockchain:
   A public ledger that stores all transactions in blocks. Each block contains transactions, a reference to the previous block (hash), a timestamp, and a nonce (a one-time random number).
3. Hash Function:
   Bitcoin uses the SHA-256 algorithm to secure block data.

Consensus Process:

1. Transactions are broadcast to the network and collected by miners into blocks. Each transaction is validated to ensure compliance with the rules (e.g., valid signatures, sufficient funds).
2. Mining and Block Creation:
   – Miners compete to find a nonce whose hash value is below a predetermined target. This target is adjusted regularly so that a new block is produced approximately every 10 minutes.

– The Proof-of-Work process is energy- and resource-intensive. Once a valid block is found, it is published to the network.

3. Other nodes verify the block and add it to the blockchain if it is valid.
4. The longest chain (i.e., the one with the highest accumulated Proof of Work) is considered the valid chain. In the event of forks, the longest chain prevails.

For the calculation of the respective indicators, the additional energy consumption and transactions of the Lightning Network were also considered, as this corresponds to the categorization of the Digital Token Identifier Foundation (FFG). Without including these transactions, the "per transaction" values would be significantly higher.

S.5 Incentive Mechanisms and Applicable Fees

The Bitcoin blockchain is based on the Proof-of-Work (PoW) mechanism, which secures the integrity of the network through economic incentives and fee structures.

Incentive Mechanisms:

1. Block Reward:
   – Newly Created Bitcoins: Miners receive block rewards in the form of newly generated bitcoins when they find a valid block. Initially, the reward was 50 BTC, but it halves every 210,000 blocks (approximately every four years) as part of the "halving" process.
   – Halving and Scarcity: The halving limits the total supply to 21 million BTC, creating scarcity that can support the asset's value.
2. Transaction Fees:
   – Fee Market: Users pay a fee to have their transactions prioritized by miners. Higher fees result in faster confirmation, especially during periods of high network congestion.
   – Sustainability: As block rewards decrease over time due to halvings, transaction fees are becoming increasingly important to finance network security.

Energy consumption and transactions from the Lightning Network were also included in these calculations, in accordance with the FFG classification of the Digital Token Identifier Foundation. Without Lightning data, "per transaction" estimates would be higher.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components.
For calculation, a "top-down" approach is used, based on an economic assessment of miners. Miners are the central drivers of energy consumption in the Proof-of-Work network.

The hardware in use is identified according to the SHA-256 algorithm and filtered for profitability — only devices above the profitability threshold are considered. The calculation includes hardware distribution, efficiency levels, and on-chain revenues of miners. Known merge mining is also incorporated.

To ensure full coverage, Functionally Fungible Group Digital Token Identifiers (FFG DTIs) are used where available, in order to include all implementations of the asset. Mappings are regularly updated based on data from the Digital Token Identifier Foundation.

To determine the token's energy consumption, the energy use of related networks (e.g., Lightning Network) is first calculated and then allocated proportionally based on network activity.

S.15 Key energy sources and methodologies

To determine the share of renewable energy, node locations are identified using public information sources, open-source crawlers, and internally developed crawling methods.

If data on the geographic distribution of nodes is not available, comparable reference networks are used.

The geo-information is combined with data from Our World in Data, Ember (2025), and the Energy Institute (2024).
Energy intensity is calculated as the marginal energy cost with respect to one additional transaction.

Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024);
Our World in Data – Share of electricity generated by renewables (CC BY 4.0).

S.16 Key GHG sources and methodologies

To calculate GHG emissions, node locations are also determined using public data sources, open-source crawlers, and internal tools.
If geolocation data is missing, comparable networks with similar incentive and consensus structures are used.

The identified locations are merged with data from Our World in Data, Ember (2025), and the Energy Institute (2024).
Emission intensity is calculated as the marginal emission with respect to one additional transaction.

Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024);
Our World in Data – Carbon intensity of electricity generation (CC BY 4.0).

2. Ethereum (ETH)

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Ethereum	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	2,159,953.20000	kWh/a
S.10 Renewable energy consumption	32.2255486008	%
S.11 Energy intensity	0.00007	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	718.86066	tCO2e
S.14 GHG intensity	0.00002	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Since the transition ("The Merge") in 2022, the Ethereum network has used a Proof-of-Stake (PoS) consensus mechanism to validate new transactions on the blockchain, replacing the previous mining process.

Core Components:

1. Validators:
   Validators are responsible for proposing and validating new blocks. To become a validator, a user must deposit (stake) at least 32 ETH into a smart contract. This deposit serves as collateral and can be reduced (slashed) if the validator behaves dishonestly.
   Validators are rewarded for their participation through staking rewards and transaction fees.

2. Beacon Chain:
   The Beacon Chain coordinates the network of validators and manages the consensus protocol. It organizes validators into committees and ensures the finality of blocks.

Consensus Process:

1. Block Proposal:
   A new block is proposed every 12 seconds. One validator is randomly selected to create the block. The remaining validators then verify the integrity of the proposed block.

2. Attestation:
   Validators who do not propose a block participate in attestation by voting on the validity of the block. These attestations are then aggregated.

3. Committees:
   Validators are organized into committees to optimize the validation process. Each committee is responsible for validation within one epoch.

4. Finality:
   Finality is achieved using Casper FFG (Friendly Finality Gadget) after two epochs (approximately 12.8 minutes). This ensures that blocks and transactions are irreversible and confirmed.

5. Fork Choice Rule:
   The LMD-GHOST (Latest Message Driven – Greediest Heaviest Observed SubTree) rule ensures that the blockchain always follows the chain with the highest accumulated validator votes.

6. Incentives and Penalties:
   Validators receive rewards for proposing and confirming blocks. In cases of malicious behavior or prolonged inactivity, they are subject to slashing penalties.
   The Proof-of-Stake mechanism was designed to enhance energy efficiency, security, and scalability. Future upgrades, such as Proto-Danksharding, aim to further improve transaction efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Since the transition to Ethereum 2.0 ("The Merge") in 2022, Ethereum has used a Proof-of-Stake (PoS) consensus mechanism to secure the network. The incentive and fee structures play a key role in maintaining the security, efficiency, and economic stability of the blockchain.

Incentive Mechanisms:
Staking Rewards:

- Validator Rewards:
  Validators are the backbone of the PoS mechanism. They are responsible for proposing new blocks, attesting, and participating in synchronization committees.
  To become a validator, a participant must deposit at least 32 ETH into a smart contract. In return, validators receive rewards in newly issued ETH and from transaction fees within the blocks they validate.

- Reward Rate:
  The amount of rewards is dynamic and depends on the total amount of ETH staked in the network.
  The more ETH is staked, the lower the individual yield, and vice versa.
  This model creates an economic balance between network security and the incentive to participate.

Transaction Fees (EIP-1559):
Since the implementation of the Ethereum Improvement Proposal 1559 (EIP-1559), each transaction fee consists of two components:

- Base Fee:
  This fee is burned with each transaction, reducing the circulating ETH supply.
  The base fee adjusts dynamically according to network congestion to stabilize fees and reduce volatility.

- Priority Fee (Tip):
  Users can include an optional priority fee to incentivize validators to process their transactions faster.
  This fee goes directly to the validator and serves as an additional performance incentive.

Penalties for Misbehavior:

- Slashing:
  Validators who act maliciously (e.g., by double signing, attempting forks, or validating incorrect data) are penalized. A portion of their staked ETH is forfeited.
  This acts as a deterrent against manipulation and secures network integrity.

