NASHVILLE ENERGY & MINING SUMMIT 2026

MONETIZING THE MEGAWATT

How Bitcoin, AI,and HPC are Building the Future of Modern Energy

PRESENTED BY:

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Editor's Note:

The greatest difficulty for a Bitcoin miner is to be understood. Our industry has been villainized, mocked, banned, blocked, and unceremoniously relocated. Yet today, after years of hard work, innovation, and day-by-day execution by passionate entrepreneurs and advocates, **we have found our voice** as an industry. The conversation has shifted.

It is our pleasure to assemble industry experts and their stories of innovation. We hope you will enjoy them as much as we enjoy telling them.

Contributors:

Thank you to our incredible Bitcoin Park community and supporters. We could not do this work without your insight and guidance.

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Introduction:

The modern history of human prosperity has been one of mastering resource acquisition, resource transportation, and efficient assembly into finished products.

This is the story of the American Industrial Revolution, the Technological Revolution, the Machine Age, Jet Age, Atomic Age, and on and on towards our modern Information Age. Technologies advance, and **unlock productivity**; a new, small fire of innovation for humans to gather around, stoked by proximity to abundant and varied resources, population centers, and some means of getting things to and from.

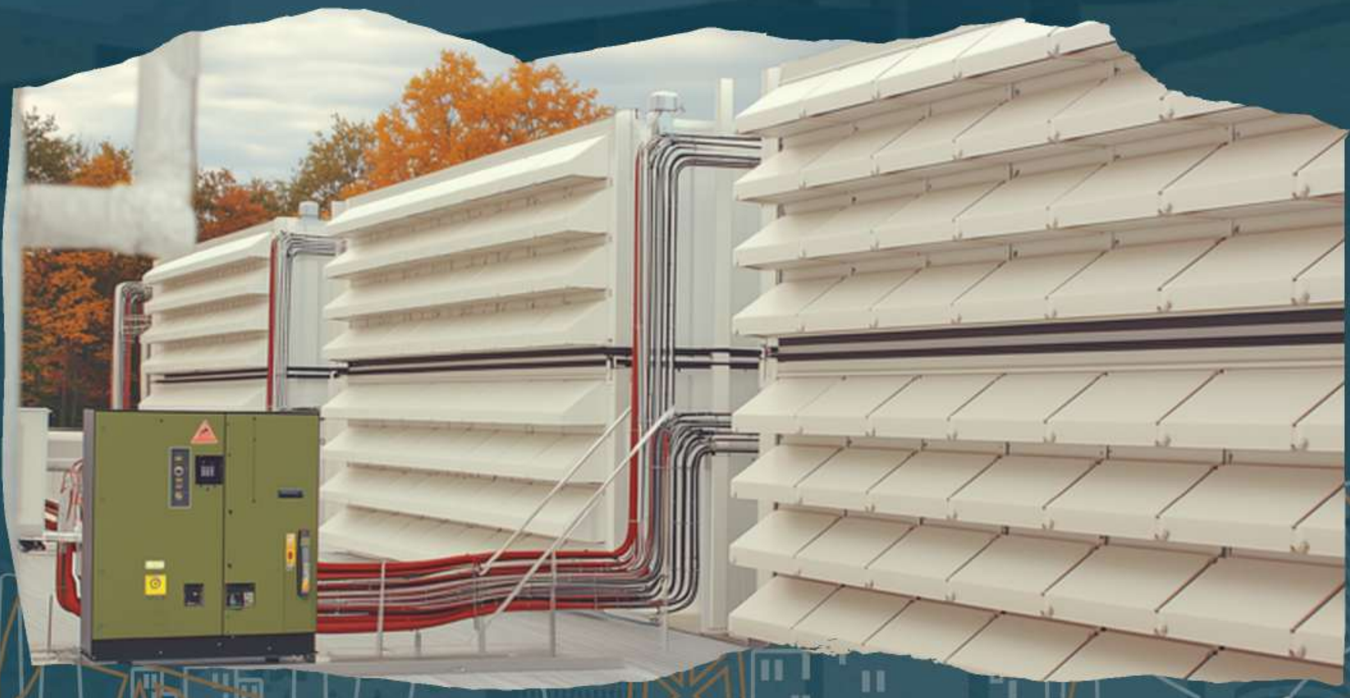
Henry Ford was a master of this model. In the early 20th century, he acquired a 130-acre plot of land in Highland Park, Michigan and built his moving assembly line in a plant lovingly nicknamed the 'Crystal Palace'. Ford's goal, of course, was the production of the Model T, a finished product manufactured near the population center of Detroit, by a business with diverse supporting acquisitions, ownership in hundreds of thousands of acres of forest, large mines, and tracts of land rich with coal and other minerals.

