

Nuclear Power and Cryptocurrency Mining

A Clean Energy Partnership



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In February 2020, with bitcoin at \$9,275, the business case for mining with nuclear power was a compelling value proposition. Now, at \$47,300, that same proposition is much more compelling. When this value proposition is coupled with the mandate for non-carbon-emitting energy use in cryptocurrency mining, nuclear power is a strong partner.

ScottMadden's original paper, "[Bitcoin Mining and Nuclear Power: Uses for Surplus Power and Diversifying Revenue](#)," highlighted how nuclear power plants could diversify their revenue base by co-locating bitcoin mining with nuclear power plants. Our analysis showed that at a bitcoin price of \$9,275, cryptocurrency mining could provide an opportunity to grow revenue and continue to provide safe, reliable carbon-free electricity.

With a bitcoin price of \$47,300 as of August 26, 2021, along with the environmental, social, and governance (ESG) criticism facing the bitcoin mining industry, the combined opportunity for both nuclear and bitcoin mining has never been greater. Bitcoin mining with surplus or undervalued carbon-free nuclear power presents opportunities for both parties, and in our view, it creates a strong clean energy partnership.

The Financial Opportunity

To get an idea of the scale of a conceptual mining operation, take a plant producing 1 MW of surplus power. Diverting that power to a cryptocurrency mining farm could, depending on the hardware, power anywhere from 300 to 900 individual mining computers.¹ A continuously operating 1 MW-sized mining operation with the most efficient miners, a power cost of .06\$/kWh, and an initial investment of \$1 million can conservatively generate a top-line revenue of \$4.5 million per year and profits of \$4 million. Our analysis predicts a small project with electrical and network upgrades could break even in approximately six months not accounting for cooling, repairs, or service technicians.²

This conceptual project was analyzed at a bitcoin price of \$45,000. A higher bitcoin price will increase profit for the same cost of goods sold (COGS). Also, as the operation scales and consumes more surplus power, revenue and profits are expected to grow at a faster rate than COGS. At today's price, it might be more profitable for utilities to mine bitcoin than to supply electricity to the public grid.

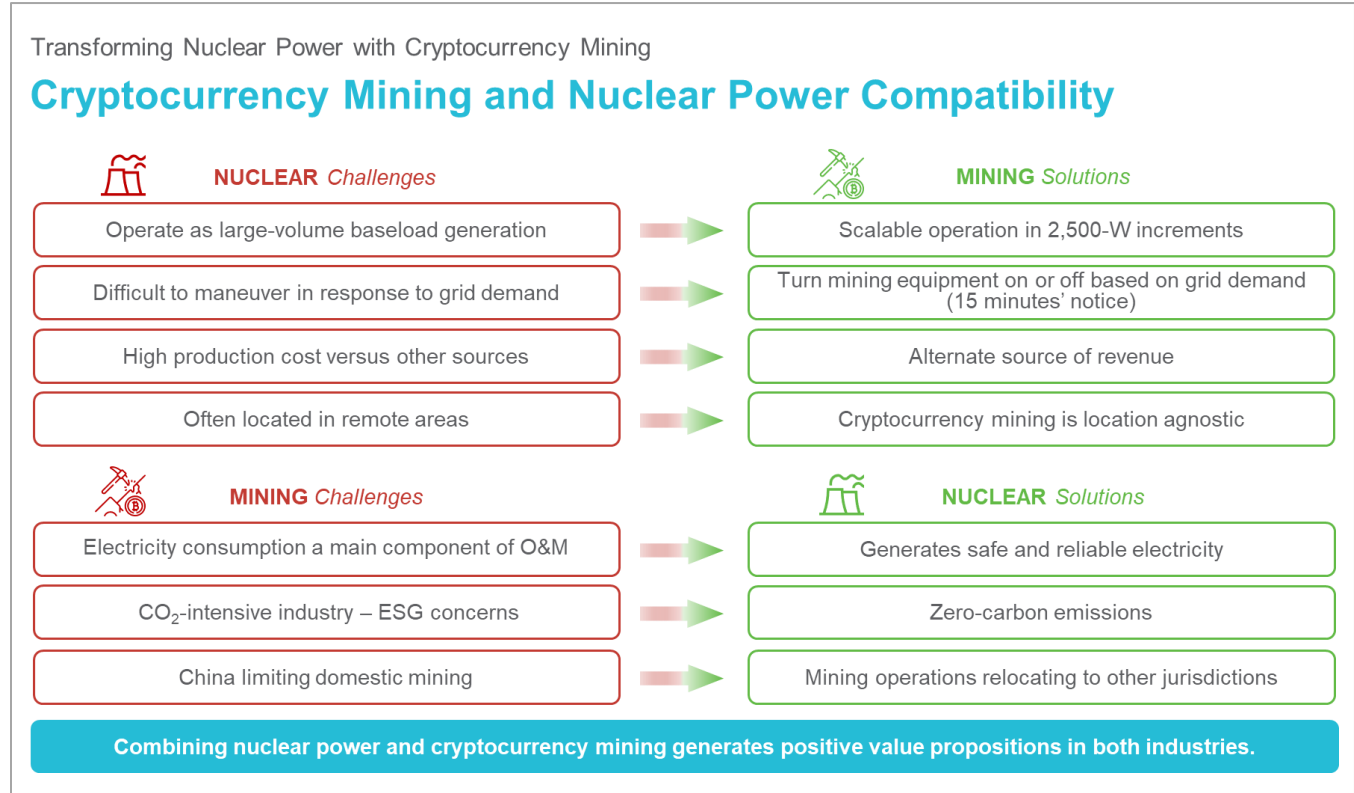
An Excellent Partnership

In our first paper, ScottMadden noted the complementary value propositions for the nuclear power industry and the cryptocurrency mining industry. Over the past year, these complementary value propositions have only strengthened.

