The Environmental Impact of The Crypto Wave

The age of digital currencies has well and truly arrived. Although many misconceptions still exist, more people continue to invest in cryptocurrencies, hoping they reach the end of the rainbow. The support these digital currencies have received from personalities like Elon Musk and Bill Gates has only increased the general curiosity in them. This "Crypto Wave" has resulted in Bitcoin achieving a valuation of more than $160 billion with one single Bitcoin worth more than $57,000!

Amidst all this hype, the environmental ramifications of cryptocurrencies have been swept under the rug. However, environmentalists have started raising the alarm on this pressing issue, and lawmakers have begun to act on it. Lawmakers in New York introduced a bill on May 3 that would place a three-year moratorium on all cryptocurrency mining centres unless they undergo a full environmental impact statement review. The review would have to prove that a mining centre doesn't affect the state's greenhouse gas emission targets. According to the document, the temporary mining ban would help New York ensure it reaches its various environmental targets, which include 70% renewable energy by 2030 and 100% zero-emission electricity by 2040. This bill could end up setting a dangerous precedent for all the traditional cryptocurrency mining centres in the world.

The Crypto currency market has seen an extremely bullish market in recent times, alluring new investors by promising

them riches. [Image: Shutterstock/Travis Wolfe]

Problems posed by Cryptocurrency Mining

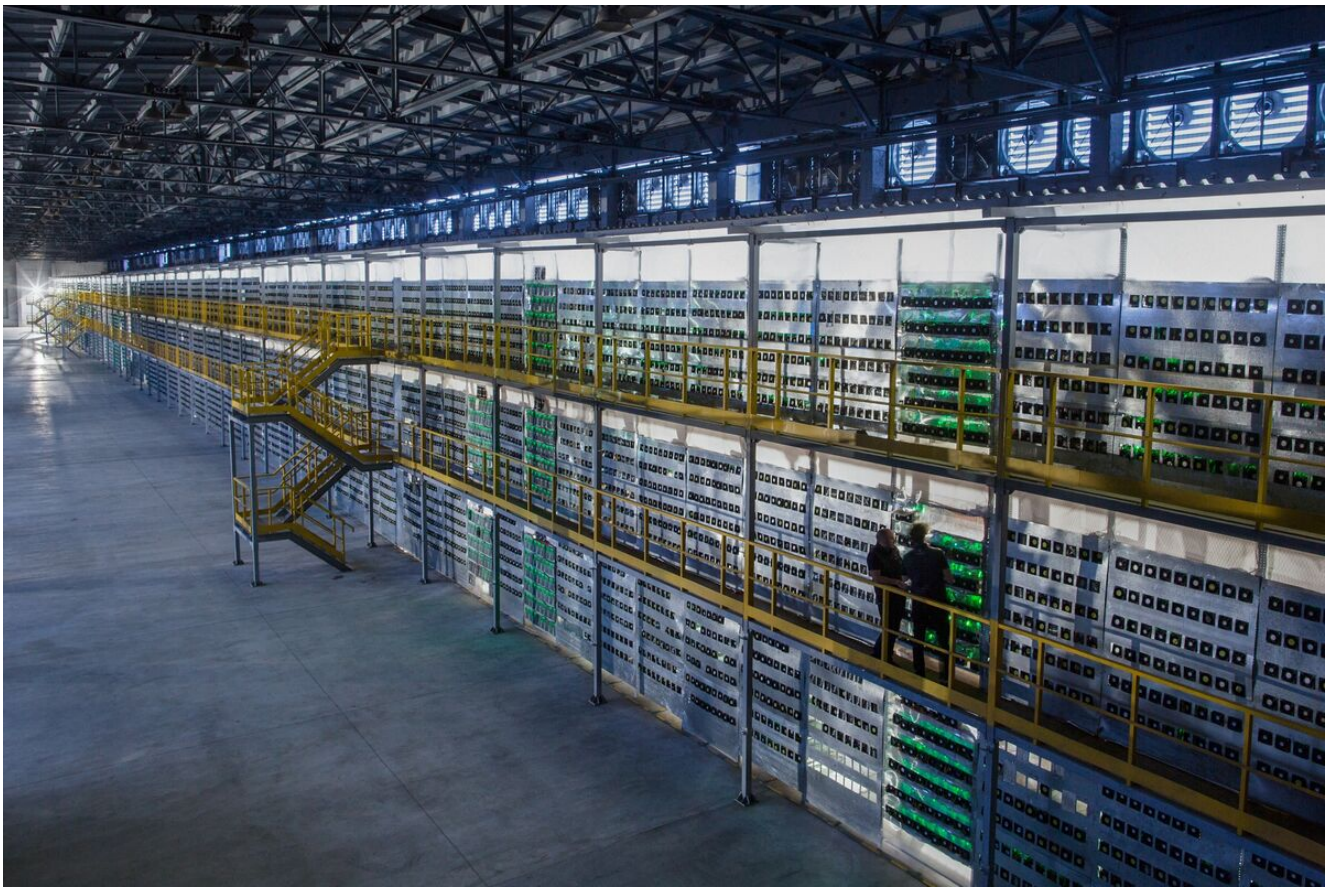
The traditional financial system essentially runs on the trust put in organisations like banks to verify, send, and receive money from one party to another. This system, however, has many loopholes in it and is susceptible to risks like manipulation and fraud. Cryptocurrencies like Ethereum and Bitcoin aim to be a decentralised alternative to this rigid system where governments, banks, and hedge funds have the power to administer monetary policies. Thus, cryptocurrencies need to either eliminate the monetary intercessor or integrate the whole transaction processing system into the program itself. This is where mining comes into the picture.