- Inactivity Penalties:
  Validators who remain inactive for extended periods gradually lose part of their rewards or stake.
  This ensures that validators remain online and actively contribute to network security.

Fees on the Ethereum Blockchain:
Gas Fees:

- Calculation:
  Gas fees are calculated based on the computational complexity of a transaction or smart contract call.
  Each operation on the Ethereum Virtual Machine (EVM) has a defined gas cost.

- Dynamic Adjustment:
  The base fee under EIP-1559 automatically adjusts to network load.
  When demand is high, the fee increases; when demand is low, it decreases.
  Through the burn model, Ethereum can develop deflationary tendencies during periods of high activity.

Smart Contract Fees:

- Deployment and Interaction:
  Publishing a smart contract requires gas fees proportional to the contract's complexity and size.
  Interactions such as function calls, token transfers, or protocol actions also consume gas.

- Optimization:
  Developers are encouraged to optimize their smart contracts for efficient gas usage to reduce transaction costs.

Asset Transfer Fees:

- Token Transfers:
  Transfers of ERC-20 tokens or other token standards also incur gas fees.
  These vary depending on the smart contract implementation and current network congestion.

S.9 Energy consumption sources and methodologies

For calculating energy consumption, a "bottom-up" approach is used. Nodes are considered the central factor in the network's energy consumption.
These assumptions are based on empirical findings from public information sources, open-source crawlers, and internally developed crawlers. The main determinants for estimating the hardware used in the network are derived from the requirements of the client software. The energy consumption of the hardware was measured in certified test laboratories.
To identify all implementations of the respective asset, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used where available. These mappings are regularly updated based on data from the Digital Token Identifier Foundation.
Information on the hardware used and the number of participants is based on assumptions that are verified using empirical data. Participants are generally assumed to be economically rational. As a precautionary principle, conservative assumptions are applied, meaning higher estimates for negative environmental impacts are used when uncertain.

S.15 Key energy sources and methodologies

To determine the share of renewable energy use, node locations are identified using public information sources, open-source crawlers, and internally developed tools.
If geographic information is unavailable, comparable reference networks with similar incentive structures and the same consensus mechanism are used.

Sustainability indicators according to MiCAR 66 (5)

The resulting geodata is combined with publicly available information from Our World in Data.
Energy intensity is calculated as the marginal energy consumption with respect to one additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024) – with data processing by Our World in Data.
“Share of electricity generated by renewables – Ember and Energy Institute” [Dataset].
Retrieved from: https://ourworldindata.org/grapher/share-electricity-renewables

S.16 Key GHG sources and methodologies

To determine greenhouse gas emissions, node locations are identified using public information sources, open-source crawlers, and internally developed tools.
If geographic information is unavailable, comparable reference networks are used.
The geographic data is combined with information from Our World in Data.
Emission intensity is calculated as the marginal emission with respect to one additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024) – with data processing by Our World in Data.
“Carbon intensity of electricity generation – Ember and Energy Institute” [Dataset].
Retrieved from: https://ourworldindata.org/grapher/carbon-intensity-electricity
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3. Cardano

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Cardano	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	780,778.80000	kWh/a
S.10 Renewable energy consumption	31.8059441814	%
S.11 Energy intensity	0.00026	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	262.93268	tCO2e
S.14 GHG intensity	0.00009	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Cardano ADA operates on the Cardano network.
The Cardano blockchain network uses the Ouroboros consensus mechanism, a Proof-of-Stake (PoS) protocol specifically designed for scalability, security, and energy efficiency.
The Ouroboros mechanism is the first formally verified PoS protocol, mathematically proven to offer the same level of security as Proof-of-Work while consuming only a fraction of the energy.

Core Components:
Proof of Stake (PoS):
Unlike Proof-of-Work systems such as Bitcoin, the selection of block producers in Cardano is not based on computational power but on the amount of ADA staked.
Validators, known as Slot Leaders, are chosen based on the amount of ADA they have staked.
These Slot Leaders propose new blocks, validate transactions, and add them to the blockchain.

Epochs and Slot Leaders:
Cardano divides time into epochs (fixed time periods), which are further divided into slots.
For each slot, a Slot Leader is randomly selected in proportion to the amount of ADA staked. The higher the stake, the greater the probability of being chosen.
Slot Leaders are responsible for validating and propagating transactions within their time window.
After a slot ends, responsibility passes to the next leader.

Delegation and Staking Pools:
ADA holders who do not wish to operate their own validator node can delegate their coins to staking pools.
These pools combine the stakes of many participants, increasing their chances of being selected to validate new blocks.
The pool operator and delegators share the rewards proportionally to their respective stakes.
This model enables broad participation, promotes decentralization, and provides smaller investors with access to staking returns.

Security Mechanisms and Attack Protection:
Ouroboros is designed to remain resilient even under potential attack conditions.
The protocol assumes that an attacker may attempt to propagate alternative chains or false messages.
As long as more than 51% of the total stake is controlled by honest participants, the network remains secure.
An additional mechanism, called settlement delay, protects against manipulation:
New Slot Leaders treat the most recent blocks as provisional until they become finalized.
This approach prevents reorganizations and ensures chain integrity.
It also allows participants to go offline temporarily and later resynchronize, provided they do not exceed the delay period.

Chain Selection and Consensus:
Cardano follows the longest valid chain rule.
Each node maintains a local copy of the blockchain and replaces it when a longer valid chain is discovered.
This ensures that all nodes eventually converge to the same blockchain state, guaranteeing consistency across the network.

Energy Efficiency:
Because Ouroboros is based on staking rather than mining, the network's energy consumption is minimal compared to Proof-of-Work systems.
Validators do not perform energy-intensive computations; selection depends solely on their stake.
This makes Cardano one of the most energy-efficient Layer-1 protocols on the market.

Advancements (Ouroboros Praos & Leios):
The protocol has undergone several improvements.

- Ouroboros Praos added enhanced protection against adaptive attacks and allowed more secure block production even in asynchronous networks.
- Ouroboros Leios (in development) aims to further optimize transaction throughput and finality to increase scalability and efficiency.

S.5 Incentive Mechanisms and Applicable Fees

Cardano uses a system of staking rewards, slashing mechanisms, and transaction fees to ensure network security and decentralization.

Incentive Mechanisms for Transaction Security:

1. Staking Rewards:

- Validators (Slot Leaders) secure the network by validating transactions and producing new blocks. Participants must stake ADA; larger stakes increase the likelihood of selection.
- Validators earn rewards in newly generated ADA and transaction fees for successfully producing blocks.
- Delegators who do not run their own validator nodes can delegate their ADA to staking pools. In doing so, they contribute to network security and receive proportional rewards based on their delegated stake.

2. Slashing Mechanism:

- To prevent misconduct, Cardano includes a slashing mechanism. Validators that act dishonestly, incorrectly validate transactions, or produce invalid blocks lose a portion of their staked ADA.
- This system creates strong economic incentives for honest behavior, preserving network integrity.

3. Delegation and Pool Operation:

- Staking pool operators may charge operating fees, consisting of fixed costs and a percentage margin on rewards.
- The remaining rewards are distributed proportionally among delegators after deducting operator fees.
- Rewards are distributed at the end of each epoch, with the pool's performance and participation determining individual returns.

Fees:

1. Transaction Fees:

- Transaction fees on the Cardano blockchain are paid in ADA and are typically low.
- The calculation formula is:
  a + b × size, where a = 0.155381 ADA (constant), b = 0.000043946 ADA/byte (coefficient), and size is the transaction size in bytes.
- This structure ensures that fees adjust dynamically to network load and transaction size.

