Bitcoin Halving: What You Need to Know

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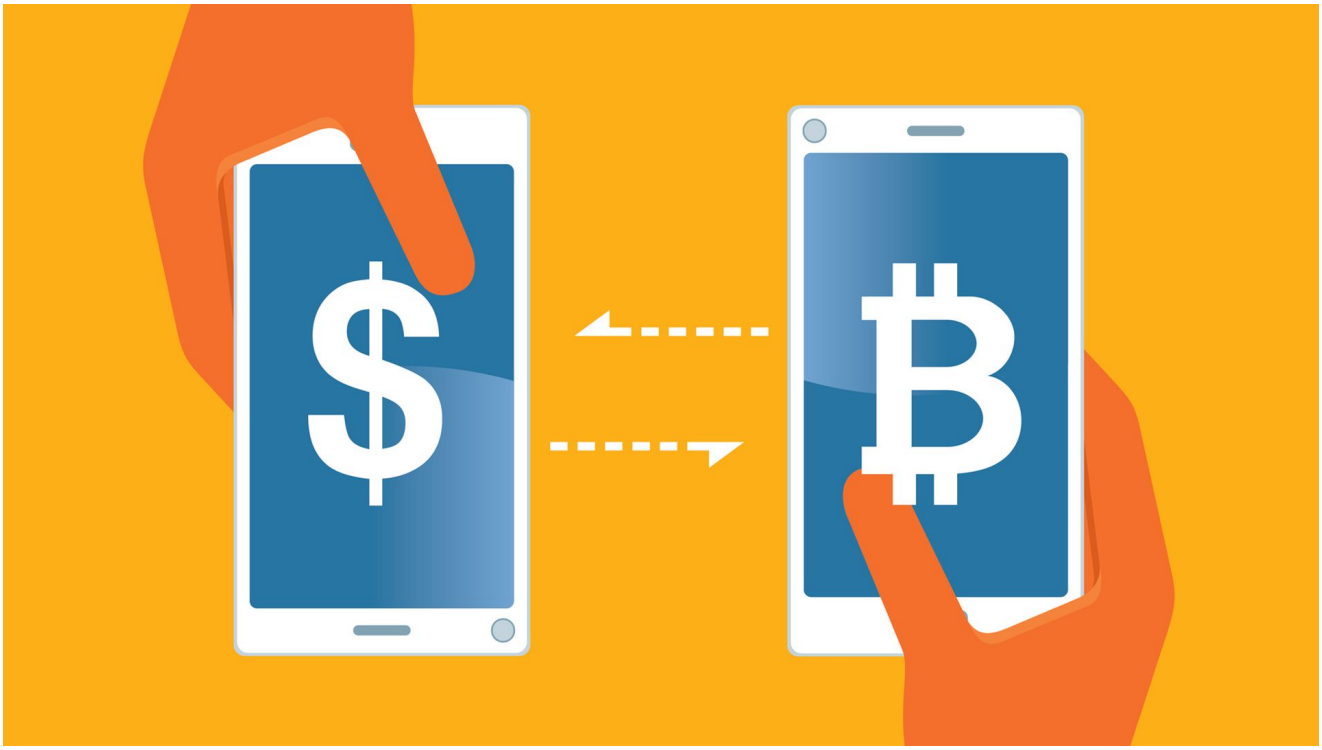

One of the most pivotal events on Bitcoin's blockchain is the halving, when the supply of new bitcoins is cut in half. Each halving reduces the rate of inflation, thereby creating upwards pressure on the Bitcoin price.

As of 2022, Bitcoin miners are awarded 6.25 bitcoins for each block they successfully mine. The next halving will occur in 2024, when the block reward will fall to 3.125. Over time, the impact of each halving will diminish as the block reward approaches zero.

Key Takeaways

- A Bitcoin halving event is when the reward for mining Bitcoin transactions is cut in half.
- This event also cuts in half Bitcoin's inflation rate and the rate at which new bitcoins enter circulation.
- Previous halvings have correlated with intense boom and bust cycles that have ended with higher prices than prior to the event.
- Bitcoin last halved on May 11, 2020, around 3 p.m. EST, resulting in a block reward of 6.25 BTC.
- The final halving will be in 2140 when the number of bitcoins in existence will reach the maximum supply of 21 million.

