santacroce tech

opinion & insights

OCTOBER 4, 2024

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INTRODUCTION

Our second newsletter focuses on the persistent myths surrounding Bitcoin mining, including its purpose, operation, and energy consumption. We'll break everything down with numbers and make comparisons with other industries.

The main mining companies have come together to form the "Bitcoin Mining Council," in partnership with the company MicroStrategy, which has made it possible to gather reliable data representing 43% of the market.

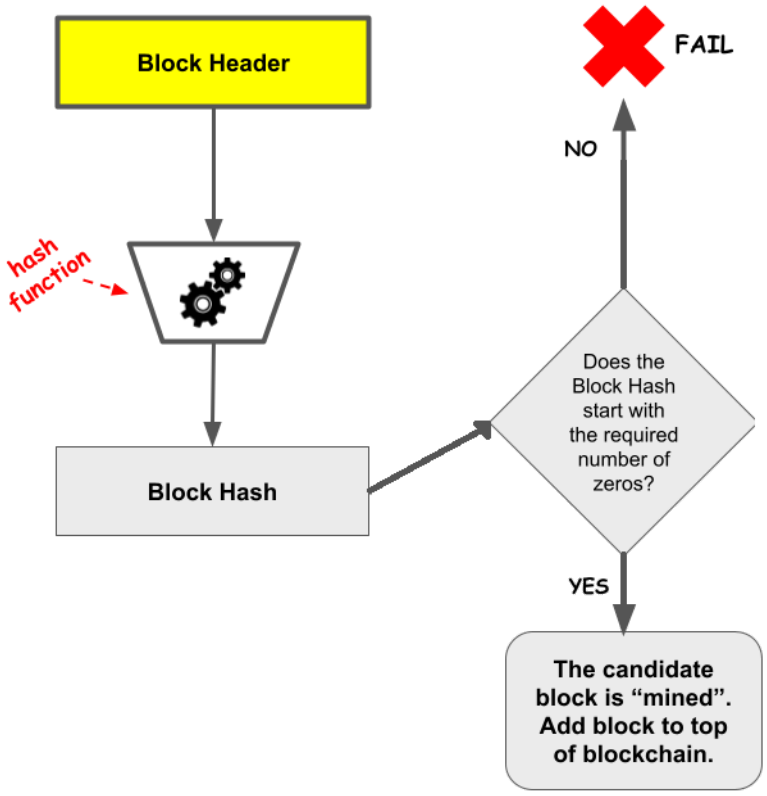
In short, even if you already have prior knowledge, it's still worth reading to discover new ways to reuse the heat generated by the Bitcoin mining equipment and understand the importance of miners in stabilizing the energy grid.

Roberto Santacroce Martins
Programmer, Santacroce Tech Founder

WHAT IS BITCOIN MINING?

Bitcoin mining adds transactions to Bitcoin's blockchain, ensuring network security and transparency. Each Bitcoin transaction is stored in a block that miners compete to add to the blockchain. This competition relies on Proof-of-Work (PoW), where miners use computing power to generate random hashes, searching for a value that meets the network's difficulty target. It's a trial-and-error process, similar to a lottery—more computing power increases the chances of success.

Mining serves two main purposes: securing the network by validating transactions and distributing new bitcoins as rewards to miners. These rewards motivate miners to maintain network security. Bitcoin's decentralized structure means no single entity controls it; miners worldwide collectively uphold the system's integrity. Mining ensures that Bitcoin remains a peer-to-peer digital currency, free from central control.



Basics of the Bitcoin mining hashing process.

IS BITCOIN'S ENERGY WASTED?

Bitcoin's energy usage is often criticized as wasteful, but many efforts are repurposing this energy efficiently. For instance, the heat generated from mining operations is reused for practical purposes. In colder climates, Bitcoin miners use the heat from their ASIC rigs to warm homes, greenhouses, and even water for swimming pools. This lowers mining operational costs and supports sustainability by converting excess heat into usable energy.

Stranded natural gas from oil drilling, which would otherwise be flared off, is diverted to Bitcoin mining operations. This allows companies to monetize wasted energy, creating productive output while decreasing emissions. Moreover, Bitcoin mining is increasingly situated in areas with surplus renewable energy, such as remote hydroelectric plants, that would otherwise remain unused. These examples demonstrate that Bitcoin mining often transforms surplus or stranded energy rather than wasting it.

Bitcoin mining facility using flare gas.

WHAT ARE ASIC MINING RIGS AND HOW DO THEY WORK?