2. Staking Pool Fees:

- Pool operators charge operational fees and a margin to cover infrastructure costs.
- After these deductions, rewards are distributed proportionally among delegators.

S.9 Energy consumption sources and methodologies

For calculating energy consumption, a bottom-up approach is used. Nodes are considered the central factor in the network's total energy use.
These assumptions are based on empirical findings from public data sources, open-source crawlers, and internally developed crawlers.
The main determinants are the hardware requirements for running client software. Energy consumption has been measured in certified testing laboratories.
The Functionally Fungible Group Digital Token Identifier (FFG DTI) is used, where available, to identify all implementations of the asset, with mappings regularly updated based on data from the Digital Token Identifier Foundation.
In cases of uncertainty, conservative assumptions are made, tending to overestimate potential negative environmental impacts.

S.15 Key energy sources and methodologies

To determine the share of renewable energy use, node locations are identified using public information sources, open-source, and internal crawlers.
If geographic data is unavailable, comparable reference networks with similar incentive structures and the same consensus mechanism are used.
These geodata are combined with Our World in Data datasets to determine the share of renewable energy.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024), processed by Our World in Data.
"Share of electricity generated by renewables – Ember and Energy Institute" [Dataset].
Retrieved from: https://ourworldindata.org/grapher/share-electricity-renewables

S.16 Key GHG sources and methodologies

The determination of greenhouse gas emissions follows the same approach as the energy source analysis.
Node locations are identified through public information sources and crawlers and linked with data from Our World in Data.
If no data is available, comparable networks are used.
Emission intensity is calculated as the marginal emission per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024), processed by Our World in Data.
"Carbon intensity of electricity generation – Ember and Energy Institute" [Dataset].
Retrieved from: https://ourworldindata.org/grapher/carbon-intensity-electricity

4. Avalanche

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Avalanche	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	825 802.43619	kWh/a
S.10 Renewable energy consumption	30.8679973961	%
S.11 Energy intensity	0.00005	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	310.06058	tCO2e
S.14 GHG intensity	0.00002	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Avalanche AVAX operates on the following networks: Avalanche and Avalanche X-Chain.
The Avalanche blockchain network uses a unique Proof-of-Stake (PoS) consensus mechanism called Avalanche Consensus, which consists of three interconnected protocols: Snowball, Snowflake, and Avalanche.

Avalanche Consensus Process:

1. Snowball Protocol:

- Random Sampling: Each validator randomly selects a small, fixed subset of other validators.
- Repeated Polling: Validators repeatedly query this subset to determine the preferred transaction.
- Confidence Counters: Validators maintain a counter for each transaction that increases when other validators share the same preference.
- Decision Threshold: Once the confidence level exceeds a defined threshold, the transaction is considered accepted.

2. Snowflake Protocol:

- Binary Decision: Extends the Snowball protocol by introducing a binary decision process, allowing validators to choose between two competing transactions.
- Binary Confidence: Confidence counters measure the strength of each decision.
- Finality: Once a specific confidence level is reached, the decision becomes final.

3. Avalanche Protocol:

- DAG Structure: Utilizes a Directed Acyclic Graph (DAG) structure to organize transactions, enabling parallel processing and high throughput.
- Transaction Ordering: Transactions are inserted into the DAG according to their dependencies, ensuring consistent ordering.
- Consensus on DAG: Unlike many Proof-of-Stake protocols that use a classical BFT consensus, Avalanche achieves consensus directly through the DAG structure via repeated Snowball and Snowflake polling among validators.
  The Avalanche X-Chain also uses the Avalanche Consensus Protocol, based on repeated subsampling of validators to achieve agreement on transactions.

S.5 Incentive Mechanisms and Applicable Fees

Avalanche AVAX employs a hybrid incentive mechanism based on staking, block rewards, and a deflationary fee model to ensure security, efficiency, and economic sustainability.

1. Validators

- Staking: Validators must stake AVAX tokens; the higher the stake, the greater the probability of being selected as a block proposer or validator.
- Rewards: Validators receive rewards proportional to their stake amount, uptime, and performance.
- Delegation: Token holders can delegate their AVAX to validators. Delegators share rewards proportionally and thus indirectly contribute to network security.

2. Economic Incentives

- Block Rewards: Validators are rewarded with newly issued AVAX tokens (inflationary) for validating and producing blocks.
- Transaction Fees: Validators receive a portion of the transaction fees paid by users for simple transactions, smart contract executions, or asset creations.

3. Penalties

- Slashing: Avalanche does not employ traditional slashing. Instead, validators that go offline or exhibit misbehavior lose eligibility for future rewards.
- Uptime Requirements: Continuous uptime and correct validation are mandatory to qualify for rewards.

Fees on the Avalanche Blockchain

1. Transaction Fees:

- Dynamic Fees: Vary depending on network load and transaction complexity.
- Fee Burning: A portion of the fees is permanently burned, reducing token supply and offsetting inflationary effects.

2. Smart Contract Fees:
   Fees for deploying or interacting with smart contracts depend on computational requirements and ensure efficient resource utilization.
3. Asset Creation Fees:
   Creating new tokens or assets incurs fixed fees to prevent spam and protect network capacity.
   On the X-Chain, incentives occur indirectly through the network-wide issuance of AVAX. Transaction fees are fixed and fully burned.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across several components.
A bottom-up approach is used for calculation, with nodes considered the central factor influencing network energy use.
The assumptions are based on empirical findings obtained from public information sources, open-source crawlers, and internally developed tools.

The main determining factors are:

- Hardware requirements of the node software
- Measurements of device energy consumption conducted in certified laboratories
- Number of active network participants

The token's energy consumption is calculated as its proportional share of the total energy usage across the Avalanche and Avalanche X-Chain networks.
Mappings are based on the Functionally Fungible Group Digital Token Identifier (FFG DTI) and are regularly updated using data from the Digital Token Identifier Foundation.
Conservative assumptions are applied to overestimate potential negative impacts in cases of uncertainty.

S.15 Key energy sources and methodologies

To determine the share of renewable energy use, node locations are identified through crawlers and public data sources.
If reliable location data is unavailable, reference networks with similar consensus structures are used.
These geodata are combined with datasets from Our World in Data.
Energy intensity is calculated as the marginal energy cost per additional transaction.
Source: Ember (2025); Energy Institute – Statistical Review of World Energy (2024), processed by Our World in Data.
Share of electricity generated by renewables – Ember & Energy Institute.

S.16 Key GHG sources and methodologies

The calculation of greenhouse gas emissions follows the same methodology as energy estimation, using geographic node data.
Missing information is supplemented with data from reference networks with similar structures.
The resulting emission values are expressed as marginal emissions per transaction.
Source: Ember (2025); Energy Institute – Statistical Review of World Energy (2024), processed by Our World in Data.
Carbon intensity of electricity generation – Ember & Energy Institute.
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5. Litecoin

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Litecoin	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	1 281 708 794.01489	kWh/a
S.10 Renewable energy consumption	29.3064250422	%
S.11 Energy intensity	0.05193	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	528 058.97491	tCO2e
S.14 GHG intensity	0.02139	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Litecoin, similar to Bitcoin, uses the Proof-of-Work (PoW) consensus mechanism but differs in several technical aspects:

1. Scrypt Hashing Algorithm:
   Instead of Bitcoin's SHA-256 algorithm, Litecoin uses the more memory-intensive Scrypt algorithm. It was designed to make mining dependent on memory bandwidth rather than pure computational power, allowing mining on CPUs and GPUs in the early years. This increased decentralization and delayed the adoption of specialized ASIC hardware.

