





Impressive but Unsustainable: Environmental Troubles of Bitcoin.

¹Juma, Idd  and ²Dr. Frances De Silver 

¹²School of Science, Technology Maths & Engineering, Federal University of Minas Gerais.

Corresponding author's email: iotuya05@email.com

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ABSTRACT

This paper takes a deep dive into the analysis of blockchain technology as used in the financial services industry. The research article focuses on one of the major cryptocurrencies to ever arise from blockchain technology; the Bitcoin. Bitcoin is the most common and highly valued of the currencies to ever exist both crypto and fiat. The focus of this article is on mining of this invaluable coin. The analysis of energy usage in mainframe servers that run the bitcoin mining algorithms is my key concern. This is brought about by a concept called proof of work; which is basically trying to be the one to resolve the next block; computing the mathematical answer to a given transaction such that it is agreed upon by all other nodes in the network. To do this, one must acquire the most powerful computers out there or join a mining pool; which is a group of individuals or firms who bring their hardware together to form a near-supercomputer machine. These setups consume a lot of power and emit quite a lot of heat requiring enormous amounts of water for cooling.

Introduction

In recent years, the rise of cryptocurrencies, particularly Bitcoin, has sparked a wave of enthusiasm and curiosity among investors and technology enthusiasts alike. However, as the popularity and value of Bitcoin continue to surge, concerns regarding its environmental impact have taken center stage. This research aims to delve into the effects of Bitcoin mining on the environment and shed light on the various aspects surrounding this issue.

The Basics of Bitcoin Mining

Bitcoin is a decentralized digital currency that operates on a peer-to-peer network known as the blockchain. Bitcoin mining is the process through which new Bitcoins are created and transactions are verified and added to the blockchain. This process involves powerful computers solving complex mathematical problems, requiring significant computational power and energy consumption.

The Energy Menace

One of the main environmental concerns associated with Bitcoin mining is its substantial energy consumption. Mining operations rely heavily on high-performance computer hardware, specifically application-specific integrated circuits (ASICs) or graphics processing units (GPUs), which require substantial amounts of electricity to operate.

The Cambridge Centre for Alternative Finance estimates that Bitcoin mining consumes more electricity than some countries, with the annual energy consumption surpassing that of entire nations like Argentina or the Netherlands. As a result, the carbon footprint of Bitcoin mining is considerable, leading to concerns about its contribution to greenhouse gas emissions and climate change.

Renewable Energy Integration

Critics argue that the majority of Bitcoin mining operations rely on non-renewable energy sources, such as coal-fired power plants, exacerbating the environmental impact. However, it is worth noting that several initiatives and mining operations are actively seeking to address these concerns.

In recent years, there has been a growing trend among Bitcoin miners to transition towards renewable energy sources. Miners are locating operations near renewable energy facilities, such as hydroelectric power plants, wind farms, and solar installations, to take advantage of their lower carbon footprints. This shift towards greener energy sources aims to mitigate the environmental impact of Bitcoin mining and promote a more sustainable industry.

Technological Innovations

Beyond the integration of renewable energy, technological advancements hold promise for reducing the environmental impact of Bitcoin mining. Innovations such as the development of more energy-efficient mining hardware and the implementation of energy-saving protocols within the blockchain network are being explored.

PoS vs PoW and the energy requirements

Furthermore, the concept of "proof-of-stake" (PoS) is gaining traction as an alternative to the current "proof-of-work" (PoW) consensus algorithm used in Bitcoin mining. PoS consumes significantly less energy as it relies on validators holding cryptocurrency as collateral, rather than performing energy-intensive computations.

Ethereum, the second-largest cryptocurrency, is currently undergoing a transition from PoW to PoS, which could have a positive ripple effect on the wider cryptocurrency industry.

Regulatory Measures and E-Waste: Aside from energy consumption, another environmental concern is the issue of electronic waste, or e-waste, generated by outdated mining equipment. As mining hardware becomes obsolete due to technological

advancements, it adds to the growing e-waste stream. Proper recycling and disposal of electronic equipment should be prioritized to minimize the environmental impact associated with Bitcoin mining.

Government regulations can also play a vital role in reducing the environmental impact of Bitcoin mining. By imposing stricter guidelines and incentivizing the use of renewable energy, governments can encourage miners to adopt more sustainable practices, leading to a greener and more eco-friendly industry.

Conclusion

Bitcoin mining undoubtedly has a significant environmental impact, primarily due to its substantial energy consumption. However, it is essential to recognize the ongoing efforts within the industry to address these concerns.

The integration of renewable energy sources, technological innovations, and the exploration of alternative consensus algorithms showcase the commitment of many miners towards a more sustainable future. By embracing these developments and implementing robust regulatory measures, the environmental impact of Bitcoin mining can be mitigated, paving the way for a greener and more sustainable cryptocurrency industry.

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