

Green Crypto Mining: A Quantitative Analysis of the Profitability of Bitcoin Mining Using Excess Wind Energy

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Abstract : This paper employs econometric analysis to quantify the potential profit wind farms can receive by allocating excess wind energy to power bitcoin mining machines. Cryptocurrency mining consumes a substantial amount of electricity worldwide, and wind energy produces a significant amount of energy that is lost because of the intermittent nature of the resource. Supply does not always match consumer demand. By combining the weaknesses of these two technologies, we can improve efficiency and a sustainable path to mine cryptocurrencies. This paper uses historical wind energy from the ERCOT network in Texas and cryptocurrency data from 2000-2021, to create 4-year return on investment projections. Our research model incorporates the price of bitcoin, the price of the miner, the hash rate of the miner relative to the network hash rate, the block reward, the bitcoin transaction fees awarded to the miners, the mining pool fees, the cost of the electricity and the percentage of time the miner will be running to demonstrate that wind farms generate enough excess energy to mine bitcoin profitably. Excess wind energy can be used as a financial battery, which can utilize wasted electricity by changing it into economic energy. The findings of our research determine that wind energy producers can earn profit while not taking away much if any, electricity from the grid. According to our results, Bitcoin mining could give as much as 1347% and 805% return on investment with the starting dates of November 1, 2021, and November 1, 2022, respectively, using wind farm curtailment. This paper is helpful to policymakers and investors in determining efficient and sustainable ways to power our economic future. This paper proposes a practical solution for the problem of crypto mining energy consumption and creates a more sustainable energy future for Bitcoin.

Keywords : bitcoin, mining, economics, energy

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