¹ <https://beincrypto.com/learn/best-cryptocurrency-mining-hardware>

² Power Price \$.06/kWh; Difficulty 15.5T; Pool Fee 2%; Recurring Cost \$2,500/month; Block Reward 6.25BTC; Difficulty Change +2%/month

Value Propositions between Nuclear Power and Cryptocurrency Mining



Cryptocurrencies are gaining acceptance as a new asset class worldwide. Large public companies, like Square, Tesla, and MicroStrategy Inc., are purchasing cryptocurrency as a percentage of their corporate treasury. Other investors are interested in cryptocurrency to supplement cash holdings and to protect against inflation. Electric utilities that operate nuclear power plants and that are mining their own cryptocurrency could use it as a hedge against inflation on their own short-term treasury assets.

Nuclear power can become a major source of electrical power to the cryptocurrency mining industry. By doing so with reliable, carbon-free electricity, nuclear plants will help stabilize cryptocurrency's network, support its growth, and further the adoption of cryptocurrency assets into the mainstream economy. The combination of excess and carbon-free, nuclear-generated electricity creates a unique value proposition for both industries. Not only will nuclear plants establish a new revenue source by mining cryptocurrency, but they will also help decarbonize an industry and make bitcoin even more attractive to a large number of institutional investors with ESG objectives.

The following points illustrate the complimentary value propositions that make the alliance between nuclear and cryptocurrency mining compelling beyond the economics:

Nuclear Challenges Met by Cryptocurrency Mining

- Nuclear power operates as a large-volume baseload power generator on the local grid. Due to most nuclear plant designs, which were intended to run continuously, plants are challenged to operate in markets where there is a high penetration of renewables and other intermittent power sources. This leads to the potential for excess nuclear power.

- That excess power can be consumed by cryptocurrency mining. Mining computers can be scaled in 2,500-W increments to meet the surplus power generated by the nuclear plant. Additionally, cryptocurrency mining is able to be switched on and off. The mining operation can be paused when demand for power from the plant is high and switched back on when market demand is low.
- Nuclear power is finding it difficult to compete with other generation sources in some markets based solely on price. Cryptocurrency mining provides a stable, revenue-producing load for a nuclear plant's excess power.
- Nuclear plants are typically not located close to load centers. Cryptocurrency mining is location agnostic, making co-location an excellent option.

Cryptocurrency Mining Challenges Met by Nuclear Power

- As cryptocurrency gains popularity, acceptance, and integration into the broader economy, positioning cryptocurrency mining with carbon-free sources, like nuclear, offers benefits to the cryptocurrency industry.
- ESG committees at institutional and sovereign funds currently limit investments in cryptocurrencies due to carbon emissions thereby limiting the marketplace of investors.³
- Cryptocurrency mining consumes substantial amounts of electrical power worldwide. One expert estimates it uses 77.78 TWh of energy—equivalent to Chile's energy consumption.⁴ Nuclear power plants that cannot sell 100% of their power can utilize that extra power for mining to help decarbonize the industry.
- Due to concerns around the CO₂ produced in China by cryptocurrency miners, the government is pushing the industry out of the country. Miners are looking for new energy partners in nearby countries and around the world. This presents an opportunity to areas of the world with inexpensive, reliable sources of power—especially nuclear.

Key Takeaways



Cryptocurrency and nuclear power benefit each other.



Cryptocurrency will benefit from a non-carbon-emitting, stable, and cost-competitive power source.



Nuclear power plants will generate additional revenue and remain available to the grid.



The more stable and carbon-free cryptocurrency becomes, the more valuable current mining operations become.

³Kevin O'Leary Yahoo Finance Interview. Bitcoin Conference Miami 2021. <https://news.yahoo.com/yahoo-finance-presents-investor-entrepreneur-145345400.html>

⁴Alex de Vries. <https://www.cnbc.com/2021/02/05/bitcoin-btc-surge-renews-worries-about-its-massive-carbon-footprint.html>

How We Can Help

ScottMadden helps clients across a range of areas in nuclear generation. We have supported our clients with the following solutions with respect to co-locating bitcoin mining and power plants:

- Education – ScottMadden can assist in educating and informing key stakeholders (internal and external) on the cryptocurrency industry, mining challenges, and opportunities.
- Business Model and Strategic Planning – Utilities can benefit from the knowledge of an independent expert to help evaluate the best partner and deal structure for any mining operation from self-perform, joint venture, or power purchase agreement.
- Business Case Development – ScottMadden can generate a clear financial and investment picture for management, stakeholders, and investors.
- Implementation – With firsthand knowledge of the cryptocurrency mining industry and a deep knowledge of utilities, ScottMadden is perfectly positioned to assist utilities that wish to implement pilot projects or large-scale mining operations.
- Innovation – ScottMadden can lead your team through the steps required to explore, prove, fund, implement, and manage the new revenue stream.

About ScottMadden

ScottMadden is the management consulting firm that does what it takes to get it done right. We consult in two principal areas—Energy and Corporate & Shared Services. We deliver a broad array of consulting services ranging from strategic planning through implementation across many industries, business units, and functions. To learn more, visit www.scottmadden.com.

About ScottMadden's Energy Practice

We know energy from the ground up. Since 1983, we have served as energy consultants for hundreds of utilities, large and small, including all of the top 20. We focus on Transmission & Distribution, the Grid Edge, Generation, Energy Markets, Rates & Regulation, and Corporate Services. Our broad, deep utility expertise is not theoretical—it is experience based. We have helped our clients develop and implement strategies, improve critical operations, reorganize departments and entire companies, and implement myriad initiatives.

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