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Disastrous environmental balance of Bitcoin

Stefanie Schock



The entire Bitcoin network already requires more energy than Peru or Hong Kong, or almost half of Austria's power supply. Such a development is clearly at odds with achieving the goals of the Paris Climate Agreement, i.e. to curb global warming to below 2 degrees.

The market value of the hyped Bitcoins today is higher than all bank notes and coins of the British pound or the Swiss franc in circulation. The digital currency based on blockchain technology is not subject to any form of control by central banks or other financial authorities and has turned out to be scalable: the number of users and transactions and the market capitalisation of Bitcoin has increased rapidly since its launch in 2009. Since its first quotation in 2010, the Bitcoin price has increased by an average factor of 10x every year. In 2017, it even outperformed its long-term average. Volatility remains high: at the moment, the price is heading south. The suitability of Bitcoin as currency, [means of payment, and value store is questionable not the least due to the extreme price fluctuations](#). Given the environmental and governance angle (suspicion of money laundering), we feel obliged to critically scrutinise the phenomenon.

215 kWh for a one-off Bitcoin transaction

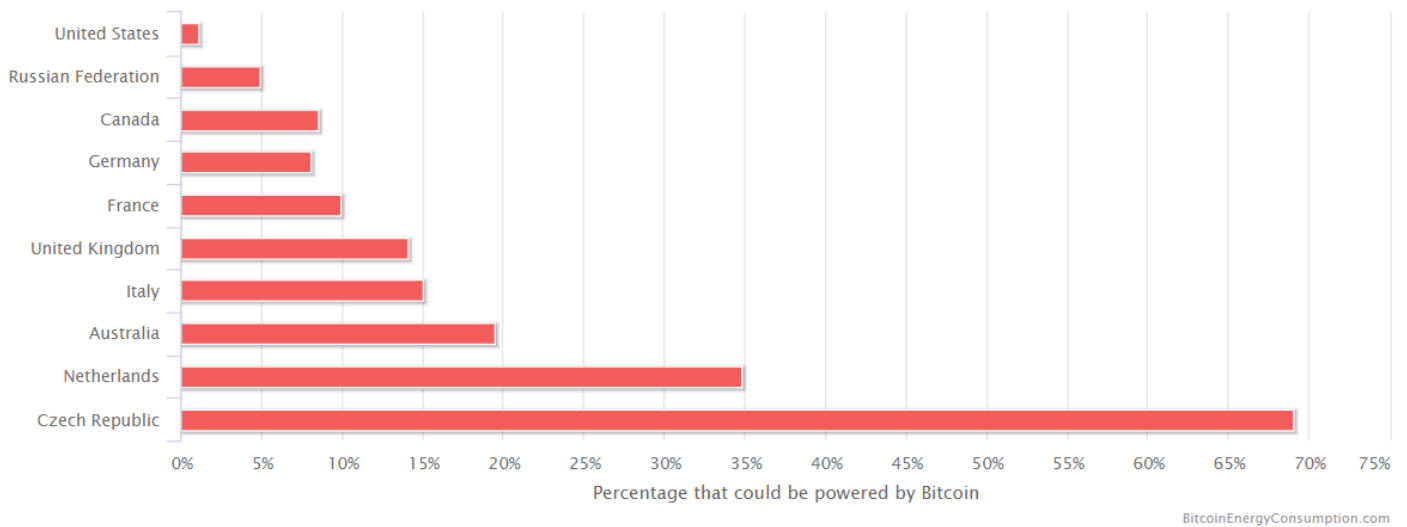
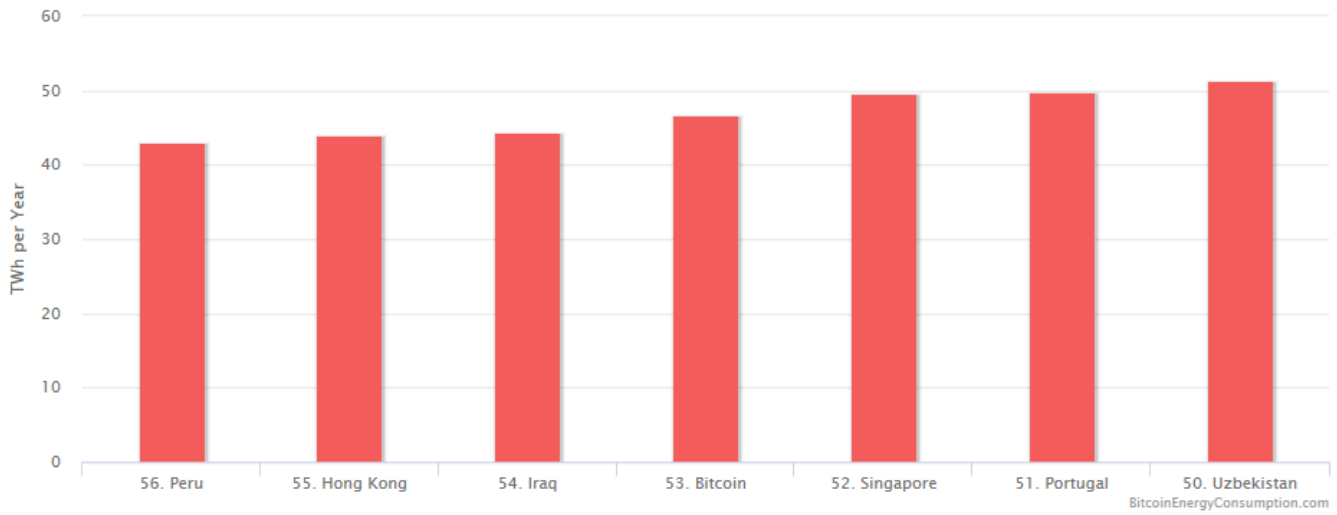
From an environmental perspective, the lack of energy efficiency of Bitcoin mining is the main bone of contention. Last year, 130mn transactions required about 29 tWh of energy, which translates into 215 kWh per transaction. Of course, 90% of power is consumed for mining new Bitcoins at the moment, while 10% goes into the validation of transactions. The drastic increase in prices in 2017 led more and more miners into participating in the process with an ever-increasing volume of server capacity.