Cryptocurrency mining is not merely the process of mining new coins from the system. The main job of the miner is to verify transactions and add them to a new block of the so-called ledger by solving a complex cryptographic equation. The miner, of course, is rewarded with some of the currency mined or a transaction fee in some cases.

Cryptocurrencies are indeed fool-proof when the transaction security is considered. However, when the details of the mining process are put under a microscope, a plethora of problems arise. The main task in the current mining process is to solve highly complex mathematical equations that require extremely power-hungry computers. Commercially, mining is done on a massive scale. Warehouses the size of mega factories are filled up with supercomputers, their cooling systems, and other equipment. Annually, the bitcoin network alone consumes more than 121 terawatt-hours of electrical energy, which would place it in the top 30 electricity consumers of the world if it were a country.

This power-intensive nature of cryptocurrency mining naturally

means that it is not profitable to mine it everywhere. Factors such as electricity prices, ambient temperature, and environmental policies of governments alter mining profit margins in different parts of the world. These variations in mining profits are proving particularly disastrous for some countries like China. Countries that offer cheap electricity from poorly regulated sources attract most of the mining firms. Consequently, the demand for coal-fired power is rapidly increasing. Asian and African countries, where governments' environmental standards and policies are relatively weak, pose as easy targets for mining firms.



Bitriver, Russia's largest Bitcoin mine [Image credits: www.bloomberg.com]

How Cryptocurrency Mining has Evolved

In the years following Bitcoin's creation, mining wasn't as complicated or difficult as it is today. An ordinary computer

or a laptop with a decent CPU could mine efficiently and even generate profits. Satoshi Nakamoto designed the bitcoin blockchain to dish out harder cryptographic equations as an increasing number of miners dove into the ecosystem. A validation method known as 'proof of work' is used for the same. As years passed and bitcoin's acceptance went up, many people started to mine to the point that mining individually stopped being profitable anymore. At present, the computational power required to mine is so high that only large mining operations with tens of thousands of GPUs can generate reasonable profits. Individual miners combine their computational power and form pools among themselves to make profits.

There have been a lot of innovative attempts at trying to mitigate this drawback of cryptocurrency mining. One such attempt is being carried out by a Canadian startup venture called Heatmine. The company is looking to put its mining servers into buildings and use the heat generated from them to help power central heating systems at no cost. Each unit of Heatmine is capable of generating enough energy to heat up 2,230 square feet of space for a day.

On the other hand, companies such as CryptoSolarTech have already begun the shift toward sustainable mining, with a number of solar farms powering their mining operations. As more advancements are made in the field of clean and renewable energy, cryptocurrency mining will be expected to get rid of its hunger for carbon-based energy.

Cryptosolartech, Spain's largest Bitcoin miner, is leading the charge for sustainable crypto mining, with the construction of a 300 MW solar farm. [Image credits:www.cryptoglobe.com]