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Bitcoin Network

To explain what a Bitcoin halving is, we must first understand a bit about how the Bitcoin network operates.

Bitcoin's underlying technology, blockchain, basically consists of a collection of computers (or nodes) that run Bitcoin's software and contain a partial or complete history of transactions occurring on its network. Each full node, or a node containing the entire history of transactions on Bitcoin, is responsible for approving or rejecting a transaction in Bitcoin's network. To do that, the node conducts a series of checks to ensure that the transaction is valid. These include ensuring that the transaction contains the correct validation parameters, such as nonces, and does not exceed the required length.

Each transaction is approved individually. It is said to occur only after all the transactions contained in a block are approved. After approval, the transaction is appended to the existing blockchain and broadcast to other nodes.

More computers (or nodes) added to the blockchain increase its stability and security. There are 14,201 nodes estimated to be running Bitcoin's code as of August 2022.1 Although anyone can participate in Bitcoin's network as a node, as long as they have enough storage to download the entire blockchain and its history of transactions, not all of them are miners.

Bitcoin Mining

Bitcoin mining is the process by which people use their computers to participate in Bitcoin's blockchain network as a transaction processor and validator. Bitcoin uses a system called proof of work (PoW). This means that miners must prove they have put forth effort in processing transactions to be rewarded. This effort includes the time and energy it takes to run the computer hardware and solve complex equations.

The term mining is not used in a literal sense but as a reference to the way precious metals are gathered. Bitcoin miners solve mathematical problems and confirm the legitimacy of a transaction. They then add these transactions to a block and create chains of these blocks of transactions, forming the blockchain.

When a block is filled up with transactions, the miners that processed and confirmed the transactions within the block are rewarded with bitcoins. Transactions of greater monetary value require more confirmations to ensure security.

El Salvador made Bitcoin legal tender on June 9, 2021. It is the first country to do so. The cryptocurrency can be used for any transaction where the business can accept it. The U.S. dollar continues to be El Salvador’s primary currency.2