2. Mining and Block Creation:
   Miners compete to solve cryptographic puzzles to create new blocks. The first miner to solve the Scrypt puzzle adds the block to the blockchain and receives a block reward in LTC, as well as all transaction fees from the included transactions.

3. Block Time:
   Litecoin's block time is 2.5 minutes, significantly shorter than Bitcoin's 10 minutes. This enables faster transaction confirmations, improving network efficiency and making Litecoin particularly attractive for smaller, everyday transactions.

4. Block Reward Halving:
   Approximately every four years, the block reward is halved ("halving"). Initially, it was 50 LTC per block; after several halvings, it is now significantly lower. The halving mechanism controls inflation and leads to a maximum total supply of 84 million LTC.

5. Difficulty Adjustment:
   Mining difficulty is adjusted every 2,016 blocks (approximately every 3.5 days). This keeps the average block time stable, regardless of fluctuations in the total network hash rate.

S.5 Incentive Mechanisms and Applicable Fees

Litecoin operates entirely on the Proof-of-Work model, in which miners are incentivized economically through rewards to secure the network.

Incentive Mechanisms:

1. Mining Rewards:

- Block Rewards: Successful miners receive LTC for each block found. The reward halves periodically, reducing the rate of new coin issuance.
- Transaction Fees: In addition to block rewards, miners receive transaction fees from the transactions included in their blocks. Users can pay higher fees to prioritize their transactions.

2. Halving and Deflationary Effect:
   The halving mechanism creates a deflationary model where supply decreases while demand may increase, stabilizing price dynamics and promoting long-term participation.
3. Economic Security:
   High energy costs and hardware investments create strong incentives for miners to act honestly. Any attempt to manipulate the network would result in financial loss, as the network rejects invalid blocks.

Fee Structure on the Litecoin Blockchain:

- Transaction Fees: Every transaction requires a fee in LTC, determined by data size (bytes) and current network congestion.
- Low Fees: Litecoin is known for its extremely low fees, making it well-suited for micro-payments and everyday use.
- Fee Distribution: All collected fees go directly to miners, further reinforcing network security and miner participation.

S.9 Energy consumption sources and methodologies

A top-down approach is used to calculate energy consumption, based on the economic viability of mining operations.
Miners participating in PoW consensus are considered the primary sources of energy consumption.

- Hardware Selection: Only economically profitable mining devices using the Scrypt algorithm are included.
- Profitability Threshold: A profitability threshold is defined based on the revenue and cost structure of mining operations; only hardware above this threshold is considered.
- Calculation: Total energy consumption is derived from the number of active devices, their efficiency levels, and on-chain mining revenue data.
- Merge Mining: Included where Litecoin is jointly mined with other networks.
- Methodological Basis: The Functionally Fungible Group Digital Token Identifier (FFG DTI) is used, where available, to identify all asset implementations.
- Assumptions: Participants are assumed to behave economically rationally; conservative assumptions are made where uncertainty exists.

S.15 Key energy sources and methodologies

To determine the share of renewable energy use, mining node locations are identified using public sources, open-source data, and internal crawlers.
If geographic data is unavailable, comparable reference networks with similar consensus structures are used.
These geodata are combined with information from Our World in Data. The energy intensity is calculated as the marginal energy cost per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024); "Share of electricity generated by renewables – Ember and Energy Institute."
Retrieved from: https://ourworldindata.org/grapher/share-electricity-renewables

S.16 Key GHG sources and methodologies

The calculation of greenhouse gas (GHG) emissions follows the same approach as the energy assessment, using geolocation of mining nodes.
If complete location data is unavailable, comparable PoW networks are used for estimation.
GHG intensity is calculated as the marginal emission per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024); "Carbon intensity of electricity generation – Ember and Energy Institute."
Retrieved from: https://ourworldindata.org/grapher/carbon-intensity-electricity

6. Polkadot

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Polkadot	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	630 720.00000	kWh/a
S.10 Renewable energy consumption	33.1727326429	%
S.11 Energy intensity	0.00030	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	186.14368	tCO2e
S.14 GHG intensity	0.00009	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Polkadot DOT is present on the following networks: Astar and Polkadot.

Astar (Parachain in the Polkadot ecosystem):
Astar uses a hybrid consensus model combining Proof of Stake (PoS) and Delegated Proof of Stake (DPoS) with sharded multichain execution via parachains:

1. PoS: Validators stake ASTR and validate transactions; selection probability increases with the size of the stake. Rewards are paid in ASTR.
2. DPoS: ASTR holders delegate their voting power/stake to trusted validators and receive a proportional share of rewards.
3. Sharded Multichain: Parachain execution enables parallel processing across multiple chains, increasing scalability.
4. Finality: Astar uses Polkadot's GRANDPA finality gadget for deterministic finality; finalized blocks are irreversible.

Polkadot (Relay Chain):
Polkadot operates on Nominated Proof-of-Stake (NPoS) with multiple roles and two core protocols:

- Roles: Validators (responsible for block production and finalization on the relay chain), Nominators (delegate DOT to validators and share their rewards/penalties), Collators (aggregate parachain transactions and create state proofs), and Fishermen (report malicious behavior).
- BABE (Block Production): Pseudorandom slot assignment for block production based on stake; proposed blocks are propagated through the network.
- GRANDPA (Finality): Provides asynchronous finality through validator voting; once a supermajority (> 2/3) agrees, the chain or block is finalized immediately.

- Process Flow: Slot assignment → Block proposal → Distribution & preliminary validation → GRANDPA voting → Finality. Misbehavior (e.g., double-signing, inactivity) results in slashing.

S.5 Incentive Mechanisms and Applicable Fees

- Staking Rewards: Validators earn ASTR for validating and securing the network; higher stakes increase selection chances.
- Delegation (DPoS): ASTR holders delegate to validators and share performance-based rewards.
- dApp/Cross-Chain Incentives: Use of multichain functionality can generate additional developer or dApp rewards.
- Fees: Transaction fees in ASTR; execution fees for smart contracts based on resource consumption; additional cross-chain fees for transfers between chains; parachain slot costs for participation within the Polkadot ecosystem.

Polkadot (NPoS):

- Validators: Receive staking rewards proportional to stake and performance; validators may charge a commission on nominator rewards.
- Nominators: Delegate DOT to validators and share in their rewards or penalties; distribution is based on the contributed stake.
- Collators & Fishermen: Receive incentives for parachain operation and for detecting/reporting malicious behavior.
- Economic Penalties: Slashing applies in cases of misbehavior; an unbonding period applies when withdrawing stake (during which additional slashing risk remains).
- Fee Model: Dynamic transaction fees (based on network load); partial fee burning to control inflation; smart contract fees based on computational resources; parachain slot auctions (bids in DOT) secure long-term operational slots for projects.

S.9 Energy consumption sources and methodologies

A bottom-up approach is used. Nodes are considered the primary factor influencing energy consumption. Assumptions are based on empirical findings from public data sources, open-source crawlers, and internally developed crawlers. Hardware estimation is determined by the client software’s technical requirements, with energy measurements conducted in certified testing laboratories.
To ensure comprehensive coverage, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used when available; mappings are regularly updated based on data from the Digital Token Identifier Foundation. Participant behavior is assumed to be economically rational; in cases of uncertainty, conservative assumptions are applied.
For token attribution, the network’s total energy consumption is first calculated for Astar, and the share attributable to the asset is derived from its relative activity within that network.

