Mandatory and supplementary information on principal adverse impacts on the climate and other environment-related adverse impacts of the consensus mechanism

N	Field	Ripple
S1	Name	BCASH Ανώνυμη Εταιρεία
S2	Relevant Legal Entity Identifier (LEI)	984500C5A9YK55041179
S3	Name of the crypto-asset	Ripple XRP
S4	Consensus mechanism	Ripple XRP is present on the following networks: Binance Smart Chain, Klaytn, Ripple. Binance Smart Chain (BSC) uses a hybrid consensus mechanism called Proof-of-Staked-Authority (PoSA), which combines elements of Delegated-Proof-of-Stake (DPoS) and Proof-of-Authority (PoA). This method is intended to support fast block times and low fees while maintaining a level of decentralisation and security. Validators are responsible for producing blocks, validating transactions, and maintaining network security. The validator set consists of up to 45 validators, including 21 “Cabinet” validators and 24 “Candidate” validators, selected based on bonded stake. A subset of validators is selected per epoch to participate in block production. Token holders may delegate BNB to validators to support their selection. Delegators share in the rewards generated by validators, providing an economic incentive to participate in staking. Validator candidates are nodes that have staked BNB but are not part of the primary validator subset for a given epoch. They may be selected into the active set based on staking rank and can participate in block production with lower probability. Validators are ranked based on the amount of bonded BNB and are updated periodically. Validators must stake BNB as collateral and may be subject to slashing in cases of misbehaviour, including double-signing, malicious voting, or prolonged downtime. Klaytn employs a modified Istanbul Byzantine Fault Tolerance (IBFT) consensus algorithm, a variant of Proof of Authority (PoA), enabling high performance and immediate transaction finality. Core Components of Klaytn’s Consensus: 1. Modified IBFT Algorithm: Immediate Transaction Finality: Klaytn’s IBFT algorithm ensures that once a block is validated, it is immediately final and cannot be reversed. This guarantees that transactions are quickly settled, providing a secure and efficient user experience. 2. Klaytn Governance Council: Council-Driven Governance: The Klaytn network is governed by the Klaytn Governance Council, a consortium of global organizations responsible for selecting and maintaining Consensus Nodes (CNs). This council-based governance model balances decentralization with performance and ensures transparency in decision-making. Two-Thirds Majority for Finalization: For a block to be finalized, it must receive signatures from more

N	Field	Ripple
		than two-thirds of the council members, ensuring broad consensus and network security. 3. Three-Tiered Node Architecture: Consensus Nodes (CNs): The selected validators responsible for producing and validating blocks. CNs are at the core of the network's security and stability. Proxy Nodes (PNs): Act as intermediaries, relaying data between CNs and the broader network, which helps distribute network traffic and improve accessibility. Endpoint Nodes (ENs): Interface directly with end-users, facilitating transactions, executing smart contracts, and serving as user access points to the Klaytn network. The Ripple blockchain, specifically the XRP Ledger (XRPL), uses a consensus mechanism known as the Ripple Protocol Consensus Algorithm (RPCA). It differs from Proof of Work (PoW) and Proof of Stake (PoS) as it doesn't rely on mining or staking but instead leverages trusted validators in a Federated Byzantine Agreement (FBA) model. Core Concepts: 1. Validators and Unique Node Lists (UNL): Validators are trusted nodes in the network that validate transactions and propose new ledger updates. Each node maintains a list of trusted validators known as its Unique Node List (UNL). Consensus is achieved when 80% of the validators in a node's UNL agree on the validity of a transaction or block. This ensures high levels of security and decentralization. 2. Transaction Ordering and Validation: Transactions are broadcast to validators, and once 80% of the validators agree, the transaction is considered confirmed. Each ledger in the XRPL contains transaction data, and validators ensure the validity and proper ordering of these transactions. Consensus Process: 1. Proposal Phase: Validators propose new transactions to be added to the ledger. 2. Validation Phase: Validators vote on proposed transactions by comparing them to their UNL. Consensus is achieved when 80% of validators agree. 3. Finalization: Once consensus is reached, the transactions are written into the new ledger, making them irreversible and final.
S5	Incentive mechanisms and applicable fees	Ripple XRP is present on the following networks: Binance Smart Chain, Klaytn, Ripple. Validators must self-delegate BNB in order to participate in the validator system. Validator selection is staking-based, and validators that rank highly enough enter the active set and participate in block production and transaction validation. Validators are rewarded from transaction fees collected on the network. When a block is produced, most of the block fee is allocated to the validator that proposed the block. A portion is retained as validator commission, while the remainder is allocated for distribution through the validator credit structure. BNB holders may delegate BNB to validators. This increases the validator's total stake and may improve its position in the validator ranking. Delegators share in the rewards earned by the validator they support, after deduction of the validator's commission. BSC distinguishes between Cabinet, Candidate and Inactive validators. The current model provides that the top 21 validators form the Cabinet, while the validators ranked from 22 to 45 are Candidates. Candidate validators have a smaller chance of producing blocks, but they remain part of the broader validator structure and support network resilience. Validator roles are updated every 24 hours based on the latest staking information. Validators may be penalised for misconduct or poor performance.