Prizing strategic location, vertical integration, and obsessive efficiency, Ford's ultimate goal was for, "a continuous, nonstop process from raw material to finished product, with no pause even for warehousing or storage."

In 2026, the 21st Century and Information Age are well underway. While Ford's manufacturing aspiration of continuous production may seem antiquated, it is only now, with **the emergence of a new class of productive 'assembly lines'**, location-invariant 21st century loads, that we can finally achieve Ford's aim.

Bitcoin mining, AI model training, inference, and high-performance computing (HPC), are modern 'Crystal Palaces', not, as Ford's building was dubbed, due to the monolithic walls cluttered with thousands of glass window panes, but rather because of the silicon within the chips that drive these modern marvels of 21st century 'manufacturing'.

Where Ford's factory demanded the coordination of geographically dispersed resources, complex transportation schemes, and trained assemblers, the **'Crystal Palaces' of the Information Age require nothing more than the right hardware, proximity to electrical inputs, and a stable connection to the internet.** For the silicon chip, its work is instantaneous, its product finds a willing market in milliseconds, and 'production' can be started and stopped near instantaneously.



This unprecedented flexibility means 21st century loads **now migrate to energy resources,** rather than being geographically constrained by talent, transportation, or access to inputs. Bitcoin miners, have been affectionately described as a kind of "dung beetle," hunting across the world for excess, wasted, or ill-positioned resources to consume and monetize. They flock to where power is cheap, from remote mountain hydro facilities, to isolated oil wells flaring gas. State of the art AI and HPC loads *also* hunt for abundant, reliable energy resources from which to build their compute clusters, yet they are a far newer type of 'Crystal Palace', whose impact is yet to be fully felt.

Much of the public conversation to date has centered on Bitcoin mining's aggregate energy consumption and grid impacts – often casting it simplistically as a grid savior or villain. What's missing, however, is a look under the hood at how different operations build their businesses. There's scant discussion of exactly how these entrepreneurs run their various Crystal Palaces, the real-world design, economic modeling, hard work and simple good sense that miners and data center operators across the world use to turn raw inputs and electrons into economic value.

In this paper, we aim to address this gap and answer the question: **"How do these various modes of large and small-scale electrical consumption monetize energy resources across the globe?"** In other words, how do Bitcoin mining, AI, and other compute-heavy processes serve as the modern bridge between abundant or untapped energy and financial return?

We will introduce a framework to help schematize *how* these loads monetize energy, then we explore specific, illustrative case studies spanning from idealistic hobbyist mining to multi-hundred megawatt, utility-integrated data centers. By examining these cases, and hearing the voices of their builders and operators, we will watch the core pieces of the megawatt monetization puzzle unfold. From cost parameters to operational strategies, we will see how each use case optimizes for slightly different conditions. Finally, we'll discuss where these trends are moving, and how these flexible loads might shape the future of modern energy systems across the world.

A Model for Monetizing Energy

To analyze how Bitcoin miners, AI/HPC data centers, and other 21st Century loads monetize the megawatt, we'll establish a simple parametric model and visualization methodology. **Akin to a "mining (or computing) profitability simulator,"** we can take in a range of input variables, and produce outputs that allow us to assess the many ways practitioners maintain profitability given operational constraints. The primary purpose is to demonstrate revenue generation against a variety of conditions and costs, and greatly simplify our ability to visualize what makes each of these businesses different. We will rely heavily on narrative and imagery instead of spreadsheets and formulas to make understanding these models as intuitive as possible to the non-technical reader. But first, a model.