Since the software protocol automatically facilitates the generation of one block per ten minutes on average, the level of complexity has increased significantly, which naturally pushed up power consumption. This in turn has led to a situation where only countries with low energy prices or lower outside temperatures are attractive to miners. In addition to the North European countries and Canada, this means China in particular. According to a global cryptocurrency study by Hileman & Rauchs, 58% of the globally biggest cryptocurrency mining pools are based there. Iceland also offers an attractive environment; the country is home to the biggest cryptocurrency mining company in the world, i.e. Genesis Mining (according to the company's own information).

The energy consumed for a one-off transaction (including the mining for new coins) is roughly equal to the weekly energy consumption of an average US household. Assuming that consumption develops in line with the price, the power consumption for Bitcoin-mining would be tantamount to that of the Netherlands or Switzerland in a few years. According to calculations by Digiconomist on the basis of data provided by IEA (International Energy Agency), the entire Bitcoin network already consumes more energy than Iraq, Peru, or Hong Kong in their respective entirety, or about half of Austria's supply.

Such a development is clearly at odds with achieving the targets of the Paris Climate Agreement, i.e. cutting global warming to below 2 degrees. In addition, the power mix in China is still coal-heavy (60%). Especially server farms in Xinjiang, Inner Mongolia, and in the North-East of China, i.e. in Heilongjiang crucially depend on coal (source: Hileman & Rauchs).

Bitcoin energy consumption in comparison with selected countries



Source: <https://digiconomist.net/bitcoin-energy-consumption>

Blockchain 2.0

In addition to proof of work, there are also other mining mechanisms: Ethereum, the cryptocurrency with the second-biggest market capitalisation after Bitcoin, uses proof of stake. Here, the stake held by the miner in the total amount of tokens is the relevant key, determining the likelihood of being selected to mine the next block: the bigger the stake of the user, the more likely they will be selected (one block every twelve seconds instead of every ten minutes).

Younger generations of blockchain technology and derivatives thereof have done away with mining altogether. For example, the cyber currency IOTA (Internet of Things / Tangle) is supposed to process transactions with lower resource input on the back of "Tangle". The main difference to Bitcoin is the development of the blockchain technology, also referred to as DAG (directed acyclic graph). It allows for growth not only in one direction, but at multiple locations at the same time. Therefore, no miners are required to verify the transactions. After all, smaller computers in cars, smartphones etc. are also supposed to process transactions.

The use of Tangle instead of a binary system as with most IOT devices, however, could require higher computer capacities.