S.15 Key energy sources and methodologies

Node locations are determined through public data sources, open-source crawlers, and internal crawlers. If geolocation data are missing, comparable reference networks with similar consensus and incentive structures are used. These geolocation data are then combined with public data from Our World in Data. Energy intensity is calculated as the marginal energy cost per additional transaction.

Source reference: Ember (2025); Energy Institute – Statistical Review of World Energy (2024) – processed by Our World in Data ("Share of electricity generated by renewables – Ember and Energy Institute").

S.16 Key GHG sources and methodologies

The GHG assessment follows the same methodology as S.15 (geolocation of nodes; use of reference networks where necessary). Emission intensity is calculated as the marginal emission per additional transaction and linked to location-specific emission factors provided by Our World in Data.
Source reference: Ember (2025); Energy Institute – Statistical Review of World Energy (2024) – "Carbon intensity of electricity generation – Ember and Energy Institute" (CC BY 4.0).

7. Polygon

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Polygon	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	97 168,85186	kWh/a
S.10 Renewable energy consumption	32,2255486008	%
S.11 Energy intensity	0,00000	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0,00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	32.33906	tCO2e
S.14 GHG intensity	0,00000	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Polygon POL is present on the following networks: Ethereum and Polygon.

The Proof-of-Stake (PoS) consensus of the underlying Ethereum network (since “The Merge” in 2022) replaced mining with validator staking. Validators must stake at least 32 ETH. For each block, a validator is randomly selected to propose the next block, which is then verified by other validators for integrity.

The network operates with slots and epochs: every 12 seconds a block is proposed; finalization occurs after two epochs (~12.8 minutes) via Casper-FFG. The Beacon Chain coordinates validators, while the fork-choice rule (LMD-GHOST) ensures the chain follows the branch with the highest accumulated validator votes. Validators receive rewards for proposing and attesting to blocks, while slashing is applied in cases of malicious activity or prolonged inactivity. The goal is to improve energy efficiency, security, and scalability; upcoming upgrades (such as Proto-Danksharding) aim to further increase transaction efficiency.

Polygon, formerly Matic Network, is a Layer-2 scaling solution for Ethereum that uses a hybrid consensus model.

Core Concepts:

1. Proof of Stake (PoS)

- Validator Selection: Validators on Polygon are selected based on the amount of MATIC tokens staked. A higher stake increases the likelihood of validating transactions and producing blocks.
- Delegation: Token holders can delegate their MATIC to validators and share proportionally in their rewards.

2. Plasma Chains

- Off-Chain Scaling: Plasma enables child chains to process transactions off-chain and only submit final state updates to Ethereum (higher throughput, reduced congestion).
- Fraud Proofs: Fraudulent transactions can be challenged and reverted within a defined time window.

Consensus Process:

1. Transaction Validation: Transactions are first validated by MATIC-staked validators; valid transactions are added to blocks.
2. Block Creation:

- Proposal & Voting: Validators propose and vote on blocks; the block with majority approval is accepted.
- Checkpointing: Regular checkpoints (snapshots) of the Polygon sidechain are submitted to Ethereum to ensure security and finality.

3. Plasma Framework:

- Child Chains: Validation occurs off-chain, with only the final state submitted to Ethereum.
- Fraud Proofs: Disputed or incorrect transactions can be challenged and reversed.

Security & Economic Incentives:

1. Validator Incentives

- Staking Rewards: Paid in MATIC, proportional to stake and performance.
- Transaction Fees: Validators receive a portion of user-paid transaction fees.

2. Delegation: Delegators earn proportional rewards and help secure the network.
3. Economic Security: Slashing applies for misconduct (e.g., double-signing, extended downtime).

S.5 Incentive Mechanisms and Applicable Fees

Polygon POL is present on the following networks: Ethereum and Polygon.

Ethereum PoS (Network Security & Fee Model):
The PoS system secures transactions through both incentives and penalties. Validators stake ≥ 32 ETH and earn rewards for block proposals, attestations, and participation in sync committees. Under EIP-1559, transaction fees consist of a base fee (burned) and an optional priority fee (tip) paid to validators. Slashing and inactivity penalties apply in cases of misbehavior. The goal is improved security and a predictable, typically deflationary fee structure under high network load.

Polygon-Specific Incentives (PoS + Plasma):

1. Validators

- Staking Rewards: MATIC rewards and transaction fees; validator selection depends on stake size.
- Block Production: Honest and efficient validators proposing and verifying blocks are rewarded; misconduct is penalized.
- Checkpointing: Regular checkpoints ensure finality through Ethereum.

2. Delegators

- Delegation: Delegating MATIC to trusted validators; proportional rewards based on delegation amount.

3. Economic Security

- Slashing: Partial loss of stake for rule violations.
- Bond Requirements: Validators must maintain a significant MATIC bond as collateral.

Fees on the Polygon Blockchain:
4. Transaction Fees:

- Low & Dynamic: Significantly lower than on Ethereum; depend on network load and transaction complexity.

5. Smart Contract Fees:

- Deployment and execution fees depend on computational resources required; paid in MATIC; cost-efficient for dApps.

6. Plasma Framework:

- State transfers and withdrawals are bundled and submitted to Ethereum; related MATIC fees reduce overall transaction costs.

S.9 Energy consumption sources and methodologies

The energy consumption of this asset is aggregated across multiple components. A bottom-up approach is used: nodes are considered the primary energy drivers; empirical data are sourced from public repositories, open-source crawlers, and internally developed crawlers. Hardware energy consumption is measured in certified laboratories and benchmarked against the requirements of the client software.

Due to the Layer-2 structure, not only the Polygon mainnet is considered. To ensure accurate representation, a proportional share of Ethereum's energy consumption is allocated to Polygon, as Ethereum contributes to its security. This share is determined based on gas consumption.

For differentiation, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used when available; mappings are regularly updated using data from the Digital Token Identifier Foundation. Assumptions follow the precautionary principle, with conservative estimates made where uncertainty exists. Participants are assumed to behave economically rationally; where necessary, higher estimates are applied to account for potential adverse effects.

S.15 Key energy sources and methodologies

To determine the proportion of renewable energy usage, the geographic distribution of the network's nodes is assessed using public information sources, open-source crawlers, and in-house developed crawlers. Where direct geographic data is unavailable, reference networks with comparable incentivization structures and consensus mechanisms are used. The resulting geographic dataset is merged with publicly available information from Our World in Data and the Energy Institute – Statistical Review of World Energy (2024).
The renewable energy share is calculated as the marginal renewable electricity contribution per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024); Our World in Data – Share of electricity generated by renewables [dataset]. Retrieved from: https://ourworldindata.org/grapher/share-electricity-renewables

S.16 Key GHG sources and methodologies

To determine greenhouse gas (GHG) emissions, the geographic distribution of nodes is analyzed using public information sites, open-source crawlers, and in-house developed crawlers. In cases where no direct geographic data is available, comparable reference networks are used based on similar consensus mechanisms and incentivization structures. This geographic information is merged with publicly available data from Our World in Data and the Energy Institute – Statistical Review of World Energy (2024).

The GHG intensity is calculated as the marginal emission generated per additional transaction within the network.

Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024); Our World in Data – Carbon intensity of electricity generation [dataset]. Retrieved from: https://ourworldindata.org/grapher/carbon-intensity-electricity — Licensed under CC BY 4.0.