Comparisons with the traditional credit system

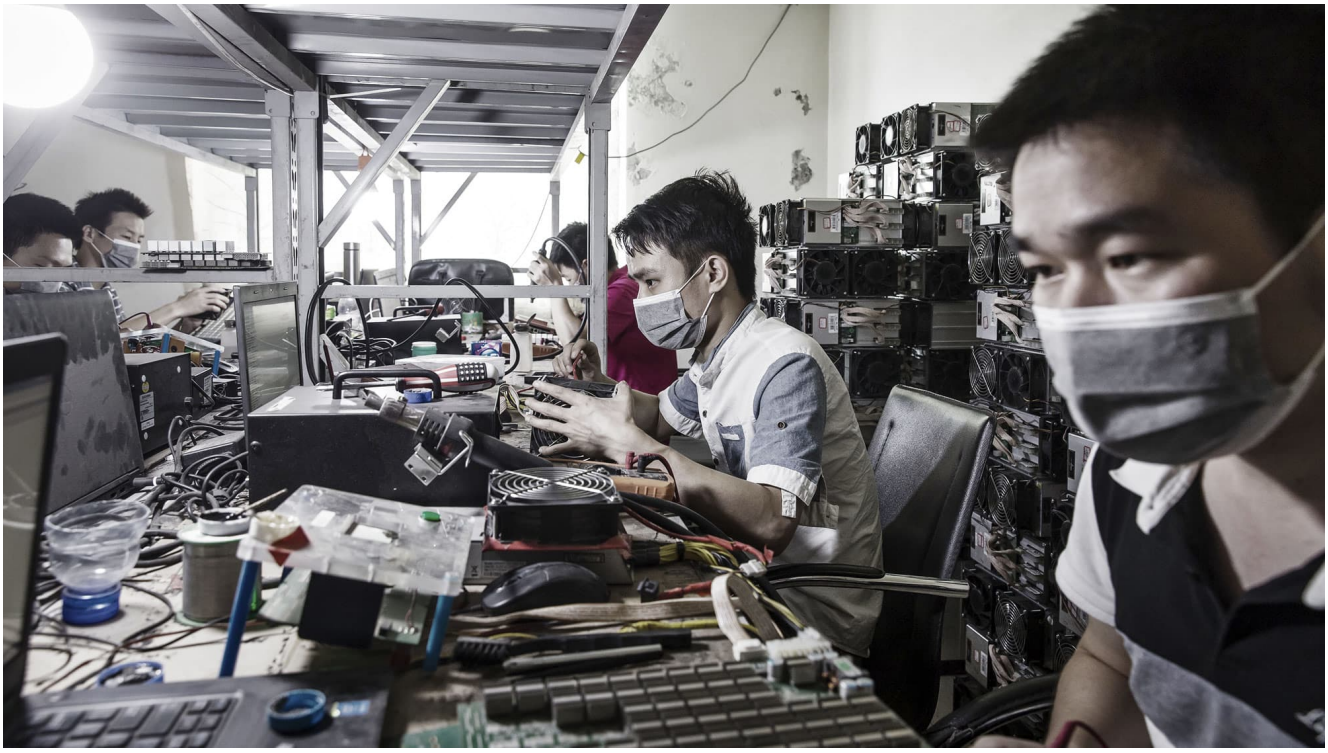
When discussing the environmental impacts of the usage of cryptocurrencies, a comparison with other traditional modes of monetary transaction like cash, credit/debit cards, digital modes, and so on, is inevitable. When seen from an incautious standpoint, cryptocurrency transactions seem like the worst idea in terms of the impact on nature. However, many argue that this is a highly unfair comparison. The credit system through which transactions take place is just a tiny layer in the entire monetary network. This argument does not consider the numerous other variables like transportation, workforce, administrative necessities, even military, and many more, all of which contribute and have their own impacts on the environment.

On the other hand, cryptocurrencies are a whole monetary framework in themselves. They are not dependent on any external organizations as all the functions of payment processing and authentication are encoded right into the currency's blockchain. Therefore, the proper comparison would be comparing a cryptocurrency with the whole monetary framework of a country.

Cryptocurrencies—The way forward

The power-intensive nature of cryptocurrencies and their impact on the environment cannot be swept under the rug. Hence, the question arises—Is there a more sustainable way to continue using cryptocurrencies? Fortunately, the answer is yes. There are already a lot of efforts underway to make the whole mining process cleaner. One of the more obvious solutions is to make the computers and their components used in mining more efficient. As the field of computation advances, the power consumption of the whole mining process will significantly come down. However, achieving that level of technological prowess may take decades and may not be feasible to implement on a large scale. Powering cryptocurrency mining

operations with renewable energy sources is also an option, but whether it will be profitable to do so in the near future remains a question.



China’s bitcoin mining is threatening its climate change goals. [Image Credits:Qilai Shen | Bloomberg | Getty Images]

However, there is one technique, or rather a mining method, in which cryptocurrency experts and environmentalists see hope—proof of stake. The proof of work concept used to validate transactions is the core reason why the whole mining process is so energy demanding. Satoshi Nakamoto designed the blockchain model so that mining rigs had to guess the solution of an equation through trial and error. It may take millions of trials until the correct answer is found to the cryptographic algorithm. The miner then gets to verify the next set of transactions. This is a highly inefficient process.

On the other hand, the proof of stake process uses a slightly different model to verify transactions and reward miners. It still uses cryptographic equations, but the reward is not based on the computational power used to solve them. Miners

get rewarded according to the percentage of the currency in circulation they put at stake to validate the next block of transactions. The two major cryptocurrencies, Bitcoin and Ethereum, are currently using the proof of work model. However, developers at Ethereum have made changes to the original code and are using a variation of proof of work. Although Ethereum developers haven't yet announced when the entire shift to proof of stake would happen, it is set to make the platform significantly efficient by increasing the number of transactions from 15 to 1000 per second.

The debate and speculation around the sustainability of cryptocurrencies are not likely to end anytime soon. Unsurprisingly, there will be uncertainty surrounding things like cryptocurrencies or even blockchain as a whole, especially when they are at such a nascent stage. The thing that matters the most here is that the cryptocurrency wave has successfully managed to prove that it is possible to break governments' monopoly over the financial system. It showed that there could be an alternative system where the power to manipulate economic functions does not lie with just a select few at the top. In the long term, making cryptocurrencies sustainable in all aspects seems to be the way forward for now.