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Litecoin's 2019 Halving Scenarios

What are the implications for Litecoin's (and Bitcoin's) future decrease in block rewards?

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KEY TAKEAWAYS

- Litecoin (LTC), one of the earliest Bitcoin's spinoffs, will see its **mining reward halved from 25 to 12.5 coins** per block on August 6th, 2019.
- The **block profitability will be cut in half** - all things being equal - in the span of 5 minutes.
- Litecoin's previous halving was preceded by a large price rally with an increase by more than 200% (and spiking by over 500% over the 3-month period before).
- Bitcoin's previous two halvings ultimately led to lower mining profitability, providing useful, but limited insights on the general impact of halving events.
- For Litecoin's upcoming halving, several non-mutually exclusive scenarios are possible:
    - **Price rally that pushes mining profitability** (measured in fiat terms) to levels approaching its pre-halving long-term average.
    - **Increasing hashrate** in the months prior to the halving
    - **Self-adjustment mechanism** where price doesn't rally, leading to miners exiting the market, resulting in lower block difficulty, which ultimately leads to higher (recovered) profitability.
    - **Permanent drop** in the mining profitability of Litecoin.

Litecoin was created in 2011 by Charlie Lee, who built the new chain by forking most of Bitcoin's source code from its Github repository[1]. Some of the key differences between Litecoin and Bitcoin are its hash function, Scrypt (instead of SHA-256), and reduced block times of 2.5 minutes (versus 10 minutes), allowing a higher theoretical ceiling on maximum transactions per day given a similar blocksize.

[1] While most of the code is the same, Litecoin's blockchain is not a fork of Bitcoin and its blockchain is completely independent from it.

In a similar fashion to Bitcoin, the block reward for Litecoin is scheduled to decrease over time, with the decaying rate of issuance leading to an eventual finite supply for the cryptocurrency. Litecoin's block reward is halved every 840,000 blocks (roughly every 4 years). This time around, what will be the implications for Litecoin's upcoming block reward halving? Will the Litecoin's halving be a precursor to Bitcoin[2]'s block reward halving in 2020?

1. Why are halvings important?

While Litecoin doesn't have a whitepaper, it is well-publicized that the chain's block rewards for mining are perpetually reduced by one half every 840,000 blocks[3].
With a current average block generation time of ~2.5 minutes, approximately 576 blocks are generated per day. As a result, **block reward halving events occur every 4 years for Litecoin**.

Litecoin's current block reward is set at 25 litecoin per block and will subsequently decrease to 12.5 litecoin per block around August 6th (at exactly block 1,680,000).

Halving has many important implications for any POW cryptocurrency, but the following are the main general aspects to consider when any chain's block rewards are halved:

- **Mining profitability is cut by half.** As block rewards are halved, the profitability will be subsequently reduced by 50% as difficulty doesn't adjust immediately.
  $$Mining\ profitability\ (per\ day) = \frac{mining\ rewards\ per\ day}{difficulty}$$
- **Potential decrease in miners** may lead to higher risk of a 51% attack if the hashrate decreases, as the cost to rent hashpower would decrease as well. An additional issue is related to potential concentration of the miners in a few pools, typically using ASIC mining equipment.

Halving events are, to some extent, similar to **a predefined change in digital central banking policy,** as they ultimately impact the inflation rate of a cryptocurrency for an extended period of time through the reduction in future supply increase.

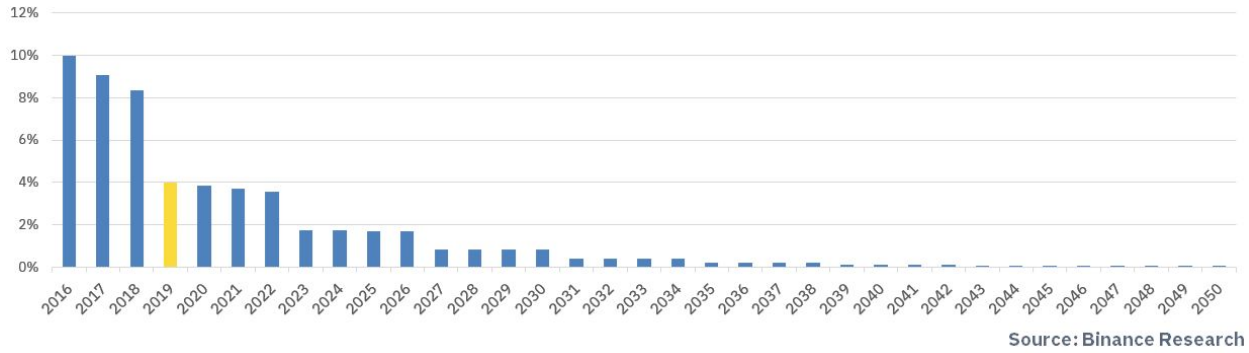
A traditional central bank's policy is determined through periodic meetings by committee members who determine what should be the appropriate policies, approaches, and rates (e.g. marginal lending facility rate, deposit rate) to be set for the economy. The only certainty in central banking policy is the frequency of the meetings (usually every six weeks for the United States Federal Reserve).