8. Cosmos

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Cosmos	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	186 473.14960	kWh/a
S.10 Renewable energy consumption	NOT APPLICABLE BECAUSE S8 < 500,000 kWh	%
S.11 Energy intensity	NOT APPLICABLE BECAUSE S8 < 500,000 kWh	kWh
S.12 Scope 1 DLT GHG emission - Controlled	NOT APPLICABLE BECAUSE S8 < 500,000 kWh	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	NOT APPLICABLE BECAUSE S8 < 500,000 kWh	tCO2e
S.14 GHG intensity	NOT APPLICABLE BECAUSE S8 < 500,000 kWh	kgCO2e

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)
The Binance Smart Chain 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 system enables fast block times, low fees, and at the same time a balanced level of decentralization and security.

Core components:

1. Validators ("Cabinet Members"):
   Responsible for creating new blocks, validating transactions, and maintaining network security. To become a validator, an entity must stake a significant amount of BNB. There are 21 active validators at any given time who rotate regularly to ensure decentralization and stability.

2. Delegators:
   Token holders who do not operate their own validator nodes can delegate their BNB to validators. This increases their stake and the probability of being selected for block production. Delegators receive proportional rewards from validator rewards and thus actively contribute to network security.

3. Candidates:
   Nodes that have deposited the required stake but are not yet in the active validator set. They form the pool of potential validators that can move up through community voting.

Consensus process:

- Validator selection: Based on the amount of BNB staked and the votes of the delegators.
- Block production: The selected validators alternately produce blocks in a PoA-like sequence.
- Transaction finality: Thanks to PoSA, BSC achieves a block time of around 3 seconds and fast finality.

Security mechanisms:

- Slashing in case of malicious behavior or failure.
- Staking as economic collateral – loss of stake in case of misconduct.

BitSong (BTSG):
BitSong operates with a Delegated Proof of Stake (DPoS) mechanism. BTSG token holders can delegate their tokens to validators who are responsible for block production and validation. The selection of validators is determined by the amount and duration of staked BTSG tokens, which defines their voting power in governance processes.
This approach promotes active community participation, combined with high efficiency and low transaction costs.

Cosmos Hub (ATOM):
The Cosmos network is based on the Cosmos SDK, a modular framework for application-specific blockchains, and uses Tendermint Core, a Byzantine Fault Tolerant (BFT) Proof of Stake (PoS) consensus engine. This architecture combines interoperability, security, and fast transaction finality.

Core components:

1. Tendermint BFT consensus:

- Validator selection: Based on the amount of staked or delegated ATOM.
- Voting system: Block proposals and validations are performed by a two-thirds majority.
- Security threshold: The network remains secure as long as less than one-third of the validators act faulty or maliciously.

2. Cosmos SDK architecture:

- Inter-Blockchain Communication (IBC): Enables connection between different Cosmos-based blockchains.
- Application Blockchain Interface (ABCI): Separates the consensus layer from the application layer and allows developers to integrate specific logic without changing the consensus mechanism.

Cronos (CRO):
Cronos uses a Proof of Stake (PoS) model integrated with Tendermint BFT. It is designed to ensure decentralization, security, and cross-chain compatibility.

Core components:

- Validator selection: Based on the staking amount of CRO tokens.
- Delegation: Token holders can delegate their CRO to validators without operating their own nodes.
- Cosmos SDK & IBC: Enables connectivity with Cosmos-based blockchains as well as external networks such as Ethereum and Binance Smart Chain.
  This setup supports an interoperable multi-chain architecture and ensures fast transaction confirmation through Tendermint finality.

Ethereum (ETH):
The Ethereum consensus mechanism was switched to Proof of Stake (PoS) with "The Merge" (2022).

Functionality:

- Validators must stake at least 32 ETH.
- Per slot (~12 s), a validator is randomly selected to propose a block; others verify its validity.
- Finality occurs after two epochs (~12.8 minutes) using Casper-FFG.
- The Beacon Chain coordinates the validators, while LMD-GHOST ensures that the chain supported by the majority of validators is selected.

Objectives:
Improved energy efficiency, security, and scalability.
Future upgrades such as Proto-Danksharding aim to further increase transaction throughput and data availability.

Injective (INJ):
Injective uses a Tendermint-based PoS consensus designed for high speed and immediate finality.

Core components:

- Validators are selected based on staking amount (self and delegated).
- Delegators can delegate tokens to validators and receive proportional rewards.
- Immediate finality ensures that confirmed transactions cannot be reversed.
  This structure enables high performance for decentralized finance applications and derivatives trading on Injective.

Osmosis (OSMO):
Osmosis is a decentralized exchange within the Cosmos ecosystem and uses a Proof of Stake (PoS) system based on Tendermint Core and the Cosmos SDK.

Core components:

- Validators secure the network and validate transactions based on their OSMO stake.
- IBC connectivity: Connects Osmosis to the Cosmos network for cross-chain swaps.
- Governance is fully decentralized – OSMO holders decide on parameters and upgrades.

S.5 Incentive Mechanisms and Applicable Fees

Binance Smart Chain (BSC)

- Validators: Receive block rewards and transaction fees in BNB.
- Delegators: Participate through delegated staking and receive proportional rewards.
- Security: Slashing in case of misconduct; unbonding period ensures honest behavior.

Fee structure:

- Low BNB transaction fees (variable depending on network load)
- Cross-chain fees for transfers between Binance Chain and BSC
- Smart contract fees depending on computational effort

BitSong (BTSG):

- Validators receive rewards from block rewards and transaction fees.
- A portion is distributed to delegators after deduction of the validator's commission.
- BTSG also serves as a governance and utility token in the network.

Cosmos (ATOM):

- Staking rewards: Validators and delegators receive ATOM rewards from block emissions and transaction fees.
- Slashing: Misconduct (e.g., double-signing or downtime) leads to stake reductions.
- Transaction fees: Users pay ATOM for all network transactions; additionally, Cosmos SDK-based chains can define their own fee models in alternative tokens.
  This system ensures security, participation, and sustainable network integrity.

Cronos (CRO):

- Staking rewards: CRO for validators and delegators.
- Deflationary mechanism: Periodic token burning reduces total supply.

Fees:

- CRO transaction fees for transfers and dApp interactions
- EVM-compatible gas fees for smart contracts

Ethereum (ETH):

- Validators receive rewards from newly issued ETH and transaction fees.
- Under EIP-1559, the base fee of each block is burned; users can optionally add a "tip."
- Slashing and inactivity penalties promote reliability and network security.
  This system combines economic incentives with deflationary effects during high network utilization.

Injective (INJ):

- Staking rewards: For validators and delegators proportional to their stake.
- Transaction fees: Payable in INJ; a portion is burned weekly via an on-chain auction, strengthening the deflationary nature.

Osmosis (OSMO):

- Validators and delegators: Receive rewards from transaction fees and block rewards.

Sustainability indicators according to MiCAR 66 (5)

- Liquidity providers: Earn swap fees and OSMO incentives.
- Superfluid staking: Combination of staking and liquidity provision – users can earn yield while providing liquidity.

S.9 Energy consumption sources and methodologies

Energy consumption is calculated using a bottom-up model, in which network nodes are considered the main drivers. The basis is empirical data from public sources, open-source crawlers, and internal analyses. The hardware used and its consumption are determined in certified test laboratories.
For the calculation, all relevant networks (binance_smart_chain, bitsong, cosmos, cronos, ethereum, injective, osmosis) are taken into account.
A share of the total consumption corresponding to the activity level is attributed to Cosmos ATOM. For attribution, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used, based on regularly updated data from the Digital Token Identifier Foundation. Assumptions follow the precautionary principle: in case of uncertainty, conservative (higher) estimates are chosen.