Every bitcoin mining operation can be described by using the following parametric model:

Revenue + Heat Credit + Load Credit = Profit – Electrical Cost – OpEx

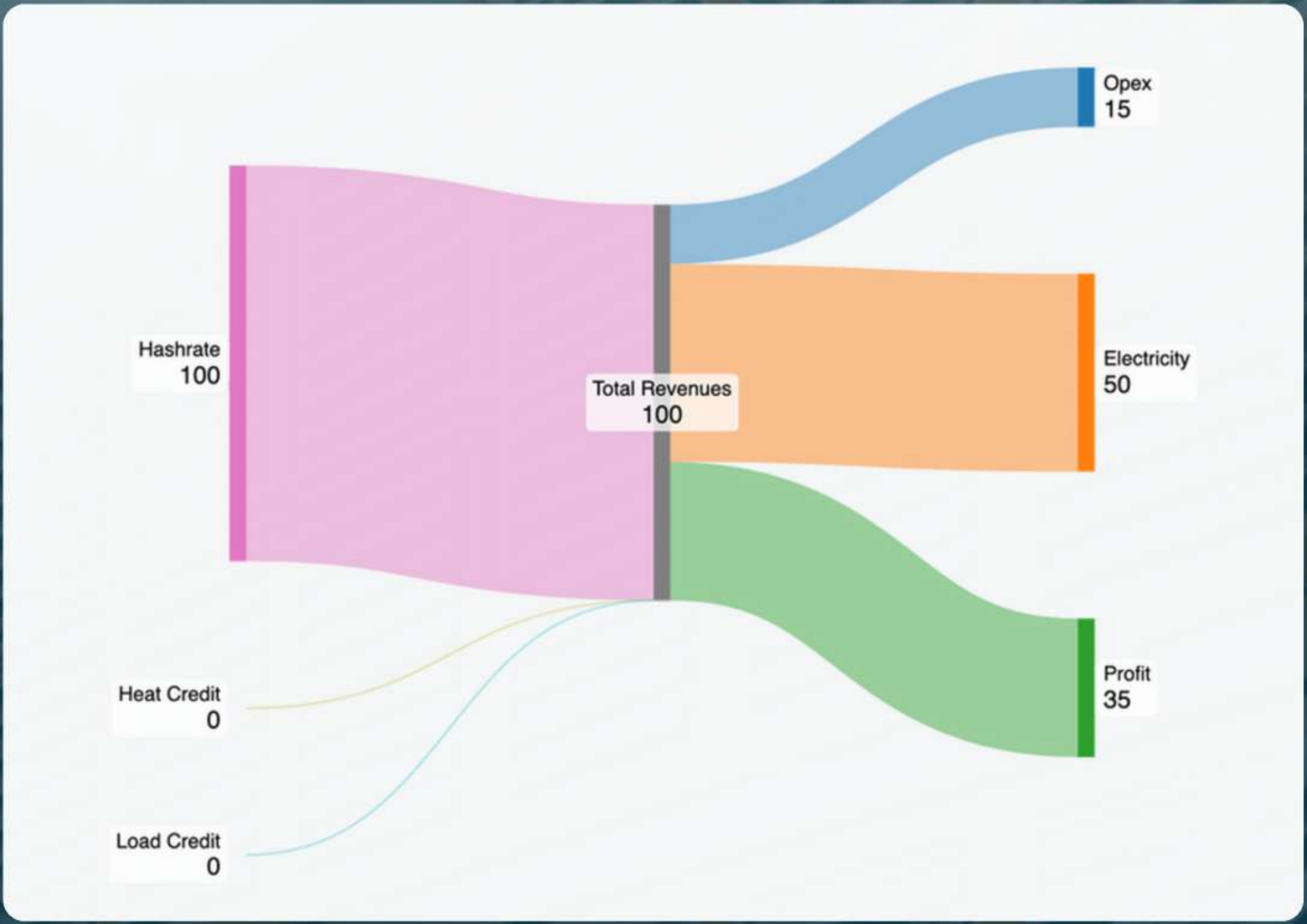
Simple Definitions

- **Revenue**: Revenue is how the business monetizes electricity consumption. This may be by generating hashes, executing scientific processing work, performing AI compute, or other forms of revenue not defined below.
- **Heat Credit**: A specific type of revenue from the value of heat generated.
- **Load Credit**: A specific type of revenue from value of electrical capacity or load, outside of the value generated directly from compute.
- **Electrical Cost**: Electrical cost is the final delivered cost of megawatts to a load. Electrical costs vary widely as a function of source type, availability, and other external factors.
- **Operational Expenses**: Sum of all other running costs in a given period (personnel, maintenance, leases, financial hedges or other financial instruments, and fees).
- **Profit**: The excess value generated by the miner, once all revenues are summed and all expenses are subtracted out.