[2] Not to forget both Bitcoin Cash and Bitcoin SV.
[3] https://litecoin.org/

Alternatively, the inflation rate for PoW cryptocurrencies such as Litecoin or Bitcoin is pre-determined and set in stone (code), immutable and bound to occur at specific block times.

For instance, here are the predicted inflation rates on Litecoin.

Chart 1 - Expected annual inflation rate (%) on Litecoin[4]



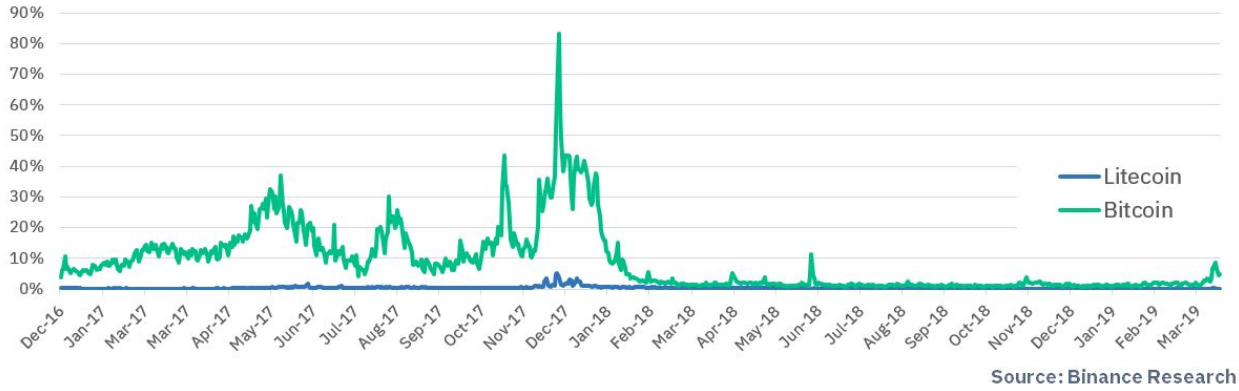
Source: Binance Research

The current inflation in the Litecoin supply is around 8.4% per year. However, after the halving, the network's inflation rate is expected to drop to ~4%.
This reduction should not be analyzed in isolation, however there are also some particular aspects of Litecoin that must be considered when discussing its halvings:

- **Lack of hedging markets:** Litecoin doesn't have any major, liquid markets[5] allowing miners to hedge their exposure (e.g. futures markets). As a result, profitability is highly dependent on prices.
- **Revenues from transaction fees are insignificant compared to block rewards:** Relative to Bitcoin, Litecoin has much lower on-chain number of transactions, so that a greater proportion of fees collected by miners come from the block rewards as opposed to transaction fees. In addition, the growing popularity of Lightning Network[6] may further jeopardize the contribution of transaction fees to total miner revenues. Furthermore, the growing popularity of the Lightning Network - currently being tested on Litecoin - may further **shrink the size of transaction fees**, thus further constricting miner revenues to just the block rewards themselves. Based on the chart below, Litecoin transaction fees currently represent less than 0.12% of the mining block reward from Litecoin and historically have never represented more than 6% of the mining block reward. In comparison, Bitcoin transaction fees currently represent 4-8% of the mining block rewards and more than 30-40% of the block rewards during December 2017.

[4] 2019 refers to the period between August 6th 2019 to August 5th 2020.
[5] Bitmex only has a single futures contract traded for Litecoin and its volume is insignificant compared to other Bitmex contracts or even to the spot volume of Litecoin markets.
[6] Lightning Network layer was enabled on Litecoin before it was activated on Bitcoin.

Chart 2 - Transactions fees (%) relative to block rewards



Source: Binance Research

2. A look at past halving events

Across its 8-year history, Litecoin has had only a single halving of its block rewards, where the block reward dropped from 50 LTC to 25 LTC[7]. This halving occurred at a block height of 840,000 (on August 26th 2015)[8]. What were the main key takeaways from this previous halving?

