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Ethereum Merge (Ether 2.0) Explained: Everything You Need to Know And Why It Matters

Ethereum Merge (Ether 2.0) date is finally coming! Read on to find out why The Merge upgrade to Proof-to-Stake matters for everyone.

[Ethereum](#) will soon adopt a [proof-of-stake](#) (PoS) consensus mechanism, which some say will reduce its carbon emissions by more than 99%.

The Ethereum Merge is significant, and not only for people who own cryptocurrencies. In the works in one form or another since 2014, the long-delayed Merge will see the second largest blockchain reduce its carbon emissions significantly. If the Merge is successful, ethereum's electricity demand will drop by more than 99%.

That is of huge consequence. Cryptocurrency critics argue that coins like bitcoin and [ether](#) are useless and consume a lot of electricity. The first point is polarizing and subjective, but the second is unequivocally true. In an era when more people than ever see climate change mitigation as a top social priority, the carbon emissions of bitcoin and ethereum are too conspicuous to ignore.

In the Merge, ethereum will use a system known as proof of stake, which has been planned since before the blockchain was created in 2014. It has been delayed multiple times due to its technical complexity, and the increasingly large amount of money at risk. [The Merge](#) is part of what used to be called "ether 2.0," a series of upgrades to reshape the blockchain's foundations, with a target deadline of Mid-September.

"We've been working on proof of stake for about seven years now," ethereum co-founder Vitalik Buterin said at the Eth Shanghai conference in March, "but finally all of that work is coming together."

Here's everything you need to know to make sense of the big day.

Why is crypto harmful to the environment?

To understand the Merge, you first need to understand the role of cryptocurrency miners.

Let's say you want to mine cryptocurrencies. You need to set up a powerful computer — a mining rig — to run software that attempts to solve complex cryptographic puzzles. Your rig competes with hundreds of thousands of miners around the world trying to solve the same puzzle. If your computer deciphers the cryptography first, you win the right to “validate” a block — that is, add new data to the blockchain. Doing so gives you a reward: Bitcoin miners get 6.25 bitcoin (\$129,000) for each block they verify, while ethereum miners get 2 ether (\$2,400) plus [gas](#), which are what users pay on each transaction (which can be huge).

It takes a powerful computer to get a chance in this race, and people typically set up warehouses full of rigs for this purpose. This system is called “[proof-of-work](#),” and it's how both bitcoin and ethereum blockchains work. The key is that it enables the blockchain to be decentralized and secure at the same time.

“It's what's called the civil resistance mechanism,” said Jon Charbonneau, an analyst at Delphi Digital. Every blockchain needs to run on a scarce resource, Charbonneau explained, one that bad actors can't monopolize. For proof-of-work blockchains, that resource is electricity - in the form of the power needed to run a mining operation.

To outrun ethereum right now, a bad actor would need to control 51% of the network's power. The network consists of hundreds of thousands of computers around the world, which means bad guys would need to control 51% of the power in this vast mining pool. Doing so would cost billions of dollars.

The system is secure. While scams and hacks are common in crypto, neither the bitcoin nor ethereum blockchains themselves have been compromised in the past. However, the downside is obvious. As cryptographic puzzles become more complex and more miners race to solve them, energy consumption skyrockets.



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How much energy does crypto consume?

Lots and lots. Bitcoin is estimated to consume about 150 terawatt hours per year, more than the electricity used by 45 million people in Argentina. Ethereum is closer to Switzerland's 9 million citizens, eating up about 62 million terawatt hours.

Much of that energy comes from renewable sources. According to the Bitcoin Mining Council, about 57% of the energy used to mine bitcoin comes from renewable sources. (BMC relies on self reporting among its members.) This is not out of climate conscientiousness but self interest: Renewable energy is cheap, so [mining](#) operations are often set up near wind, solar or hydroelectric farms.

Nonetheless, the carbon footprint is still extensive. It is estimated that Ethereum emits carbon dioxide at a similar scale to Denmark.

How will Ethereum Merge improve such issue?

The Merge will see ethereum move completely away from proof of work, the energy-intensive system it currently uses, in favor of proof of stake.

In crypto space, "[staking](#)" refers to depositing cryptocurrency to yield interest. For example, the creators of the [terraUSD \(UST\)](#) stablecoin offered customers 19% interest on staked TerraUSD: You could put in \$10,000 and take out \$11,900 after a year (until it imploded).

When proof of stake takes effect, miners will no longer need to solve cryptographic puzzles to verify new blocks. Instead, they'll deposit ether tokens into a pool. Imagine that each of these tokens is a lottery ticket: If your token number is called, you win the right to verify the next block and be rewarded accordingly.