What Isn't Included

For the sake of simplicity, we don't consider infrastructure purchases of machines, changing market assumptions, depreciation, or cost of capital in this introductory version of our model. We can, when necessary, include high level CapEx or depreciation when relevant to model payback.

Note: There are many, many details that are considered and optimized for when building and operating a 21st century load. Entrepreneurs model for scale, environment, machine type, capital efficiency, and a variety of other necessary factors. To save readers from the introductory requirement of an MBA, we note that all examples are simplified and illustrative. **Real business bulding is much harder than any model can capture.**



A Visualization

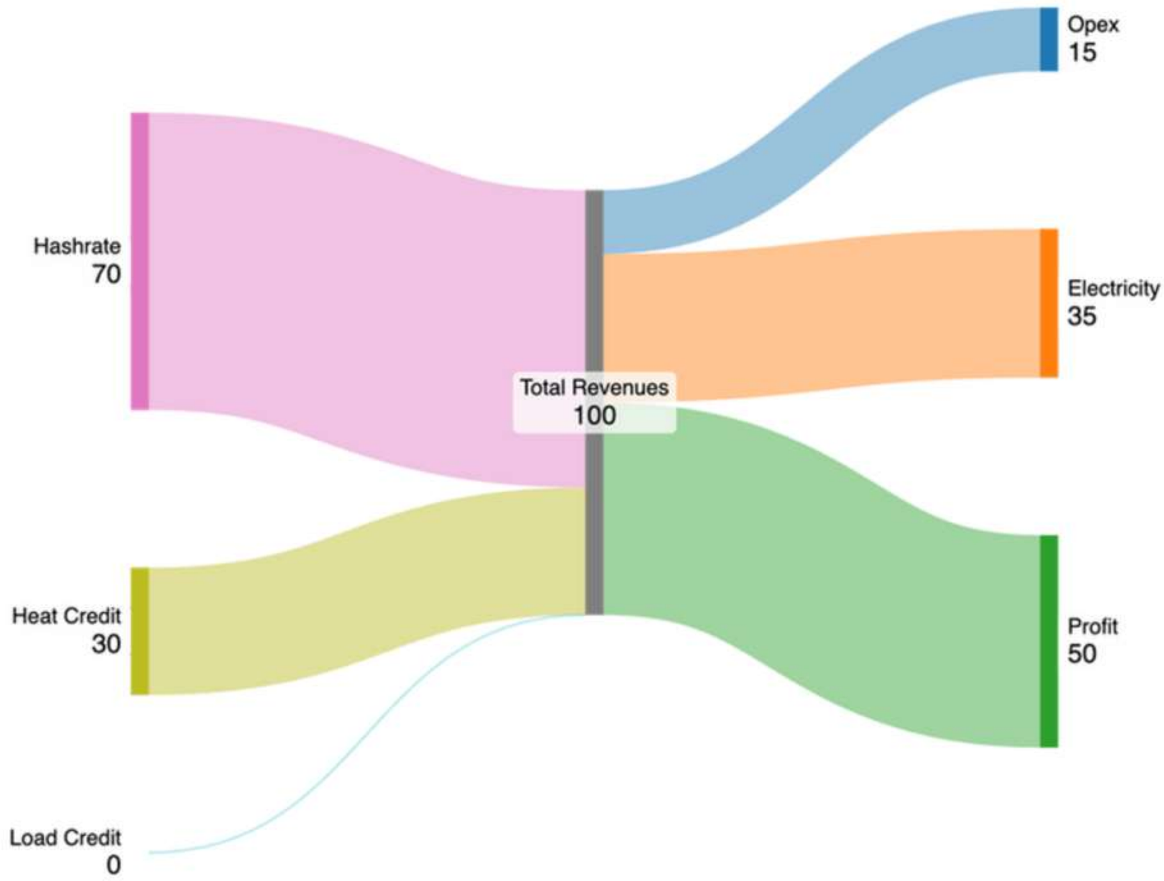
An effective way to visualize this model is by using a **Sankey diagram**, where all input revenues on the lefthand side, aggregate to 100%, and all outputs and expenses on the righthand side are visualized downstream. This method allows us to quickly see how changing inputs changes profitability for the business, where particular models excel towards optimization, and how **profit as a proportion** of excess revenues changes based on other factors.