2.1 Litecoin's August 2015 halving

2.1.1 Price rallied before the event

Chart 3 - Evolution of the price (USD) before/after the 2015's halving

Source: Binance Research, BitInfoCharts

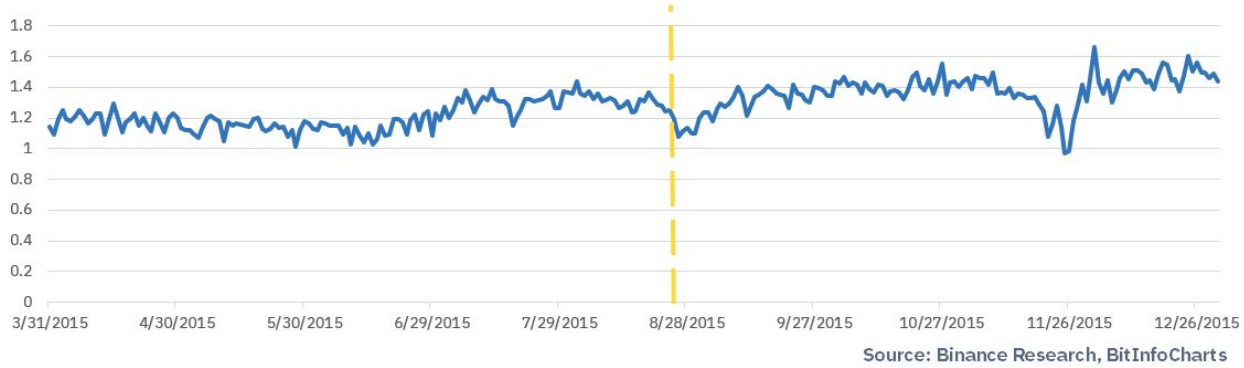
Litecoin's price increased from around 1.5 USD (3 months before halving) to over 3 USD post-halving, with a peak of 7 USD in mid-July 2015. The overall volatility of the cryptoasset also correspondingly increased in the months prior to the halving event.

[7] https://www.coindesk.com/litecoin-first-mining-reward-decline/

[8] https://live.blockcypher.com/ltc/block/e2acdf2dd19a702e5d12a925f1e984b01e47a933562ca893656d4afb38b44ee3/

2.1.2 Hashrate barely dropped

Chart 4 - Litecoin's hashrate (in THash/s)



Source: Binance Research, BitInfoCharts

One of the potential consequences from the halving of Litecoin was a potential drop in miner participation. As seen in the chart above, however, Litecoin miners didn't "opt out" after the reduction in mining rewards per block. The hashrate dropped by roughly 15% around the event, before quickly rebounding in the two weeks following the halving.

2.1.3 Permanent drop in mining profitability

Chart 5 - Litecoin's mining profitability (in USD/day for GHash/s)

Source: Binance Research, BitInfoCharts

The drop in mining profitability was compensated by the price rally that occurred a few months before block 840,000.

Specifically, this price increase led to a spike in profitability prior to the event. Eventually the halving pushed down the mining profitability back to its long-run equilibrium point, mitigating the effects of the short-term price movement, which led to a skyrocketing profitability prior to the halving.

As a result, post-halving mining profitability was only inferior by a few percent to the long-term median profitability (around 38 USD/day per GH/sec).

In general, price fluctuations remain the largest determinant of the mining profitability as discussed in the report about Monero's March 2019 fork.

2.2 Bitcoin's previous halvings

Since the genesis block was created, Bitcoin has had two halvings in block rewards:

- November 28th 2012 (from 50BTC to 25BTC per block)
- July 9th 2016 (from 25BTC to 12.5BTC per block)

Bitcoin's third halving is expected to occur in May 2020[9].

Table 1 - Bitcoin's historical halving figures

Halving date	Preceding 90-day price change	Post 90-day price change	Day-to-day change in mining profitability	Preceding 90-day change in block profitability	Post 90-day change in block profitability
2012-08-28	**+18%**	+141%	-44%	-53%	**+139%**
2016-07-09	**+54%**	-4%	-41%	-37%	-13%

In the case of Bitcoin's first halving, the post-halving rally in Bitcoin price helped partially offset the nominal decrease in mining profitability.

However, the second halving in Bitcoin led to a general decrease in block profitability (given a constant amount of hashpower). The initial price rally did not compensate for the loss in block profitability. Over the long run, alternative factors such as greater competition in the mining industry, measured by growing difficulty to mine blocks[10], could explain these findings.

As the main results to previous halvings for both Bitcoin and Litecoin have been investigated, what could be the different scenarios for Litecoin's upcoming halving?