It's still an expensive enterprise. Prospective block verifiers - who will be known as "validators" instead of miners - need to stake at least 32 ether (\$48,500) to be eligible. This system sees punters put up raw capital, rather than power, to validate blocks. Whereas a bad actor needs 51% of a network's power to outperform a proof-of-work system, they'd need 51% of the total staked ether to outperform the proof-of-stake system.

Since cryptographic puzzles will no longer be part of the system, electricity expenditure are estimated to drop by 99.65%, according to the Ethereum Foundation.



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Why is it called 'the Merge' of Ethereum?

Ethereum will transition from proof of work to proof of stake by merging two blockchains.

The ethereum blockchain that people use is known as "mainnet," as distinguished from various "testnet" blockchains that are used only by developers. In December 2020, ethereum developers created a new network called the beacon chain. The beacon chain is essentially the new ethereum.

The beacon chain is a proof-of-stake chain that has been operating in isolation since its creation 18 months ago. Validators have been adding blocks to the chain, but these blocks have not contained any data or transactions. Essentially, it has been subjected to various stress tests ahead of the big day.

The Merge will see the data held on ethereum's mainnet move to the beacon chain, which will then become the prime blockchain on ethereum network. Prior to the merger, ethereum developers have been stress testing the new blockchain by running data and transactions through it on various ethereum testnets.

"If you talk to the ethereum developers, and I have, they would tell you that if proof-of-work mining

got banned overnight, they could do the Merge right now and it'd be fine," Charbonneau said. He added that much of the ironing out developers are currently focused on pertains to applications and clients built on top of ethereum, rather than the proof-of-stake execution itself. "If they did the Merge today, it would be buggy for a few months ... but the protocol itself, there's no worries [among the developers]."

Is there no risk at all?

Absolutely not. Critics of ethereum — typically bitcoin enthusiasts — compare the merge to changing the engine of an airplane in the middle of a passenger flight. At stake is not just the airplane, but also the \$183 billion worth of ether in circulation.

On a technical level, the new blockchain could have many unforeseen bugs. Solana, another proof-of-stake blockchain, has suffered several complete outages this year. Solana and ethereum differ in that solana's fees are minuscule, which means it's easier for bots to overwhelm the blockchain, but technical difficulties are not impossible.

Critics also wonder if proof of stake will be as secure as proof of work. Charbonneau reckons it could be more secure because of a function called "slashing" - essentially, validators can have their network access revoked, and their staked ether burned, if they're found to have acted maliciously.

"Say someone 51% attacks bitcoin today, you can't really do anything," Charbonneau said. "They have all the miners and they could just keep attacking you. ... With proof of stake, it's really simple. If you attack the network, it's provable and we just slash you, and then your money's gone."

"You get one bullet, and then that's it. Then you can't do it again."



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Will Ethereum Merge lead to a higher Ether price?

Ether has fallen about 60% since the beginning of the year, and many are hoping the Merge will revive its price. This has been a hotly debated topic within crypto circles in recent months, and no one knows for sure what the Merge will do the price of ether.

There are two main reasons people predict ether's price will spike after the Merge. First is the idea that ethereum fractioning its carbon footprint will make it easier for large companies to both invest in ether and create ethereum applications.

"The reality is, if you take the environmental caring part away, there are a lot of people who are not going to use it [ethereum] and not want to invest in it just based on ESG reasons," Charbonneau said, referring to environmental, social and corporate governance standards for ethical investing. "There are a lot of tech companies that have openly said, 'we are not going to do anything until after the Merge.'"

The second argument people make is a little more technical. Mining ethereum is expensive; as electricity prices have risen and crypto prices have fallen, even successful mining operations have begun to lose money. To offset costs, miners typically sell most of the cryptocurrency they earn from mining. That creates millions of dollars of sell pressure every day as miners sell off their ether. Once ethereum becomes proof of stake, miners (or "validators" as they'll be called) will not have to sell all the ether they earn, since validating blocks is so much cheaper than mining them through proof of work cryptography.

However, others argue that the Merge is already priced in. It's been in the works for seven years and many big-time investors, the argument goes, have put money into ethereum with the expectation that the Merge would succeed.

When is the big day?

The Merge is expected to take place in September. In a recent conference call among ethereum developers, the Ethereum Foundation's Tim Beiko cited [September 19](#) as a tentative date.

"This merge timeline isn't final, but it's extremely exciting to see it coming together," another developer tweeted. "Please regard this as a planning timeline."

The announcement did see ether's price rise sharply, to \$1,600. That's far from its high of \$4,800, but encouraging news for ethereum enthusiasts in a frozen crypto winter.

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