

# Separating MEV and Staking Rewards



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# It takes a village...

- h/t Barnabé for being a great KOL.<sup>1,2</sup>
- h/t Julian, Thomas, Francesco, et al. on extensive inclusion list work.<sup>3,4</sup>
- h/t Terence & Potuz on relentless consensus specification work.<sup>5,6</sup>
- h/t Elijah, Max, & Mallesh for talking about concurrent proposers for over a year already.<sup>7,8</sup>



<sup>1</sup><https://efdn.notion.site/Block-construction-session-bd611621250f45948eff05fcf6a34067>

<sup>2</sup><https://mirror.xyz/barnabe.eth/QJ6W0mmmyOwjec-2zuH6lZb0iEl2aYFB9gE-LHWIMzjQ>

<sup>3</sup><https://ethresear.ch/t/fork-choice-enforced-inclusion-lists-focil-a-simple-committee-based-inclusion-list-proposal/19870>

<sup>4</sup><https://ethresear.ch/t/uncrowdable-inclusion-lists-the-tension-between-chain-neutrality-preconfirmations-and-proposer-commitments/19372>

<sup>5</sup><https://eips.ethereum.org/EIPS/eip-7732>

<sup>6</sup><https://ethresear.ch/t/builder-bidding-behaviors-in-epbs/20129>

<sup>7</sup><https://arxiv.org/pdf/2301.13321.pdf>

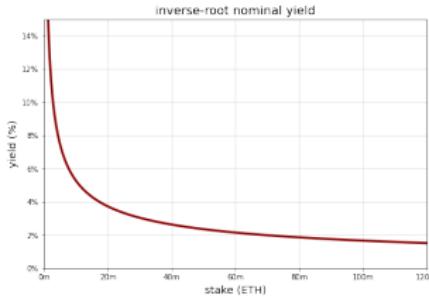
<sup>8</sup><https://ethresear.ch/t/multiplicity-a-gadget-for-multiple-concurrent-block-proposers/14962>

# Validator rewards taxonomy

## Issuance

- Issuance rewards incentivize validators to participate in consensus by creating new tokens (inflation).
- The amount of yield (interest) paid depends on the amount of stake,

$$\text{yield} = \frac{2.6 \cdot 64}{\sqrt{\text{staked ETH}}}.$$



- These rewards are mostly from voting for the correct block.

<https://notes.ethereum.org/@mikeneuder/subsol>.

# Validator rewards taxonomy

## Transaction fees

- Transaction fees are the amount users pay to interact with Ethereum.
- Fees are split into two parts.
  1. *Base fee* - dynamically updated based on current market demand.
  2. *Priority fee* – a tip to the block producer for inclusion.



- Priority fees have extreme variability.

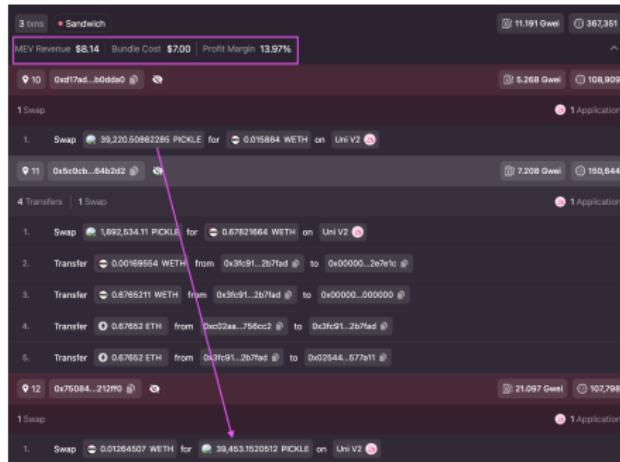
5,126,816 (17.09%   -66%)	30,000,000	5.82 Gwei	0.01478 ETH
29,866,784 (99.56%   +99%)	30,000,000	5.17 Gwei	0.42494 ETH

<https://www.blocknative.com/gas-estimator>.

# Validator rewards taxonomy

## MEV

- *Maximal Extractable Value* (abbr. MEV) is the value created from the ability to reorder and insert transactions.