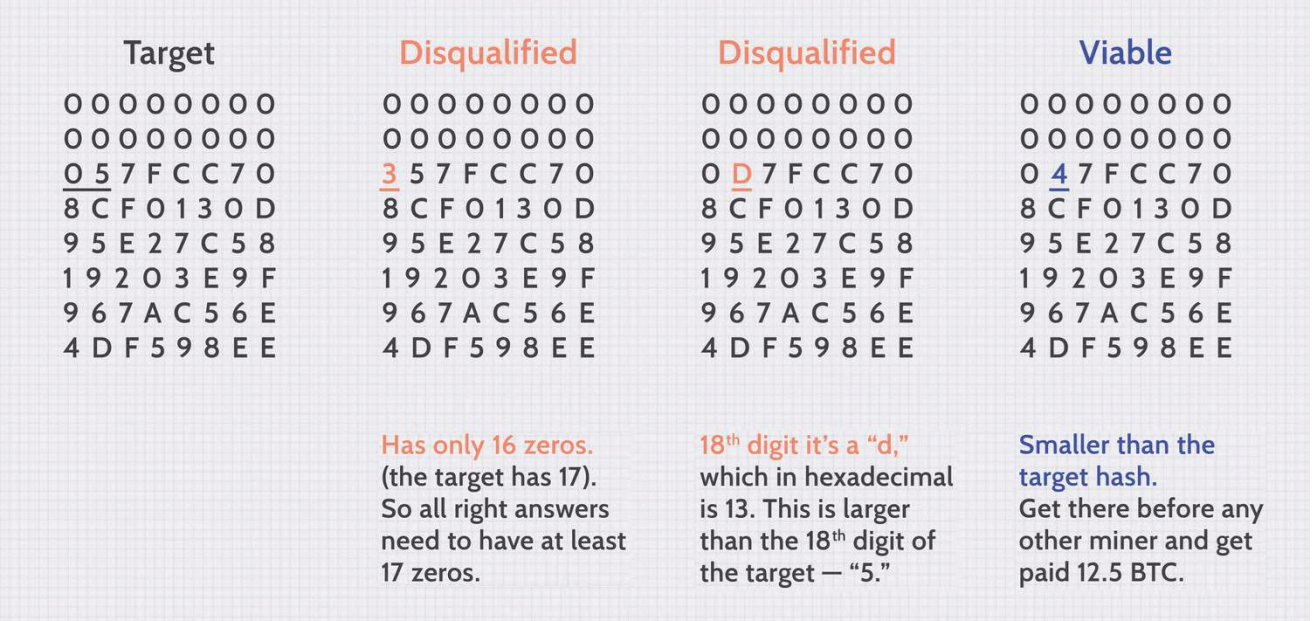
Application-specific integrated circuit (ASIC) miners are specialized hardware designed exclusively for mining Bitcoin. Unlike general-purpose computers like CPUs or GPUs, which perform various tasks, ASICs are optimized solely for mining. They efficiently compute hashes for Bitcoin's Proof-of-Work algorithm, SHA-256, making them significantly faster and more energy-efficient than other mining equipment.

Examples of hashes generated by the SHA256 algorithm.

ASIC miners generate the highest possible number of hashes to find a valid block. Each miner proposes a block of transactions and processes it through the SHA-256 algorithm. If the hash is valid and within the limits proposed by the network, the miner adds the block to the blockchain and receives a reward. Using ASICs ensures efficiency in handling the eventual increase in Bitcoin mining difficulty, making them the best option to keep the network secure even in case of an increase in the required computational power.

WHY CAN'T ONE SPEED UP THE MINING PROCESS?

Bitcoin mining is highly competitive, with miners racing to create a valid block first to earn rewards. If a miner increases hash power to mine faster, the Bitcoin protocol's difficulty adjustment counteracts this. Every 2016 blocks (approximately 14 days), the system adjusts the target, often requiring more leading zeros in the hash, which makes it harder to find a valid block, aiming for an average mining interval of 10 minutes.

