# Methodologies to calculate the proposed mandatory sustainability indicator required by the EU Markets in Crypto-Assets (MiCA) regulation

## This document is relevant for Vertical Studio B.V.'s Vertical AI (VERTAI)

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*CCRI – Crypto Carbon Ratings Institute*

*https://carbon-ratings.com*

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# Introduction and general remarks

The Markets in Crypto-Assets Regulation (MiCA) entered into force in June 2023. Crypto-asset issuers as well as service providers are required to disclose information on the principal adverse impacts on the climate and other environment-related adverse impacts of the consensus mechanism used to issue the respective crypto-asset. The European Securities and Markets Authority (ESMA) has developed the final draft regulatory technical standards related to sustainability indicators, proposing six mandatory climate and other environment-related indicators in their final report on the second consultation package which was released on 3 July 2024. The six indicators cover the areas of energy and GHG emissions. For crypto-assets with an annual energy consumption of less than 500 MWh only the first indicator needs to be reported. This has been confirmed in the final RTS which has been adopted on 17 December 2024. This document prepared by CCRI provides the methodology on how to derive the one mandatory MiCA sustainability indicator specified in the final RTS for Vertical Studio B.V.'s Vertical AI (VERTAI).

On the following pages, we will provide a description to determine the first MiCA sustainability indicator for each type of network that we assess. There are two categories to assess which are relevant for the Vertical AI (VERTAI) which is launched on Ethereum (ETH):

- **Layer 1 networks**: Regular networks with a Proof of Stake (PoS) consensus mechanism or similar (as it is the case for ETH).
- **Tokens**: VERTAI on ETH.

We calculate the MiCA sustainability indicator for the base chain as well as for the token combinations on the respective base chain (i.e., VERTAI on ETH).

# Proposed mandatory MiCA sustainability indicator

The only indicator that needs to be reported for crypto-assets with an annual energy consumption below 500 MWh is the first indicator.

## Indicator 1 – Energy consumption

"Total amount of energy used for the validation of transactions and the maintenance of the integrity of the distributed ledger of transactions, expressed per calendar year"
Format: "*Amount in kilowatt-hours (kWh)*"

*- European Commission, Final RTS, Annex, Table 2*

For the first indicator, the final RTS defines the total energy consumption of the network that is required for the validation of transactions and the maintenance of the integrity of the distributed ledger. It makes the important distinction between transactions and maintenance of the ledger, such that for other sustainability indicators we can discern between the two (not required for this token). For a proper assessment of Indicator 1, one needs to also consider the impact of transactions on the overall energy consumption in the network.

**Proof of Stake:**

For Proof of Stake (PoS) networks, a uniform approach can be applied to generate the total energy consumption. The driver of the total energy consumption in such networks is the node devices in the network, both their count as well as their individual power demand.

"Number of nodes" is a metric that is often readily available. Block explorers or other data providers are able to analyze the P2P network and understand how many entities are connected to the network and provide (depending on the specific algorithm) computational and storage capacity. We include both full nodes and validating nodes, as the regulation explicitly states that an assessment should include "*the maintenance of the integrity of a distributed ledger of transactions by all DLT network nodes*"[1].

In contrast to the number of nodes, the power demand of the individual devices is not available. Some research papers estimate the power demand per node based on common hardware requirements of the network. However, such an approach does not allow for nuanced differentiations between different networks, as it is not possible to deviate average power demands from basic performance metrics of the network, such as transaction throughput. This can be addressed through generating the data by setting up nodes and measuring the energy consumption in real-world scenarios. CCRI has developed a reference hardware set that includes low-tier nodes such as a Raspberry Pi up to server-grade hardware. With this hardware set, CCRI has generated data for an average node of each of these blockchain networks. The individual power demand is enhanced with a marginal energy consumption per transaction that is calculated based on the power demand and transaction throughput of the node during a measurement period. A detailed description of the methodology applied by CCRI is available.[2]

[1] European Commission, Final RTS, p. 4
[2] https://carbon-ratings.com/dl/whitepaper-pos-methods-2023

**Tokens**

To calculate the total energy consumption of a token that exists on a blockchain, one needs to first understand the energy consumption of the underlying network (see previous section). Once this data is readily available, one can allocate the total energy consumption to an individual token by allocating the energy consumption from the base chain for which the token is responsible for the individual token. CCRI uses the hybrid allocation framework[3] developed together with South Pole and under the consultation of PayPal to allocate the share of energy that holdings and transactions from a specific token trigger on the base layer. If a token is live on multiple base chains, we derive the share of energy consumption that needs to be allocated to the token for multiple base chains and aggregate it to the total energy consumption.

[3] https://carbon-ratings.com/accounting-framework-2022

# Overview of data sources

The following data sources were used to generate the indicator for the crypto-assets relevant for VERTAI.

**Network-specific sources:**

- **Ethereum (ETH):**
    - More details at: https://docs.mica.api.carbon-ratings.com/mica/#/currencies

**Token-specific sources:**

Transaction and holding data are collected from the respective blockchain network (i.e., ETH) by analyzing the smart contract address of VERTAI.