N	Field	Ripple
		Slashable events include double signing, malicious fast-finality voting and unavailability. Depending on the violation, consequences may include removal from the validator set, loss of staking rewards and slashing of part of the validator's self-delegated BNB. The staking model therefore creates an economic incentive for validators and delegators to support reliable validator performance. Transaction fees on BSC are paid in BNB and are intended to compensate validators for maintaining the network. BSC is designed as a comparatively low-fee network, and smart-contract transactions and transfers require gas fees in BNB. BSC does not rely on a separate protocol-level block reward. Instead, staking rewards are derived from transaction fees. Most of the block fee is allocated to the proposing validator, then split between validator commission and delegator-linked reward distribution. Part of transaction-fee revenue is collected through the System Reward Contract and used for designated system purposes, including fast-finality rewards. Deploying and interacting with smart contracts on BSC requires payment of gas fees in BNB. These fees depend on the computational resources required and form part of the network's overall fee and validator-incentive model. Klaytn's incentive structure includes block rewards and transaction fees distributed to Consensus Nodes (CNs) and various network funds, fostering network security, sustainability, and community development. Incentive Mechanisms: 1. Rewards for Consensus Nodes (CNs): Fixed Block Rewards: CNs earn fixed rewards in KLAY tokens for validating and producing blocks. This predictable income incentivizes CNs to maintain active participation and secure the network. Transaction Fees: Users pay transaction fees in KLAY tokens, which are collected by the network and distributed among the CNs as additional rewards, further supporting network security and stability. 2. Block Reward Distribution: Governance Council (GC) Reward: GC Block Proposer Reward: 10% of the block reward goes to the specific CN that proposed the block, incentivizing continuous active participation. GC Staking Award: 40% of the block reward is distributed among all Governance Council members who stake KLAY, promoting network security by rewarding staked tokens. Klaytn Community Fund (KCF): 30% of each block reward is allocated to the KCF to support community development, dApp creation, and overall ecosystem growth. Klaytn Foundation Fund (KFF): 20% of the block reward goes to the KFF, providing resources for long-term network sustainability and future development initiatives. 3. Transaction Fees: User Fees for Network Interaction: Users pay fees in KLAY based on gas usage and gas price for transactions. These fees are then distributed to CNs, incentivizing efficient transaction processing and active participation. Applicable Fees: Transaction Fees: Transaction fees on Klaytn are paid in KLAY and calculated based on gas consumption. These fees support network maintenance by compensating validators and fostering economic sustainability. The Ripple XRP blockchain uses a unique incentive structure that differs from traditional Proof of Work (PoW) or Proof of Stake (PoS) systems, focusing on its Ripple Protocol Consensus Algorithm (RPCA). Here's a breakdown of the incentives and fees: Incentive Mechanisms to Secure Transactions: 1. Validators: Validators on the Ripple network are not directly compensated with rewards like in PoW/PoS models. Instead, they are

N	Field	Ripple
		incentivized by the utility and stability of the network, particularly financial institutions that benefit from Ripple's efficiency in cross-border payments. 2. No Mining: Since Ripple does not use mining, it eliminates the need for energy-intensive computations, contributing to fast transaction speeds and scalability. Fees on the Ripple XRP Blockchain: 1. Transaction Fees: Ripple charges minimal transaction fees (typically fractions of an XRP, known as "drops") for each transaction. The purpose of these fees is to prevent network spam and overload. 2. Burn Mechanism: A portion of each transaction fee is burned, meaning it's permanently removed from circulation. This reduces the overall supply of XRP over time, contributing to potential long-term value stability.
S6	Start of the disclosure reference period	2025-08-15
S7	End of the disclosure reference period	2026-08-15
S8	Energy consumption (per year) in kWh/a	456254.76296
S9	Energy consumption sources and methodologies	The energy consumption of this asset is aggregated across multiple components: For the calculation of energy consumptions, the so called 'bottom-up' approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings 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) binance_smart_chain, klaytn is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best

N	Field	Ripple
		effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.
S10	Renewable energy consumption (%)	39.599907432
S11	Energy intensity (kWh per validated transaction)	0.00002
S12	Scope 1 DLT GHG emissions – Controlled (tCO2eq per year)	0.00000
S13	Scope 2 DLT GHG emissions – Purchased (tCO2eq per year)	152.84611
S14	GHG intensity (kg CO2eq per validated transaction)	0.00001
S15	Key energy sources and methodologies	To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction. Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Share of electricity generated by renewables - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables.
S16	Key GHG sources and methodologies	To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction. Ember (2025); Energy Institute - Statistical Review of World Energy (2024) - with major processing by Our World in Data. “Carbon intensity of electricity

N	Field	Ripple
		generation - Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0.

Last review: 17.08.2026