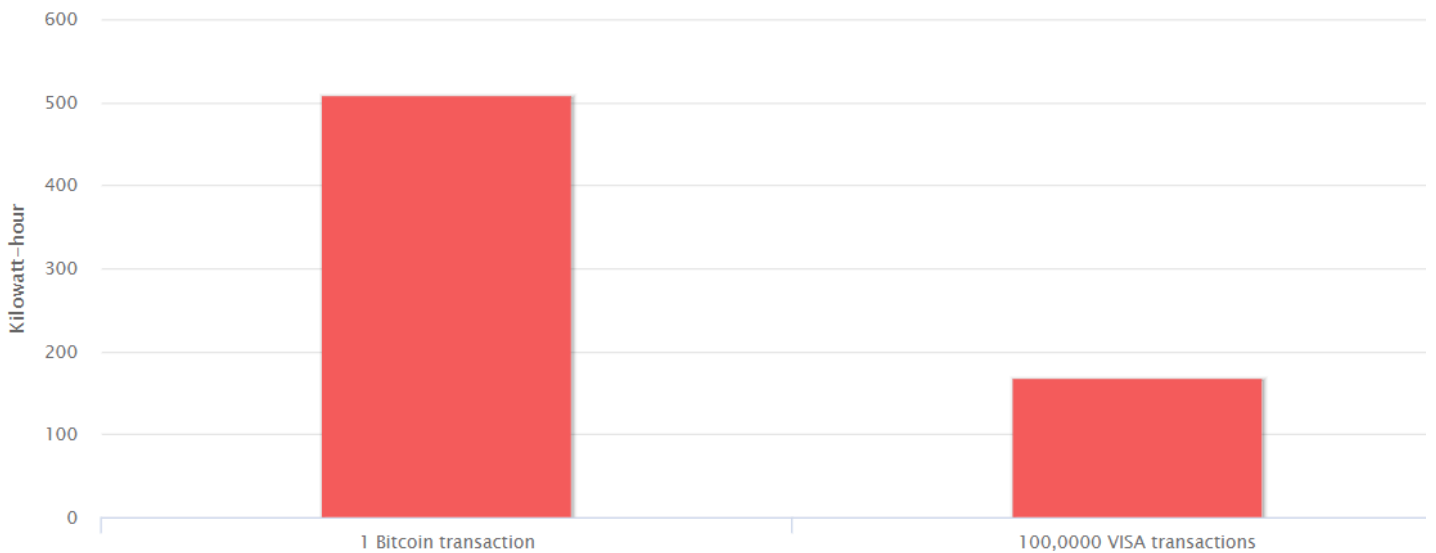
Lack of regulation and consumer protection

In addition to the strong price fluctuations, a lack of regulation is another focal point of criticism for cryptocurrencies. Consumer protection like in MIFID II does not exist for cryptocurrencies to any satisfactory extent. This is expected to change in the foreseeable future (source: Spiegel).

"In areas like cryptocurrencies, like Bitcoin, we should be looking at these very seriously, precisely because of the way they can be used, particularly by criminals," as UK Prime Minister Theresa May announced (source: CNN). In the cryptocurrency strongholds of China and South Korea, authorities have been taking action against trading platforms and curbed mining as well.

The financial authorities in China criticise the speculative nature of the currencies and the loopholes for money laundering and tax evasion that result from it. A new anti-money-laundering directive by the EU is supposed to make it impossible for investors to remain anonymous when they exchange digital into central bank money, and in Austria the Austrian Financial Markets Authority (FMA) has declared itself in favour of an obligatory prospectus for ICOs (Initial Coin Offerings), along the lines of traditional IPOs, as well as of a more transparent duty to report (source: fondsprofessionell).

Bitcoin network versus VISA network average consumption



Source: <https://digiconomist.net/bitcoin-energy-consumption>

Bitcoin does not belong in a sustainable universe

The chart above shows why Bitcoins are unacceptable from the point of view of sustainability. Due to the enormous energy input, a lack in regulation, and governance issues such as the suspicion of money laundering, an investment in Bitcoin (and at this point in time, also all other cryptocurrencies) is out of the question at least for the sustainable investment products of Erste Asset Management. That being said, the blockchain technology and its advancement also create opportunities, which will require separate analysis (transparency, data security, access to information).

Stefanie Schock is an engineer in environmental and bioresource management and has been part of the Responsible Investment Team of Erste Asset Management since 2016. Before that, Stefanie Schock worked for WWF Austria in the field of "Sustainable Finance".

Sources: Bloomberg, Digiconomist, JBS, Motherboard Vice, Financial Times

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