

Staking yield math: where ETH staking returns come from

An ETH staking rate adds new issuance, transaction tips and MEV payments, then subtracts penalties and fees. Issuance shrinks as more ETH is staked.

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1. How to read it / Where it misleads

Staking yield measures the yearly return on ETH locked to run Ethereum's validators, expressed as a percentage of the stake. It comes from three streams: new ETH issued by the protocol as rewards, the priority fees users attach to transactions, and payments from block builders for the right to order transactions, known as MEV. Penalties and any staking provider's fee come off the top.

The figure has limits. It is counted in ETH, not dollars, so a positive yield says nothing about a gain in value. It changes with the total amount staked, because the protocol's issuance per validator falls as more ETH joins. Providers report different things: some a trailing average, some the latest period, some before fees and some after.

Issuance also cuts both ways. New ETH paid to stakers enlarges the total supply, so part of a nominal yield only offsets the dilution that holders who do not stake absorb in full.

This explains how a metric is calculated. It is not a signal, forecast or recommendation, and past readings do not predict prices. Le Coin does not publish live readings of this metric.

2. The formula

The consensus rules set the issuance stream. In the Altair specification, the base reward per unit of stake is $\text{EFFECTIVE_BALANCE_INCREMENT} \times \text{BASE_REWARD_FACTOR} \div \text{the integer square root of total active balance}$, and a validator's base reward is that amount times its number of increments (source 1).

$\text{BASE_REWARD_FACTOR}$ is 64 (source 2). The specification adds that "on average an optimally performing validator earns one base reward per epoch" (source 1). Rewards are split by fixed weights out of 64 for timely votes, sync committee work and block proposals (source 1).

Ethereum.org states the consequence: as the number of validators grows, total issuance rises with its square root, while the base reward per validator falls with one over its square root (source 3).

Fees come from EIP-1559. Users pay a base fee, which is burned, plus a priority fee, which goes to the block producer: a miner in the EIP's 2019 wording (source 4) and a validator today, since validators now propose blocks (source 3). MEV payments are explained in Le Coin's [MEV basics](#) guide.

Le Coin's restatement:

$\text{Staking APR} \approx (\text{Issuance} + \text{Priority fees} + \text{MEV} - \text{Penalties}) \div \text{Stake} \times (1 - \text{Provider fee})$

$\text{Change in share of supply} \approx (1 + \text{APR}) \div (1 + \text{Supply growth}) - 1$

3. Example data

The figures below are invented to show the arithmetic. They describe no real validator or period.

Line	Example data
Stake	32 ETH for one year
Issuance rewards	0.80 ETH
Priority fees	0.15 ETH
MEV payments	0.10 ETH
Penalties	0.01 ETH
Net rewards	1.04 ETH, or 3.25% APR
Through a pool charging 10%	2.93% APR
Total ETH supply growth that year	0.5%
Change in share of supply	$1.0293 \div 1.005 - 1 \approx 2.42\%$

The square root also matters. In Le Coin's arithmetic from the specification, if total stake quadruples, the square root doubles, so each validator's issuance rate halves, while total issuance doubles.

4. Who publishes it and how definitions differ

Lido publishes a realized, pool-level APR from changes in its share rate between oracle reports, using this formula from its documentation (source 5):

$$\text{userAPR} = \text{secondsInYear} * ((\text{postShareRate} - \text{preShareRate}) / \text{preShareRate}) / \text{timeElapsed}$$

Its event data notes the protocol fee as "fee part included in postTotalShares," so the rate reflects Lido's fee. It also offers a figure "based on Simple Moving Average of APR values over a period of 7 days" (source 5).

Ethereum.org's staking page displays a network-wide "Current APR" without stating its method on that page (source 6). Its rewards page explains the reward formula in the older Phase 0 form, with `base_rewards_per_epoch` set at 4 (source 3); the Altair specification removed that constant in favor of increment-based accounting (source 1).

Rated publishes an APR method for groups of validators, such as all those run by one operator. Its calculation takes "CL+EL rewards," meaning consensus-layer and execution-layer rewards, over a rolling window of 1, 7 or 30 days or all-time, and divides them by active stake (source 7):

$$\text{APR\%} = (\text{total rewards in ETH} / \text{active_stake}) \times (365 / \text{time_period}) \times 100$$

Rated counts only "validators that have been active for the whole of the query window," caps its all-time window at 90 days, and says the calculation does not yet distinguish validators funded by reinvested rewards from those funded by outside stakers (source 7).

In Le Coin's view, the two methods measure different things. Lido's is a pool token's realized, after-fee rate from its share price; Rated's is a validator group's rewards over its active stake. A staking rate should be read with its source.

5. Where the terms come from

The reward formula is set out in Ethereum's consensus specifications, written by the specification's contributors rather than a single named author (sources 1 and 2). No originator of staking yield as a metric is credited.

6. What it means

In Le Coin's view, an ETH staking rate is a blend of protocol issuance and market-driven income, measured in ETH. Issuance falls as staking grows; fees and MEV move with network demand.

Sources

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