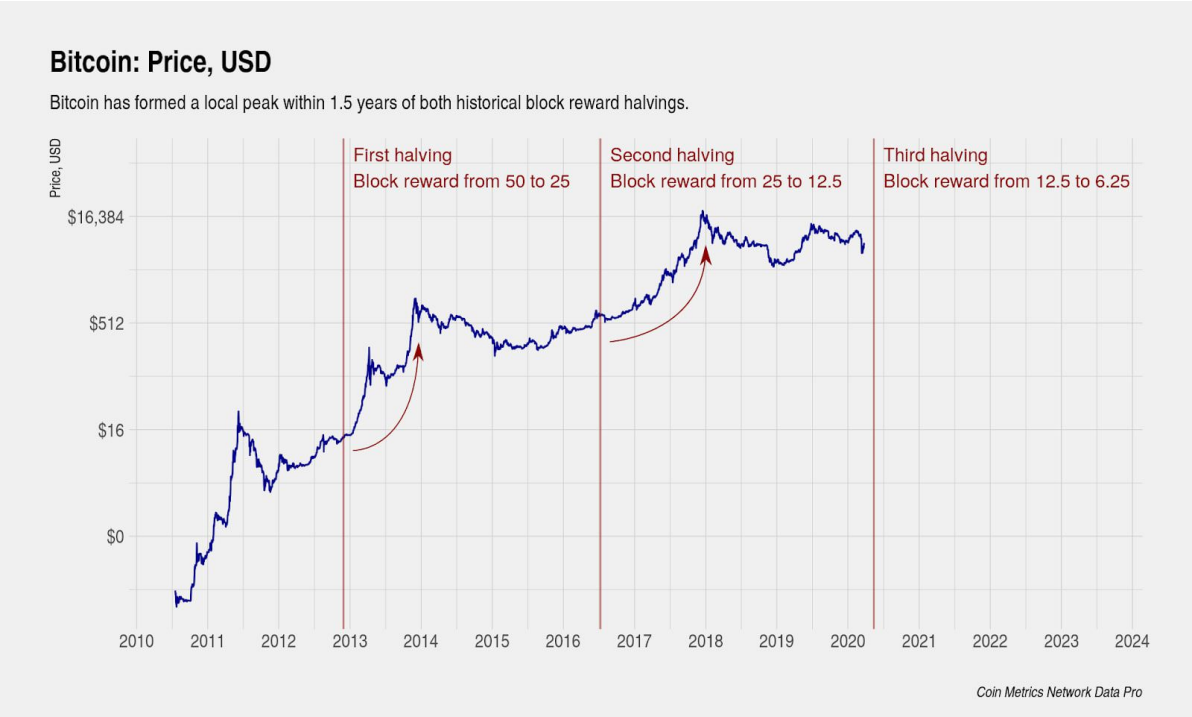
Bitcoin Halving

After every 210,000 blocks mined, or roughly every four years, the block reward given to Bitcoin miners for processing transactions is cut in half. This event is referred to as halving because it cuts in half the rate at which new bitcoins are released into circulation. This is Bitcoin's way of enforcing synthetic price inflation until all bitcoins are released.

This rewards system will continue until around the year 2140, when the proposed limit of 21 million is reached. At that point, miners will be rewarded with fees, which network users will pay, for processing transactions. These fees ensure that miners still have the incentive to mine and keep the network going.

The halving event is significant because it marks another drop in the rate of new Bitcoins being produced as it approaches its finite supply: the total maximum supply of bitcoins is 21 million. As of October 2021, there are about 18.85 million bitcoins already in circulation, leaving just around 2.15 million left to be released via mining rewards.3

In 2009, the reward for each block in the chain mined was 50 bitcoins. After the first halving, it was 25, and then 12.5, and then it became 6.25 bitcoins per block as of May 11, 2020. To put this in another context, imagine if the amount of gold mined out of the Earth was cut in half every four years. If gold's value is based on its scarcity, then a "halving" of gold output every four years would theoretically drive its price higher.



Coin Metrics logarithmic chart of Bitcoin price action following halvings.

Halving Implications

Halvings reduce the rate at which new coins are created and thus lower the available amount of new supply, even as demand increases. This has some implications for investors as other assets with a low or finite supply, like gold, can have high demand and push prices higher.

In the past, these Bitcoin halvings have correlated with massive surges in bitcoin's price. The first halving, which occurred on Nov. 28, 2012, saw an increase from $12 to $1,217 on Nov. 28, 2013. The second Bitcoin halving occurred on July 9, 2016. The price at that halving was $647, and by Dec. 17, 2017, a bitcoin's price had soared to $19,800. The price then fell over the course of a year from this peak down to $3,276 on Dec. 17, 2018, a price 506% higher than its pre-halving price.4

The most recent halving occurred on May 11, 2020. On that date, a bitcoin's price was $8,787. On April 14, 2021, a bitcoin's price soared to $64,507 (an astonishing 634% increase from its pre-halving price). A month later, on May 11, 2021, a bitcoin's price was $54,276, representing a 517% increase that seems more consistent with the behavior of the 2016 halving.4

Halving and Its Effects

The theory of the halving and the chain reaction that it sets off works something like this:

> The reward is halved → half the inflation → lower available supply → higher demand → higher price → miners' incentive still remains, regardless of smaller rewards, as the value of Bitcoin is increased in the process

In the event that a halving does not increase demand and price, then miners would have no incentive. The reward for completing transactions would be smaller, and the value of Bitcoin would not be high enough.

To prevent this, Bitcoin has a process to change the difficulty it takes to get mining rewards, or in other words, the difficulty of mining a transaction. In the event that the reward has been halved and the value of Bitcoin has not increased, the difficulty of mining would be reduced to keep miners incentivized. This means that the quantity of bitcoins released as a reward is still smaller, but the difficulty of processing a transaction is reduced.

This process has proved successful twice. So far, the result of these halvings has been a ballooning in price followed by a large drop. The crashes that have followed these gains, however, have still maintained prices higher than before these halving events.

For example, as mentioned above, the 2017 to 2018 bubble saw the value of a bitcoin rise to around $20,000, only to fall to around $3,200. This is a massive drop, but a bitcoin's price before the halving was around $650.4 Although this system has worked so far, the halving is typically surrounded by immense speculation, hype, and volatility, and how the market will react to these events in the future is unpredictable.

The third halving occurred not only during a global pandemic, but also in an environment of heightened regulatory speculation, increased institutional interest in digital assets, and celebrity hype. Given these additional factors, where Bitcoin's price will ultimately settle in the aftermath remains unclear.