For example, a miner who generates 100% of their revenue from hashrate might have a simplified Sankey diagram of our parametric model that looks like the above.

Note that this diagram is a **representation of proportion**. Should you find yourself using more or less efficient machines, or more or less expensive electricity, the proportions above will change. For most residential consumers of electricity, electrical price is fixed across time. For businesses that monetize megawatts, the story is more complex. There are various types of PPAs (power purchasing agreements), floating spot pricing, day ahead bidding markets, and even grid level agreements between businesses and grid operators.

For example, a fixed price consumer, using a late model S9 machine will pay substantially more in electricity to operate relative to the hashrate it produces. In certain situations, the total amount of hashrate produced may not cover the cost of the electricity. Contrarily, using the newest model S23 with a substantially greater efficiency will produce meaningfully more hashrate relative to the electricity it consumes. However, this does not mean more efficient is always better.

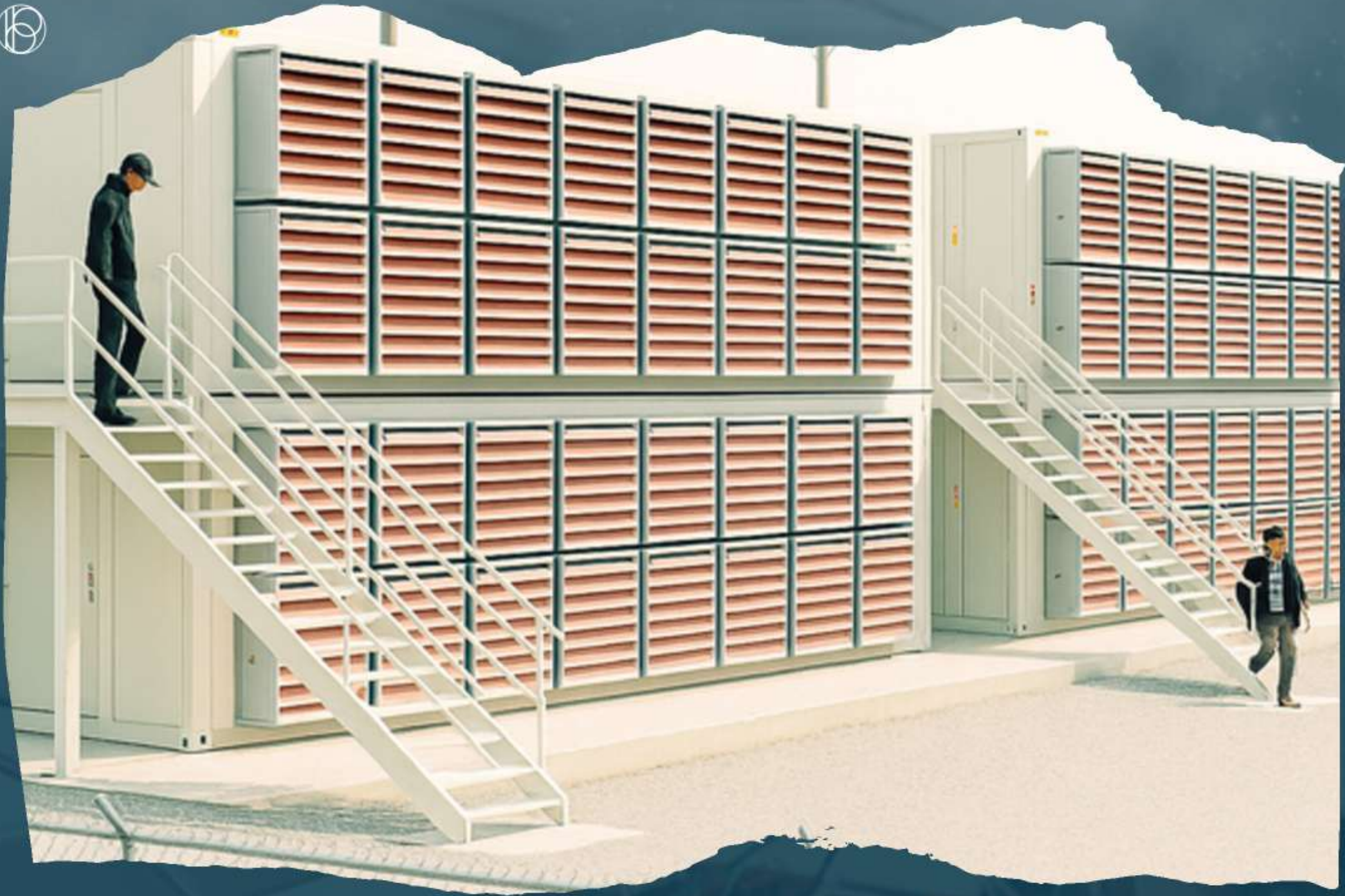
Should our example miner from before find that they can **utilize the heat** generated from their farm – this heat will offset a certain amount of their current heating cost – We can represent that as the following Sankey Diagram:



Heat credit appears as a new form or revenue, and the cost of electricity as a total proportion of costs goes down. **Similarly, hashrate now forms a smaller proportion of overall revenues.** This leaves our miner with a higher proportional profit margin and a new 'income stream' within their business.

Case Studies in Monetizing the Megawatt

Real-world farm operators employ a variety of novel approaches to turn electrons into work and profit. In the interviews that follow, we outline several of these cases. **Each case study features the voice of an entrepreneur or operator**, then uses our parametric model and Sankey Diagram frameworks to highlight their operational advantages. It is our hope that these firsthand stories and supporting tools will help to celebrate the business acumen of these operators.



Bootstrapping Grid Stability with Megawatt

Ilya Rekhter is the founder of Megawatt, an Indiana-based Bitcoin mining and energy optimization company that has quietly built a sophisticated model for **monetizing flexible electrical load**. Rekhter, a serial entrepreneur who sold his previous startup in 2019, entered Bitcoin mining, not as an energy expert, but as an investor seeking a tax-efficient way to convert capital gains into productive assets. “I saw Bitcoin mining as a way to be tax-efficient and leverage into the thing that I wanted anyway, which is Bitcoin,” he recalled. What began as a personal experiment with a few hosted machines (machines an individual purchases and pays to have operated at a third party location) scattered across the United States, quickly evolved into a vertically integrated business after early hosting arrangements fell apart, forcing him to bring hundreds of idle miners back home to Indiana.