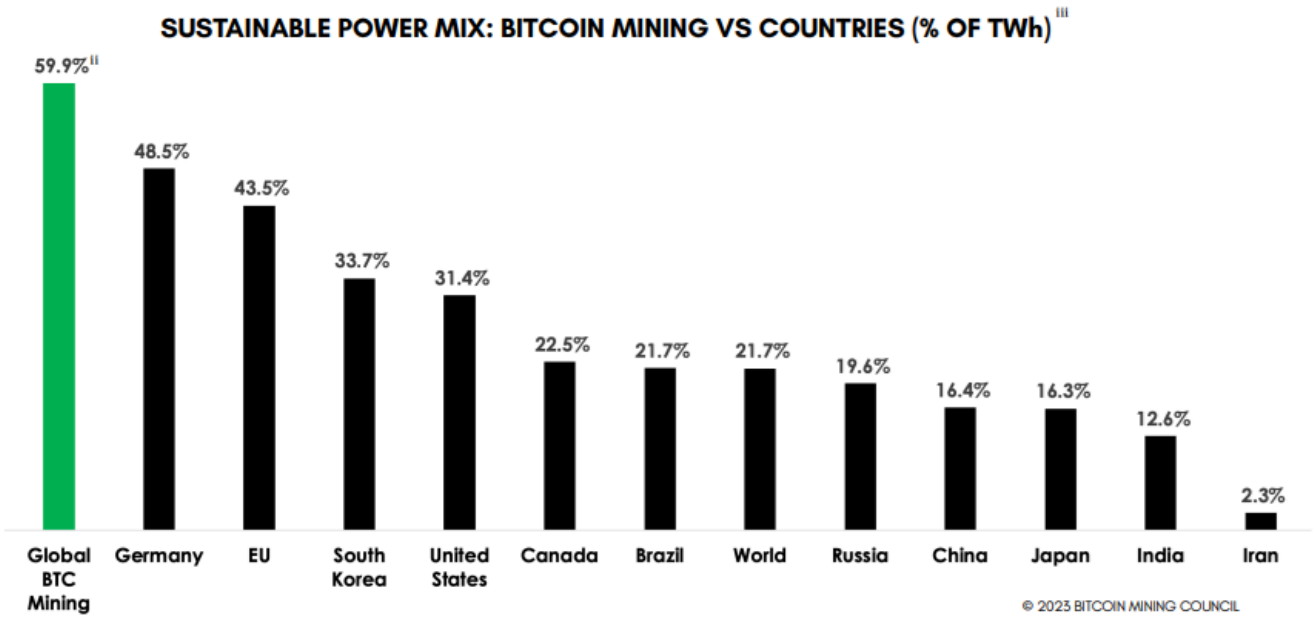


How to get a valid hash. Source: investopedia

For instance, adding a leading zero reduces the success probability to 1 in 256 attempts. As more miners join and hash rates rise, difficulty scales to maintain steady block production. This feedback loop prevents any miner from significantly speeding up mining, ensuring predictable Bitcoin issuance, network security, and decentralization.

HOW MUCH ENERGY DOES BITCOIN MINING CONSUME?

Bitcoin mining consumes substantial energy due to the computational power required for Proof of Work. The network's annual energy consumption is estimated at around 348 TWh, which is less than the 420 TWh used by clothes dryers in the US alone. However, this narrative doesn't capture the whole picture. Approximately 60% of Bitcoin mining operations use renewable sources like hydro, wind, and solar.

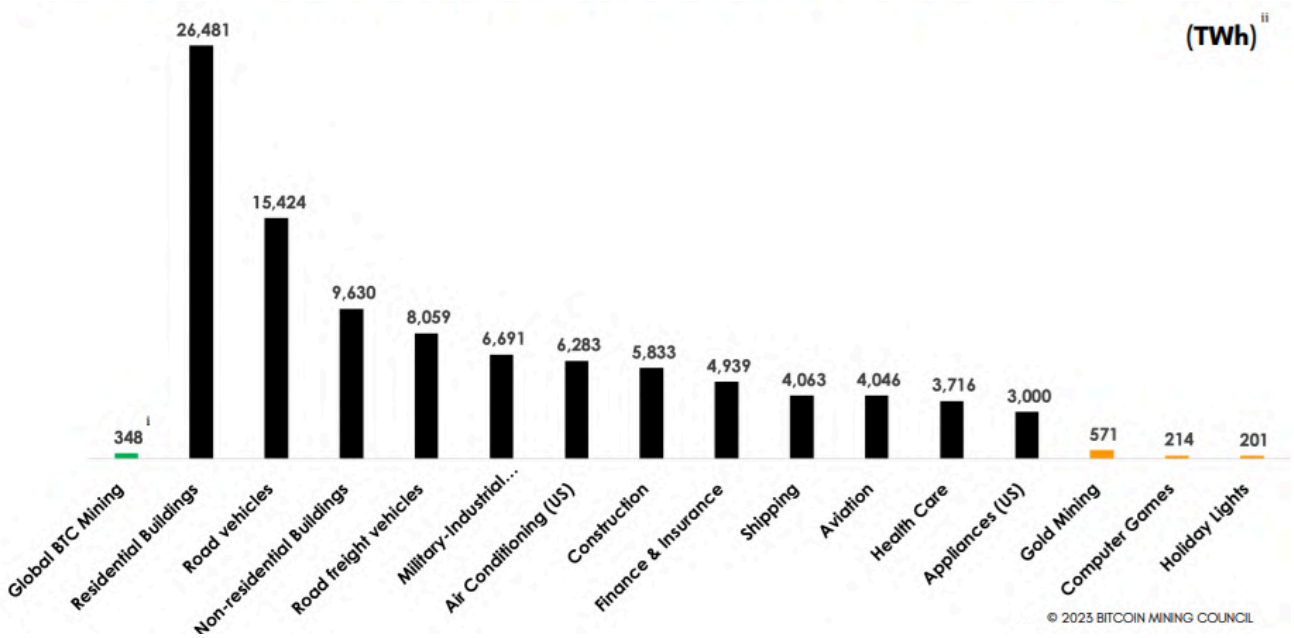


Bitcoin sustainable energy use vs. major countries.