How Does Bitcoin Halving Affect Bitcoin's Network?

Since Bitcoin halving is a major event, it has a major effect on various parties involved in Bitcoin's network. Here is a brief description of how Bitcoin halving affects major stakeholders and talking points in bitcoin's network.

Investors: Halving generally results in increased prices for the cryptocurrency due to reduced supply and surging demand, meaning it is good news for investors. Trading activity on the cryptocurrency's blockchain increases in anticipation of the halving. However, the pace of price increases differs based on the logistics and conditions of each price halving, as demonstrated earlier.

Miners: The effect of mining on Bitcoin's ecosystem is complicated. On the one hand, a diminishing bitcoin supply increases demand and prices. But fewer rewards can also make it difficult for individual miners or small mining outfits to survive in Bitcoin's ecosystem because

they may find it difficult to compete with large mining organizations. According to research, Bitcoin's mining capacity is counter-cyclical to its price. Thus, when the cryptocurrency's price increases, the number of miners in its ecosystem decreases and vice versa. A halving event is characterized by a price increase and can increase the probability of a 51% attack on Bitcoin's network because miners move out of its network, thereby making it less secure.5

What Happens When Bitcoin Halves?

The term "halving" as it relates to Bitcoin has to do with how many Bitcoin tokens are found in a newly created block. Back in 2009, when Bitcoin launched, each block contained 50 BTC, but this amount was set to be reduced by 50% roughly every four years. Today, there have been three halving events, and a block now only contains 6.25 BTC. When the next halving occurs, a block will only contain 3.125 BTC.

When Have the Halvings Occurred?

The first Bitcoin halving occurred on Nov. 28, 2012, after a total of 10,500,000 BTC had been mined. The next occurred on July 9, 2016, and the latest was on May 11, 2020. The next is expected to occur in early 2024.

Why Are the Halvings Occurring Less Than Every 4 Years?

The Bitcoin mining algorithm is set with a target of finding new blocks once every 10 minutes. However, if more miners join the network and add more hashing power, the time to find blocks will decrease. This is remedied by resetting the mining difficulty (or how hard it is for a computer to solve the mining algorithm) once every two weeks or so to restore a 10-minute target. As the Bitcoin network has grown exponentially over the past decade, the average time to find a block has consistently remained below 10 minutes (roughly 9.5 minutes).

Does Halving Have Any Effect on the Bitcoin Price?

The price of bitcoin has risen steadily and significantly from its launch in 2009, when it traded for mere pennies or dollars, to April 2021 when the price of one bitcoin traded for over $63,000.4 Because halving the block reward effectively doubles the cost to miners, who are essentially the producers of bitcoins, it should have a positive impact on price because producers will need to adjust their selling price to their costs. Empirical evidence does show that bitcoin prices tend to rise in anticipation of a halving, often several months prior to the actual event.

What Happens When There Are No More Bitcoins Left?

Around the year 2140, the last of the 21 million bitcoins ever to be mined will have been mined. At this point, the halving schedule will cease because there will be no more new bitcoins to be found. Miners, however, will still be incentivized to continue validating and confirming new transactions on the blockchain because the value of transaction fees paid to miners is expected to rise into the future, the reasons being that a greater transaction volume that has fees will be attached, and bitcoins will have a greater nominal market value.

The Bottom Line

Bitcoin halving imposes synthetic price inflation in the cryptocurrency's network and cuts in half the rate at which new bitcoins are released into circulation. The rewards system is expected to continue until the year 2140, when the proposed 21 million limit for bitcoin is reached. Thereafter, miners will be rewarded with fees to process transactions.

In 2009, the reward for each block in the chain mined was 50 bitcoins. After the first halving, it was 25, and then 12.5, and then it became 6.25 bitcoins per block as of May 11, 2020. Bitcoin halving has major implications for its network. Investors can expect a price appreciation in the days leading up to the halving and after the event itself. For miners, the halving event may result in consolidation in their ranks as individual miners and small outfits drop out of the mining ecosystem or are taken over by larger players.

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Correction—May 2, 2022: A previous version of this article misstated that the fourth halving occurred on May 11, 2020. In fact, that was the date of the third Bitcoin halving.