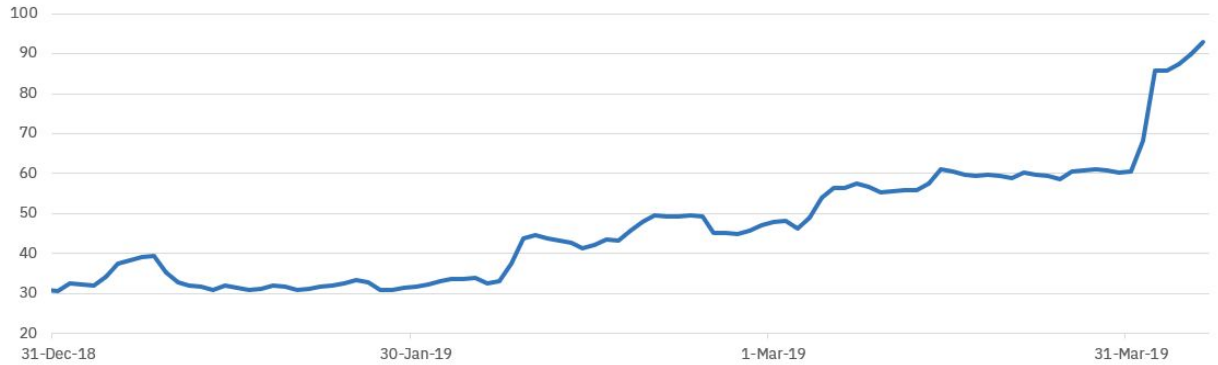
3. Halving scenarios

Outcome 1: price rallies before stabilizing at a new high

The price of Litecoin has already started rallying since the beginning of the year, exhibiting a 200% year-to-date return, while the broader market is up by 40% YTD (as represented by Bletchley 10 Index).

[9] https://ihodl.com/infographics/2018-04-09/chart-day-bitcoin-reward-halving-and-price-history/
[10] https://bitinfocharts.com/comparison/bitcoin-difficulty.html

Chart 6 - Litecoin's year-to-date prices in USD



Source: Binance Research, BitInfoCharts

Outcome 2: hashrate increases before the halving

As the rewards will be halved, more miners may decide to start mining Litecoin (instead of other currencies) as they want to mine as much litecoins as possible short-term in anticipation of the future decrease in mining rewards. As a result, the hashrate (and subsequently the mining difficulty) may rise in the months preceding the halving. The hashrate has more than doubled since the beginning of the year and is now at its highest historical level, surpassing 350 THash/sec as of the current time of writing (April 14th).

Chart 7 - Litecoin's year-to-day hashrate (THash/sec)

Source: Binance Research, BitInfoCharts

Outcome 3: mining profitability adjust as miners exit the market

If some miners were to leave the market and/or switch over to mining other, more profitable coins[11], the hashrate would decrease. As a result, this reduced competition would help compensate for the loss of profitability due to the absolute block reward reduction. On the

[11] Hayes, A. (2015). The Decision to Produce Altcoins: Miners' Arbitrage in Cryptocurrency Markets. *Available at SSRN 2579448*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2579448

other hand, loss of hashrate and network participants would increase the centralization of Litecoin, with fewer miners, pools, and participants, which ultimately leads to a greater risk of a 51% attack.

An alternative explanation could be centered around the supply-side mining narrative. Fewer LTCs will be mined after the halving, lessening the selling pressure from miners, as the smaller block rewards act as a smaller relative dilution to the total supply. As a result, fewer litecoins being released per day may result in new market environment which may lead to the stabilization of the price at overall higher price than before the decrease in mining rewards.

Outcome 4: permanent drop in mining profitability

If Litecoin's post 90-day price post-halving would be near its historical long-term median, all other things being equal, it would result in lower profitability for all Litecoin miners. Ceteris paribus, assuming that manufacturers of mining chips do not innovate and create more efficient equipment instantaneously, LTC prices failing to stabilize at a much higher point than pre-halving prices may lead to a permanent reduction in equilibrium levels of mining profitability for Litecoin miners.
Since this did not occur after last fork, it is **impossible to predict how miners would react this time if this outcome were to occur**.

Conclusion

If Litecoin price increased further (in USD terms) but remained flat relative to other cryptocurrencies (e.g. BTC, ETH), the mining profitability would still increase, as mining costs, such as electricity and hardware equipments, are denominated in fiat. However, **rational miners would still consider the marginal profitability and opportunity costs of mining each PoW cryptocurrency** over the same time periods to decide whether or not it is more profitable to mine Litecoin or other cryptocurrencies.

Only an exogenous rally in Litecoin's price (i.e., outperforming all other PoW cryptocurrencies) or increasing usage of the chain itself - resulting in higher total transaction fees collected by miners per block - could compensate for this future decrease in mining block rewards.

Unlike the US Federal Reserve providing guidance that projects roughly 3 future rate hikes for the rest of the year, these **halving events are written in the stone of code and are — to some extent — similar to a predefined central banking change in policy** for any POW cryptocurrency.

Whereas these events are important for miners and other market participants, the scarcity of historical cases lead to uncertainty about what could be the potential outcomes from future halvings, regardless if it is Litecoin, Bitcoin, or even Bitcoin Cash.

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