S.15 Key energy sources and methodologies

NOT APPLICABLE BECAUSE S8 < 500,000 kWh

S.16 Key GHG sources and methodologies

NOT APPLICABLE BECAUSE S8 < 500,000 kWh

9. Solana

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Solana	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	6 843 750.00000	kWh/a
S.10 Renewable energy consumption	32.7956468965	%
S.11 Energy intensity	0.00000	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	2 319.13534	tCO2e
S.14 GHG intensity	0.00000	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Solana uses a hybrid combination of Proof of History (PoH) and Proof of Stake (PoS) to achieve high transaction speed, low latency, and strong security. This system enables efficient ordering of transactions and fast finality while maintaining low fees.

1. Proof of History (PoH):
   PoH is a cryptographic procedure that provides a verifiable time source (“cryptographic clock”) for the network.

- Timestamped transactions: Each transaction is assigned a cryptographic timestamp, creating a verifiable chronological order.
- Verifiable Delay Function (VDF): A sequential hash function generates unique hashes, where each output depends on the previous one. This allows the order of transactions to be independently verified.
- Function: Validators can validate transactions in the correct order without needing to synchronize with each other. This enables extremely fast block times of around 400 milliseconds and high scalability.

2. Proof of Stake (PoS):
   PoS serves for validator selection, block validation, and network security.

- Validator selection: Validators are selected according to the amount of SOL tokens staked. The higher the stake, the greater the chance of being chosen as a leader (block producer).
- Delegation: Token holders can delegate their SOL tokens to validators and receive proportional rewards. This decentralizes the network and strengthens security.
- Slashing: Misconduct such as double-signing or producing invalid blocks leads to a reduction of the stake (slashing). These penalties promote network integrity and stability.

3. Consensus process:

- Transaction validation: Transactions are checked by validators for signatures, account balance, and validity.
- PoH sequence: The leader validator generates a sequence of cryptographic hashes that serves as a timeline. Each transaction thus receives a unique temporal position.
- Block creation: The leader bundles validated transactions into a block according to the PoH sequence.
- Finalization: Other validators verify the blocks and sign them after successful validation. Once a sufficient majority has signed, the block is considered finalized.

The interaction between PoH and PoS allows Solana to process tens of thousands of transactions per second with high energy efficiency and final confirmation within seconds.

S.5 Incentive Mechanisms and Applicable Fees

Solana's economic model is based on staking rewards, transaction fees, and storage fees (rent fees). It creates a balance between economic incentives, decentralization, and long-term sustainability.

Incentive mechanisms:

1. Validators:

- Block rewards: Validators receive rewards in SOL for producing and validating blocks. The size of the reward depends on the share of staked SOL and validator performance.
- Transaction fees: Validators earn the fees from transactions they include in their blocks. Fees are low and predictable, making network usage more accessible.
- Performance dependency: Validators with high uptime and stable infrastructure achieve higher returns; unreliable validators are penalized with lower rewards.

2. Delegators:

- Delegated staking: Token holders can delegate their SOL to validators and receive proportional staking rewards.
- Transparency: All validator information such as commission rates, availability, and performance is publicly accessible, ensuring fair competition.

3. Economic security:

- Slashing: Validators that violate protocol rules lose part of their stake. This protects the network from malicious activity.
- Opportunity cost: Staked tokens are locked and cannot be freely traded. This creates an incentive to behave correctly in order to secure long-term earnings.

Fee structure on the Solana blockchain:

- Transaction fees: Every transaction requires a small fee in SOL. This averages less than 0.01 USD per transaction and remains stable due to high network efficiency.
- Rent fees: For permanent data storage on the blockchain, periodic fees are charged. These promote efficient data management and prevent excessive data accumulation.
- Smart contract fees: The cost of executing smart contracts depends on actual resource consumption (computation, storage, bandwidth) and ensures that users pay only for the resources they use.

S.9 Energy consumption sources and methodologies

A bottom-up approach is used to calculate energy consumption, considering network nodes (validators) as the primary source of energy use.

- Data sources: Public information pages, open-source crawlers, and internally developed analytical tools form the basis of the calculation.
- Hardware profile: The hardware used is determined based on the requirements of the Solana client software.
- Measurement: Energy consumption of devices is measured in certified test laboratories.
- Methodology: To identify all relevant implementations, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used where available.
- Validation: Assumptions regarding hardware, number of participants, and geographic distribution are based on empirical data and are regularly reviewed.
- Precautionary principle: Conservative estimates are used in case of uncertainty to avoid underestimating energy consumption.

S.15 Key energy sources and methodologies

To determine the share of renewable energy, the locations of validators are analyzed using public information sources, open-source crawlers, and internal tools.
When exact location data is not available, comparable reference networks with similar consensus structures are used. Geodata is cross-referenced with datasets from Our World in Data to determine the share of renewable energy sources. The intensity calculation is based on marginal energy consumption per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024).
"Share of electricity generated by renewables – Ember and Energy Institute."
Retrieved from: https://ourworldindata.org/grapher/share-electricity-renewables

S.16 Key GHG sources and methodologies

The calculation of greenhouse gas emissions (GHG) follows the same approach as energy determination, using geolocation of validators. When complete location data is unavailable, comparable networks with similar structures are used as references. GHG intensity is calculated as marginal emissions per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024).
"Carbon intensity of electricity generation – Ember and Energy Institute."
Retrieved from: https://ourworldindata.org/grapher/carbon-intensity-electricity
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10. Ripple

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Ripple	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	299 638.27314	kWh/a
S.10 Renewable energy consumption	33.6598592386	%
S.11 Energy intensity	0.00001	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	100.38024	tCO2e
S.14 GHG intensity	0.00000	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Ripple XRP is represented on the networks Binance Smart Chain (BSC), Klaytn, and Ripple (XRPL).

Binance Smart Chain (BSC):
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 enables fast block times (~3 seconds) and low fees while maintaining security and decentralization.

- Validators: 21 active validators (so-called "Cabinet Members") produce new blocks, validate transactions, and secure the network. Validators must stake a significant amount of BNB and are selected through voting by token holders.
- Delegators: Token holders who do not wish to run validator nodes can delegate their BNB to validators. They receive proportional rewards and contribute to network security.
- Candidates: Nodes that have staked the required amount of BNB and are waiting to be activated as validators.
- Block production: Selected validators produce blocks in a rotation system.
- Finality: Transactions reach finality within a few seconds.

Klaytn:
Klaytn uses a modified Istanbul Byzantine Fault Tolerance (IBFT) algorithm, a variant of Proof of Authority (PoA).
This mechanism enables immediate transaction finality and high performance.

- Governance Council: The network is governed by the Klaytn Governance Council, a global consortium that selects and operates the Consensus Nodes (CNs).

Three-layer node architecture:

- Consensus Nodes (CNs): Validate and produce blocks.
- Proxy Nodes (PNs): Relay data traffic between CNs and the rest of the infrastructure.
- Endpoint Nodes (ENs): Serve as an interface for end users and execute transactions.

Ripple (XRPL):
The XRP Ledger uses the Ripple Protocol Consensus Algorithm (RPCA), which is based on a Federated Byzantine Agreement (FBA) model.
There is no mining or staking; instead, validation is carried out by trusted validators within so-called Unique Node Lists (UNL).

- Consensus is achieved when 80% of the validators in a given UNL agree on a proposal.
- Transactions are ordered and confirmed through proposal, validation, and finalization phases.
- Once the quorum is reached, new ledger entries are finalized and stored irreversibly.