Mining often moves to regions with abundant, cheap excess energy. Additionally, Bitcoin mining incentivizes the development of renewable energy infrastructure, providing steady electricity demand in underutilized regions. Over time, improved mining efficiency and a shift to greener energy sources continue to reduce Bitcoin mining's environmental impact.

HOW DOES BITCOIN MINING STAND IN TERMS OF ESG?

Gold mining has a significant environmental impact, contributing heavily to deforestation, particularly in the Amazon, where illegal mining accounts for up to 90% of deforestation in certain regions. Besides land degradation, gold mining releases toxic mercury into water systems, posing long-term health risks to nearby communities. Moreover, it contributes to 38% of global mercury emissions, further worsening its environmental footprint.



Bitcoin annual energy consumption vs. other industries.

Bitcoin mining is more transparent and offers potential for energy recovery. In contrast, gold mining relies on the destructive extraction of resources, while Bitcoin's energy use supports a decentralized financial system that can be more environmentally sustainable as it transitions to green energy.

WHY CAN'T BITCOIN MOVE TO PROOF-OF-STAKE?

Transitioning Bitcoin to a Proof-of-Stake (PoS) system is incompatible with its core principles and security. Unlike mining, which has no alternative replicates Bitcoin's unique security through competition, PoS replaces the energy-intensive mining with wealth control. This shift would centralize power in wealthy holders instead of decentralized mining. In PoS, wealthy participants can modify monetary rules, creating a fiat-like system with concentrated control instead of being democratized.

The blockchain trilemma. Source: SEBA Bank

Most wealth in staking models is generated without energy expenditure and allocated to founders, maintaining network control. Bitcoin's mining mechanism ensures attacking the network requires significant electricity and capital investment, deterring malicious actions via economic incentives. The benefits of this approach, including robust security and decentralized governance, outweigh energy costs. Therefore, Bitcoin's Proof-of-Work energy expenditure is justifiable.

THE EXPERIENCE OF BITCOIN MINERS IN TEXAS


CNBC CRYPTO WORLD

Texas paid bitcoin miner Riot $31.7 million to shut down during heat wave in August

PUBLISHED WED, SEP 6 2023•5:08 PM EDT
UPDATED THU, SEP 7 2023•9:58 AM EDT

Texas is a major hub for Bitcoin mining due to its abundant energy resources like wind and solar power and a favorable regulatory environment. Competitive energy prices attract miners seeking cost optimization. A key advantage is access to "demand response" programs, allowing miners to shut down during peak demand, such as extreme weather, and sell energy back to the grid, supporting the state's power infrastructure.

This flexibility enables Bitcoin miners to stabilize the energy market by balancing supply and demand, especially during energy scarcity. In return, miners receive compensation for contributing to grid stability, enhancing their revenue. The synergy between Texas's energy sector and Bitcoin mining creates a mutually beneficial relationship, with miners accessing cheap, plentiful power while supporting the state's grid resilience.

SANTACROCE'S PICKS

Bitcoin Mining: A Paradigm Shift in Energy

Harry Sudock is the Chief Strategy Officer at Griid, Will Roberts is the Co-CEO at IREN, Erik Hersman is the CEO of Gridless, Thomas Pacchia is a Board Member of Stronghold, & Dennis Porter is the CEO of Satoshi Action Fund. In this interview, they discuss bitcoin mining sustainability, accessing stranded energy and the Bitcoin halving.

https://www.youtube.com/watch?v=SUm8e7UeVdE

ABOUT US

Santacroce Tech is a dedicated blockchain technology company committed to scalability and decentralization. We're actively participating in the Stratum V2 development, fine-tuning mining protocols to achieve better efficiency and providing flexibility to the miners.

Additionally, Santacroce Tech is innovating in the Ethereum space by creating an automated staking platform that simplifies the Proof-of-Stake process for users, prioritizing security and ease of use. Lastly, we're also engaged in zero-knowledge proof privacy solutions.

Our twenty year proven experience in the tech industry and strong partnership with hardware suppliers allows us to manage data centers with proprietary security modules to ensure streamlined and efficient systems in the cryptocurrency ecosystem.

CONTACT INFO

[redacted]

Count on Santacroce Tech's content to guide you through the dynamic digital asset and blockchain industry. Subscribe now for invaluable insights! For business inquiries or general questions, please don't hesitate to contact us at info@santacroce.xyz

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