BVNK

Sustainability indicators for Polygon POL

Disclosures in accordance with Article 66 (5) MiCAR.

This report was provided by Crypto Risk Metrics.

2025-11-19

Preamble

About the Crypto Asset Service Provider (CASP)

Name of the CASP: System Pay Services (Malta) Limited
Street and number: TRQ SANT'ANDRIJA, Malta
City: SAN GILJAN
Country: Malta
LEI: 984500640Z8ADE893D04

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." The optional information specified in Article 6, par. 8 (a) to (d) DR 2025/422 is not included.

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

Sustainability indicators

Polygon POL

Quantitative information

Field	Value	Unit
S.1 Name	System Pay Services (Malta) Limited	/
S.2 Relevant legal entity identifier	984500640Z8ADE893D04	/
S.3 Name of the crypto-asset	Polygon POL	/
S.6 Beginning of the period to which the disclosure relates	2024-11-19	/
S.7 End of the period to which the disclosure relates	2025-11-19	/
S.8 Energy consumption	97430.88773	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 regulary, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically 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.

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