- Other MEV types: atomic and non-atomic arbitrage, liquidations.
- MEV is variable in market conditions and builder sophistication.

<https://sorellalabs.xyz/dashboard>.

# Validator rewards taxonomy

## Summary



- *Issuance* is stable and not very gameable.
- *Tips* are highly variable both in market conditions. *MEV* is variable both in market conditions and the sophistication of the block producer.

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<https://ultrasound.money/>.

<https://mevboost.pics/>.

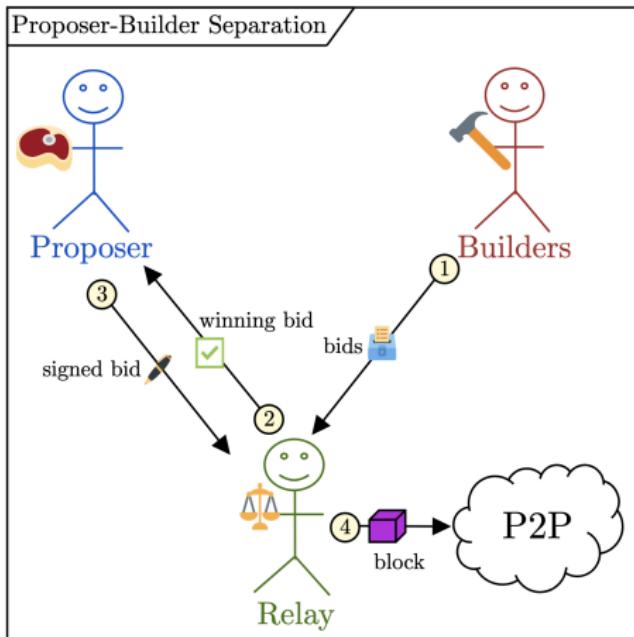
# Mechanism toolkit

## Motivation for change

- There are many centralizing forces around the extraction of MEV. We focus on the following 2:
  1. Timing games, latency, and colocation.
  2. High reward variability is bad for the risk-averse (and infrequently sampled) solo-staker.

# Mechanism toolkit

Aside: Proposer-Builder Separation today.

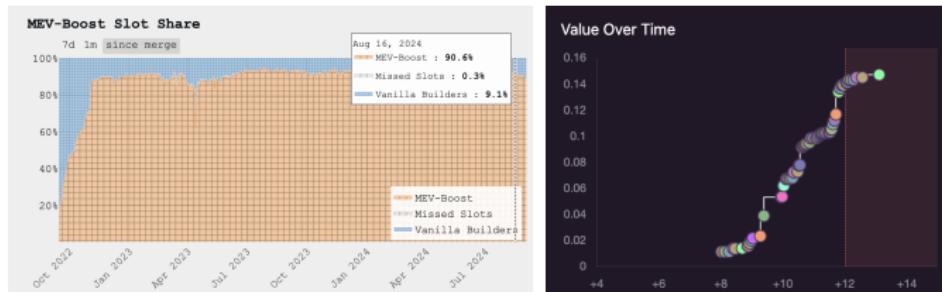


- ① **The builder bids** in the auction through the relay.

# Mechanism toolkit

Aside: Proposer-Builder Separation today.

- The relay brokers the fair exchange to allow *all* validators to participate in the MEV market if they want to...
- and most want to...
- but there are still games to be played.

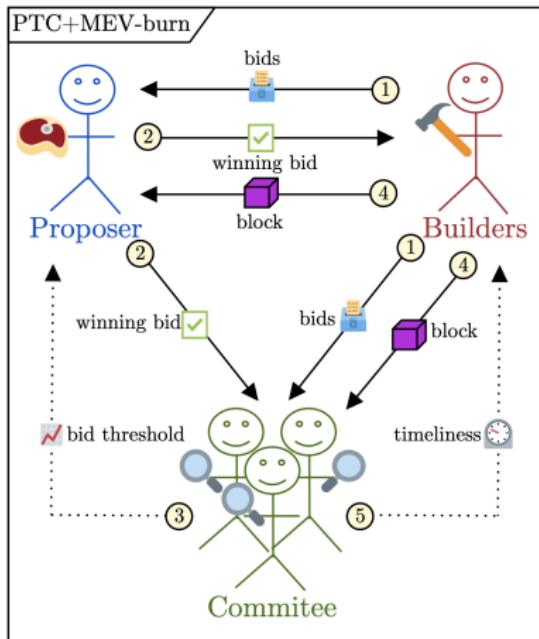


<https://mevboost.pics/>.

