

CoinFund

CESR™ Methodology

December 2023

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Introduction

Objective

CESR™ is a [periodic rate](#) that measures the average annualized yield awarded to all eligible validators staking ether on the Ethereum blockchain. CESR is derived from new staking rewards emitted from the Ethereum proof of stake blockchain and transaction fees accrued over a one-day observation period.

CESR is based on CoinFund’s U.S. patent-pending staking rate methodology and is calculated, published, and licensed by CoinDesk Indices.

CoinFund Management LLC (“CoinFund”) (www.coinfund.io) is an SEC-registered investment advisor that was founded in 2015. It serves as the administrator of CESR.

Construction

CESR comprises two components: consensus rewards and priority transaction fees that accrue over a defined observation period.

Consensus rewards

For their participation in the consensus layer, validators receive ETH-denominated rewards that are primarily proportional to the stake of the validator and the number of valid attestations the validator includes in a proposed Ethereum block, while being inversely proportional to the square root of the total active stake across the entire network.

The consensus reward component of CESR is determined by annualizing the average percentage change in balances of all eligible validators over the defined observation period.

Transaction fees

Transaction fees on Ethereum (referred to as “gas fees” and denominated in ETH) comprise **base fees**, which are “burned” (permanently removed from circulation), and **priority fees**, which are paid to validators.

The transaction fee component of CESR is determined by dividing the priority transaction fees accrued during an Observation Period by the total active stake at the beginning of the Observation Period and annualizing the result.

Eligible validators

For each Observation Period (as defined below), eligible validators are all validators that meet all the following requirements:

1. The validator is active for the duration of the Observation Period.¹
2. The validator does not deposit ETH during the Observation Period.²

Observation period

The Observation Period is one day, defined as the period between the Observation Time on day t and the same local time on the previous calendar day, subject to a lag adjustment designed to help ensure epochs included in the Observation Period are finalized.³ Each Observation Period will begin and end by epoch reference as shown in the table below:

For any date t :

Epoch description	Defined as:
First epoch included in the Observation Period for day t	(The last epoch included in the Observation Period for day $t-1^4$) + 1
Last epoch included in the Observation Period for day t	(The active epoch at the Observation Time of day t) - 5

Observation Time

The Observation Time is 13:05 Eastern Time

¹ In addition to other requirements, being active requires the validator maintain a current balance of at least 16 ETH.

² Validators whose current balance has increased by 1 ETH or more during an observation period are deemed to have made a deposit and are therefore ineligible for that observation period. (Deposits of less than 1 ETH are not accepted by the network.)

³ The observation period on days where clocks are changed for daylight saving time will be longer or shorter than other days. On days when clocks are not adjusted and the Ethereum network experiences no disruptions, the observation period aims to capture 225 epochs. The observation period is adjusted by a four-epoch lag to reduce the occurrence of unfinalized epochs in the observation period.

⁴ The first epoch included in the first Observation Period was 146967.

Calculation and distribution

CESR is calculated daily based on the components described above. The calculation formula is:

$$CESR_t = 365 \times \left(\frac{1}{n} \times \sum_1^n \frac{(VB_{n,t} + W_n - VB_{n,t-1})}{VB_{n,t-1}} + \frac{FEES}{STAKED_{t-1}} \right)$$

where;

$VB_{n,t}$ = current balance of eligible validator n at the end of the Observation Period

W_n = partial withdrawals deducted from the current balance of eligible validator n during the Observation Period

$VB_{n,t-1}$ = current balance of eligible validator n at the end of the previous Observation Period⁵

$FEES$ = sum of priority transaction fees accrued to all validators during the Observation Period

$STAKED_{t-1}$ = total ether staked across all validators at the beginning of the Observation Period

As denoted in the formula, the calculation of CESR uses a 365-day convention to annualize the daily consensus rewards and transaction fees. There is no adjustment to this convention for leap years.

Calculation

The daily calculation of CESR begins following the Observation Time and includes all staking rewards received by validators during the Observation Period.

Data publication

CESR is [published daily](#) at 16:00 Eastern Time. Each calendar day, CESR and its underlying components will be available through a CoinDesk API. Please contact info@coindesk-indices.com for details.

Decimal Precision

⁵ Validator balances for the first Observation Period were measured at the conclusion of epoch 147966.

CESR is published via the API as a number with 6 decimal precision.

Launch date

CESR was launched on August 16, 2023. Historical data for CESR, starting on September 16, 2022, is available.

Source of data inputs

Input data used to calculate CESR is sourced from redundant enterprise grade remote procedure call (RPC) Beacon Chain end points. The data is aggregated for all eligible validators over the Observation Period.

Disruption events

Beacon Chain Outage: If there is a partial outage on the Beacon Chain during the Observation Period, CESR continues to be calculated based on the available data in the Observation Period. If there is a full outage for the duration of the Observation Period, CESR will be published with a value of 0.

Forks: Digital asset networks consist of users that run versions of a digital asset protocol software. Different programming language versions of the same protocol are called Clients, which can be individually updated. CoinFund has established a Rates Governance Committee which is responsible for determining the appropriate actions to take during any future fork of the Ethereum blockchain.

Index cessation events: If the number of eligible validators fall below 25,000, the Rates Governance Committee will determine if CESR should be discontinued and, if discontinued, the Rates Governance Committee will publicize an announcement including the cessation date.

Governance

As stated above, CESR is governed by CoinFund's Rates Governance Committee (the "Committee") which is tasked to discuss compliance issues, identify existing, emerging and potential risks and implement policies to mitigate risks. The Committee will be responsible for:

1. **Setting and Adjusting Rates:** The Committee shall establish the methodology for CESR and periodically review and adjust it as necessary to maintain stability and achieve the desired benchmark goals. It is tasked with adjudicating

recalculations and restatements in accordance with published methodologies. CESR's restatement policy may be found [here](#).

2. **Monitoring and Analysis:** The Committee shall regularly monitor and analyze CESR, taking into consideration relevant factors such as market conditions, network performance, and community sentiment.
3. **Proposal Evaluation:** The Committee shall evaluate proposals related to changes in CESR submitted by stakeholders or other relevant parties, as well as in connection with changes in relevant and applicable regulation. Evaluation criteria may include technical feasibility, economic impact, and alignment with the long-term goals of the benchmark.
4. **Governance and Decision-Making:** The Committee shall facilitate the governance process related to CESR. It shall oversee decision-making procedures for any potential future changes to the CESR's methodology including adjudicating forks, index cessation events, and ensuring proper operational risk management controls are in effect.
5. **Communication and Transparency:** The Committee shall maintain open and transparent communication channels with stakeholders, providing regular updates on rate adjustments to CESR, proposal evaluations, and any other relevant information. It shall also actively seek constructive input from the community to foster a collaborative and inclusive governance process, and ensure that complaints, if any, are handled in accordance with the CESR's methodology processes.

Further Information

For information on CoinFund, please visit our website www.coinfund.io or email rates@coinfund.io

For information on CoinDesk Indices, please visit www.coindeskmarkets.com or email sales@coindesk-indices.com

For information on CESR, please visit www.coindesk.com/indices/ether/cesr

CoinFund's Rates Governance Committee complaints policy can be found [here](#).

Appendix A: Methodology Changes

Date	Change	Description	Impact
23 December 2023	Observation time changed to 13:05 Eastern time from 13:00 Eastern time daily.	Slight Beacon Chain and system latency resulted in single epoch inconsistencies during the observation period. By making this change, CESR will more consistently include the standard 225 epochs during the observation period	Not material

Disclaimers

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