The Ethereum Merge: Why It's a Game Changer and What It Means for Users

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On the 15th of September, at 06:43 am UTC, the Ethereum blockchain upgraded through a process known as 'the Merge'. The Merge refers to the combining of the Ethereum mainnet with the Beacon Chain to form one blockchain.

Over 41,000 people tuned in live to witness Ethereum switch to a proof of stake (PoS) consensus mechanism. With multiple teams coordinating across time zones and continents, the Merge represents one of the most ambitious open-source software projects to date. While commemorative POAPs and celebratory NFTs were processed through the new consensus layer, the Merge itself was imperceptible to most users.

But what has actually changed for Ethereum? Why was the Merge considered necessary and what does all this mean for users and creators on the network? In this piece, we spill the tea on all of the above.

From Genesis to the Merge: An Evolving Roadmap

The eventual transition away from proof of work (PoW) to PoS was first outlined in the Ethereum whitepaper. PoW offered low barriers to entry for early validators. With a diverse base of miners, Ethereum guaranteed the network's decentralization. The technology that sustained PoW consensus

Ethereum, the road to get there has changed over the years. Navigating an open-source, decentralized project of this scale and complexity resulted in numerous delays.

The first step in preparing for the Merge was to launch a parallel blockchain upon which PoS could be developed. The Beacon Chain was released for this purpose in December 2020. The job of the Beacon Chain, prior to the Merge, was to focus on confirming early validator accounts and build consensus. All transactions, as well as account details and block issuance, continued to be processed through the Ethereum mainnet execution layer.

But before a date – or, more precisely a block height – for the Merge could be set, several conditions had to be met. In the interest of guaranteeing the network's security and decentralization, 16,384 stakers had to be validated on the Beacon Chain. The upgrade also had to undergo rigorous testing. Such tests included trialing the Merge on twenty shadow forks as well as running dress rehearsals on testnets such as Ropsten, Sepolia, and Goerli.

Proof of Decarbonization: How Ethereum Went Green

Home users may not have noticed any changes in the network. Yet, estimates suggest that the transition to PoS is responsible for a 0.2% reduction in annual global carbon emissions. Before the Merge, the Ethereum blockchain was responsible for annual carbon emissions comparable to those of Finland. Ethereum co-founder, Joseph Lubin, described the impact of the Merge "as likely the biggest decarbonization effort of any industry in history."

From energy use to token staking: PoW vs PoS

This win for the climate is down to the change in Ethereum's consensus mechanism and the way in which blocks are issued. Under PoW, 'miners' compete to solve cryptographic puzzles. Those that win earn the opportunity to validate a block and are rewarded in the native token. While secure and decentralized, the process of mining is energy intensive.

To become eligible as a validator under PoS, users must stake a set amount of the native token in a smart contract - 32ETH in the case of the Ethereum network. The winner is then selected at random to propose a block and receive protocol rewards. Replacing the computationally demanding process of mining with staking has resulted in a 99.9% reduction in Ethereum's energy consumption.

Also reduced is the rate of ether (ETH) issuance. In a phenomenon that the Ethereum community has

pressure on the cryptocurrency. In current conditions, Ethereum is considered a deflationary asset from just under 15 gwei and above.

What's Next for Ethereum?

Now joining the ranks of Polygon and Tezos as an 'Environmental Social and Governance (ESG) compliant' chain, the Merge is a major step in Ethereum's ongoing evolution. That said, the upgrade is less about applying finishing touches and more about laying the groundwork for future changes. Transactions are now processed fractionally faster than pre-Merge. But it is not expected that users will notice much of a difference. In the same way, gas prices are unlikely to see much, if any, reduction.

The change in consensus mechanism from PoW to PoS does not address issues of throughput or network capacity. But it does set the stage for an upgrade that will.

Referred to as 'the Surge', this next upgrade features a sharding mechanism. Paving the way for danksharding, it will also incentivize a shift of the application layer onto L2s. The vision doesn't stop there. A further four upgrades are planned over the years following the Surge – namely, the Verge, the Purge, and the Splurge. Amongst other objectives, these stages aim to tackle data efficiency and historical overload.

Conclusion

The Merge marks a historic moment for Web3. The switch from PoW to PoS represents one of the most significant developments in efforts to decarbonize global economies. It also opens the door to institutional investors with ESG concerns.

The Merge may be the first in a set of five upgrades. But Ethereum is already delivering on an ambitious roadmap – one that upholds its founding principles while adapting to an evolving Web3 landscape.

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