S.5 Incentive Mechanisms and Applicable Fees

Validators on the Binance Smart Chain must stake a substantial amount of BNB to participate in the consensus process. In return, they receive rewards composed of transaction fees and block rewards. Their selection depends on the total amount of BNB staked and the votes received from delegators. Delegators can stake their BNB through validators and receive a proportional share of the rewards, supporting decentralization and overall network security. Candidate nodes that meet the staking requirements but are not yet active remain on standby, ensuring a constant pool of potential validators ready to maintain network continuity.

Economic security within the network is maintained through slashing — where validators can lose part of their staked BNB for misbehavior or inactivity — and through opportunity costs, as staked tokens are locked and unavailable for trading. This creates a direct financial incentive for honest and stable participation in network validation.

Fees on the Binance Smart Chain are designed to remain low and predictable. Transaction fees are paid in BNB and vary slightly with network load and transaction complexity. Validators also receive additional block rewards on top of transaction fees. Cross-chain fees apply for transfers between Binance Chain and BSC, while smart contract fees depend on computational usage (gas consumption) and are also paid in BNB.

On the Klaytn network, validators known as Consensus Nodes (CNs) receive fixed block rewards in KLAY for validation and block creation. Transaction fees are distributed among CNs according to predefined proportions: 10% to the block proposer, 40% to Governance Council members as staking rewards, 30% to the Klaytn Community Fund (KCF) to support decentralized applications and ecosystem projects, and 20% to the Klaytn Foundation Fund (KFF) for long-term network development. All transaction fees are paid in KLAY, calculated based on gas usage and gas price.

On Ripple's XRP Ledger (XRPL), validators do not receive monetary rewards. Their primary motivation lies in maintaining network stability and ensuring reliable infrastructure, especially for financial institutions using the network. Since the XRPL operates without mining, no energy-intensive computational processes are involved. Transaction fees are minimal — measured in fractional XRP units called "drops" — and serve mainly as a spam prevention mechanism. A portion of each fee is permanently destroyed ("burned"), gradually reducing the circulating supply of XRP and contributing to its deflationary nature.

S.9 Energy consumption sources and methodologies

- Energy consumption data is calculated using a bottom-up approach.

- The central factor is the nodes of the networks (BSC, Klaytn, XRPL).
- Hardware assumptions are based on the technical requirements of the respective client software.
- Energy consumption measurements were conducted—where available—in certified test laboratories.
- If multiple implementations exist, allocation is determined using the Functionally Fungible Group Digital Token Identifier (FFG DTI).
- Data is regularly updated based on the Digital Token Identifier Foundation.
- Participants are assumed to act economically rational; in cases of uncertainty, conservative (higher) estimates are used.

S.15 Key energy sources and methodologies

The locations of nodes are determined using public information sources, open-source crawlers, and proprietary crawlers. When no precise geodata is available, reference networks with similar structures and consensus mechanisms are used. Geographical information is cross-referenced with data from Our World in Data (Ember & Energy Institute) to determine the share of renewable energy in the electricity mix. The intensity is calculated as marginal energy consumption per additional transaction. The main data sources are Ember (2025) and the Energy Institute's Statistical Review of World Energy (2024), with data processing by Our World in Data under the dataset "Share of electricity generated by renewables."

S.16 Key GHG sources and methodologies

The calculation of greenhouse gas emissions (GHG) follows the same approach as energy determination, using geolocation of validators. When complete location data is unavailable, comparable networks with similar structures are used as references. GHG intensity is calculated as marginal emissions per additional transaction.
Sources: Ember (2025); Energy Institute – Statistical Review of World Energy (2024).
"Carbon intensity of electricity generation – Ember and Energy Institute."
Retrieved from: https://ourworldindata.org/grapher/carbon-intensity-electricity
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11. Binance Coin

Quantitative information

Field	Value	Unit
S.1 Name	V-Bank AG	/
S.2 Relevant legal entity identifier	529900FB29C36LKTAW50	/
S.3 Name oft he crypto-asset	Binance Coin	/
S.6 Beginning of the period to which the disclosure relates	2024-11-08	/
S.7 End of the period to which the disclosure relates	2025-11-08	/
S.8 Energy consumption	90 228.00000	kWh/a
S.10 Renewable energy consumption	33.1500000000	%
S.11 Energy intensity	0.00000	kWh
S.12 Scope 1 DLT GHG emission - Controlled	0.00000	tCO2e
S.13 Scope 2 DLT GHG emission - Purchased	37.40520	tCO2e
S.14 GHG intensity	0.00000	kgCO2e

Qualitative information

S.4 Consensus Mechanism

Binance Coin operates on the Binance Smart Chain (BSC) and opBNB networks.

Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof of Staked Authority (PoSA), combining elements of Delegated Proof of Stake (DPoS) and Proof of Authority (PoA). This system achieves fast block times of about three seconds, low fees, and an effective balance between decentralization and security.

Main components:

- Validators (“Cabinet Members”) are responsible for block production, transaction validation, and network security. To become a validator, a significant amount of BNB must be staked. There are 21 active validators rotating regularly.
- Delegators are token holders who do not run their own nodes. They can delegate their BNB to validators and receive a share of the transaction and block rewards.
- Candidates are nodes that have staked the required amount of BNB and are waiting for activation as validators.
- Validator selection is based on the staked amount and votes from delegators.
- Blocks are produced in rotation, and transactions reach finality within seconds through the efficient PoSA mechanism.

S.5 Incentive Mechanisms and Applicable Fees

Validators must stake a substantial amount of BNB to participate in consensus and are rewarded through block rewards and transaction fees. Selection depends on the amount of staked BNB and delegator votes. Delegators can stake BNB via validators and receive proportional rewards, contributing to decentralization and network stability. Candidates ensure a continuous pool of validation-ready nodes.

Economic security is maintained through:

- Slashing, which penalizes validators for misconduct or downtime by partially reducing their stake.
- Opportunity cost, as staked BNB remains locked, creating financial motivation for honest participation.

Fee structure on the Binance Smart Chain:

- Transaction fees are low, paid in BNB, and vary slightly based on network load and transaction complexity.
- Block rewards provide additional compensation for validators.
- Cross-chain fees apply to transfers between Binance Chain and BSC.
- Smart contract fees depend on computational demand (gas usage) and are paid in BNB.

S.9 Energy consumption sources and methodologies

Energy consumption is determined through a bottom-up approach, considering network nodes as the main energy consumers. Assumptions are based on empirical data from public sources, open-source crawlers, and internal analyses. Hardware requirements follow the BSC client software specifications, and consumption values were measured in certified test laboratories where available. The Functionally Fungible Group Digital Token Identifier (FFG DTI) is used for implementation classification, and data is regularly updated by the Digital Token Identifier Foundation. Network participants are assumed to act economically rationally, and in cases of uncertainty, conservative (higher) estimates are applied.
Source: bscscan.

S.15 Key energy sources and methodologies

The locations of nodes are determined using public information, open-source crawlers, and internal tools. When no precise geodata is available, reference networks with comparable consensus structures are used. Geographical information is cross-referenced with data from Our World in Data to determine the share of renewable energy. The intensity is calculated as the marginal energy consumption per transaction.
Source: Ember (2025); Energy Institute – Statistical Review of World Energy (2024), processed by Our World in Data, "Share of electricity generated by renewables."

S.16 Key GHG sources and methodologies

Greenhouse gas emissions are calculated based on the geographic distribution of nodes and regional energy mixes. When no location data is available, reference networks with similar consensus structures are used. The results are combined with data from Our World in Data to estimate the CO_2 intensity per additional transaction.
Source: Ember (2025); Energy Institute – Statistical Review of World Energy (2024), "Carbon intensity of electricity generation – Ember and Energy Institute," CC BY 4