<https://sorellalabs.xyz/dashboard/>.

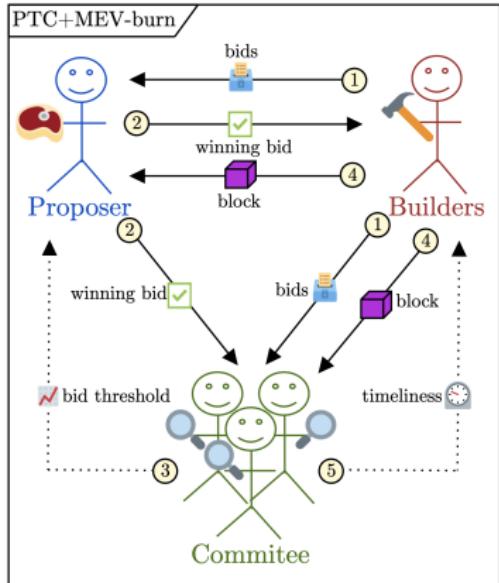
# Mechanism toolkit

## Payload-Timeliness Committee + MEV-burn



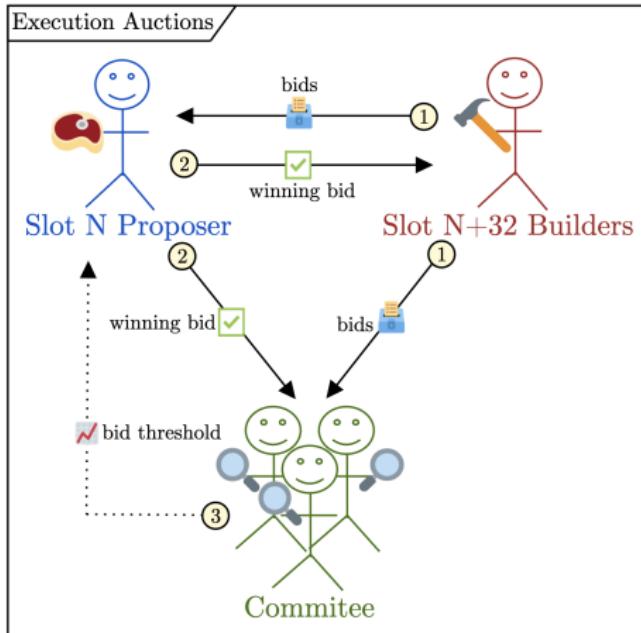
- ① **The builder bids** in the auction by sending (block header, bid value) pairs to the proposer and the committee members.

# MEV-burn analysis



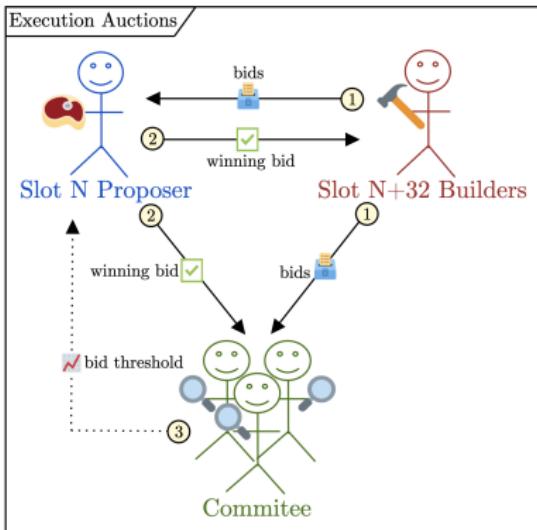
- MEV-burn allows for in-protocol fair exchange between builder and proposer (no relay as the trusted third party).
- MEV-burn aims to address high reward variability by burning most of the MEV rewards.
- MEV-burn does not address timing games and latency advantages.

# Execution Auctions



- ① **The builder bids** in the auction by sending bid value to the proposer and the committee members.

# Execution Auctions analysis



- Execution Auctions solve in-protocol fair exchange between builder and proposer.
- Execution Auctions aim to reduce timing games (and thus validator sophistication) inherent from the “value-in-flight” problem.
- Execution Auctions also aim to reduce validator rewards variability.
- Execution Auctions suffer from a much higher risk of multi-slot MEV and reduced builder competition.<sup>1</sup>

<sup>1</sup> <https://arxiv.org/pdf/2408.03116>

# Decentralization is the means; neutrality is the end

## The bigger picture of Ethereum design



- “*Block production is centralized, block validation is trustless and highly decentralized, and censorship is still prevented.*” – Vitalik<sup>1</sup>
  - *block production is centralized*
    - ⇒ **design goal #1: encourage builder competition.**
    - ⇒ *block validation is trustless and highly decentralized*
    - ⇒ **design goal #2: limit the value of validator<sup>2</sup> sophistication.**
  - *censorship is prevented*
    - ⇒ **design goal #3: preserve the neutrality of block space.**

<sup>1</sup><https://vitalik.eth.limo/general/2021/12/06/endgame.html>

<sup>2</sup>N.B., I notationally abuse the word validator.

# Decentralization is the means; neutrality is the end

Removing arbitrary transaction exclusion



- Block builders have outsized influence in the protocol because they determine which transactions are included and in what order.
- *How can we rely on the decentralized validator set?*
- *Idea #1:* Can validators provide a “block template” that the builder must follow?<sup>1</sup>
- *Idea #2:* Can multiple validators co-create this template?<sup>2</sup>

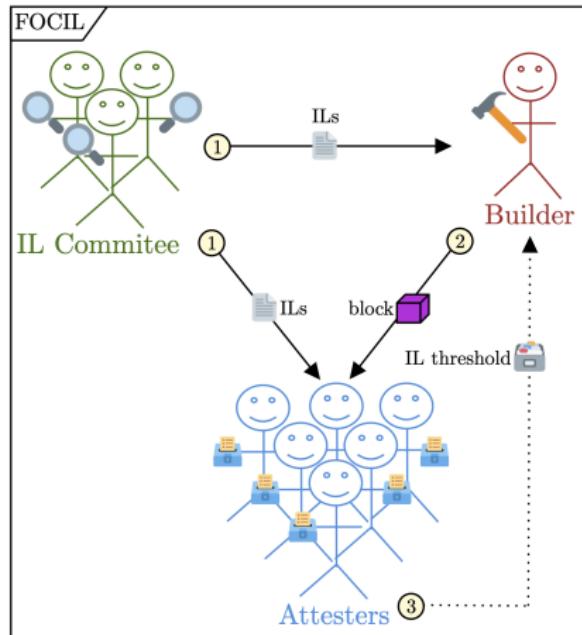
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<sup>1</sup><https://ethresear.ch/t/no-free-lunch-a-new-inclusion-list-design/16389>

<sup>2</sup><https://ethresear.ch/t/fork-choice-enforced-inclusion-lists-focil-a-simple-committee-based-inclusion-list-proposal/19870>

# Decentralization is the means; neutrality is the end

Fork-choice enforced inclusion lists



- ① **The IL committee publishes** their inclusion lists to the builder and the attestors.

# Decentralization is the means; neutrality is the end

Ethereum's main export: property rights

- Personal take (caveat emptor): the most important and differentiating element of Ethereum is the digital property rights it exports.
- *The core promise:* anyone can store, send, and receive ETH from anywhere on earth – a permissionless store of value.

thanks :-)



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<https://ethresear.ch/t/mechan-stein-alt-franken-ism/20321>