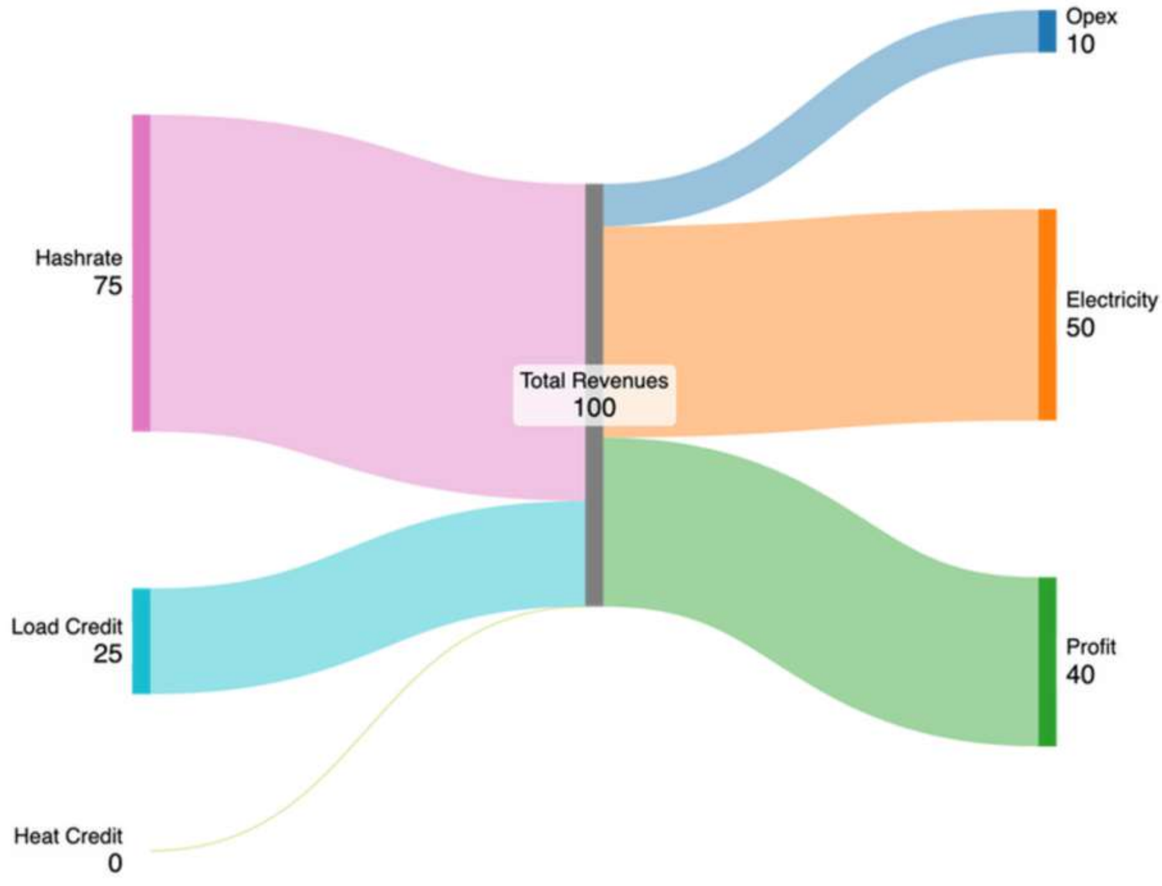
Rekhter identified an opportunity to build locally in regions with untapped grid capacity. Indiana, he reasoned, was no Silicon Valley, but it offered available energy, land, and regulatory stability. His first site, developed under a public utility, was an initial success, but exposed him to the vulnerability of large utilities that discriminated against miners. “They passed a rule saying these economic incentives were no longer applicable to Bitcoin miners,” he said. That experience prompted a legislative effort to prohibit such discrimination and led him to a cooperative conglomerate of regional utilities across the Midwest.

With them, **Megawatt was able to build out a first-of-its-kind market-based rate structure pegged to MISO’s day-ahead and real-time locational marginal pricing**. This gave him the ability to purchase electricity for tomorrow at a locked in rate today, offering improved operational stability.

Rekhter frames his business through a simple framework. Revenue derives primarily from Bitcoin mining, operating across multiple regional mines. Electrical cost is managed dynamically through bidding into the wholesale markets. “We have a real-time feed from our node for MISO (Midcontinent Independent Systems Operator, the grid operator for much of the American Midwest),” Rekhter explained. “If prices creep up, we have a strike price that we curtail at.” Their operational expenses are managed by a mix of automation and co-location near overbuilt existing substations that once powered industrial zones.

Megawatt does not currently use waste heat as Rekhter notes, “I want to figure out something to do with our heat, but nothing so far.” However, the firm does innovate in its generation of load credits. By bidding into specific time frames in the day ahead markets, then monitoring when prices spike in real time, Megawatt can sell electricity back to the grid at a profit, a practice that smooths operations, stabilizes grid function, and creates a hedged, semi-predictable cost base, “It doesn’t make or break the business, but it raises uptime and lowers overall energy cost,” Rekhter noted. The bidding system functions as a financial stabilizer, **much like oil reduces mechanical stress in an engine**. Megawatt is able to effectively improve long-term profitability while reducing wear on their sites.

The unique advantage of Megawatt’s model lies in its **synthesis of small-scale agility and market sophistication** typically reserved for gigawatt-level operators. Rekhter’s bootstrapped team competes by mastering curtailment economics and leveraging stranded infrastructure capacity across rural substations. “We’re good at it to the point where other miners are using our stuff.”



Spot Price Mining at the Cholla Innovation Lab

Cholla Innovation Lab, spearheaded by Brad Cuddy, is a division of the third-generation West Texas oil, gas, and venture enterprise led by Gideon Powell. They run a seven-megawatt, grid-connected, Bitcoin mining operation. **Primarily designed as a proving ground for industry partnerships and proof-of-concepts over raw profit maximization**.

The lab's mission is to experiment with grid integration, data collection, and controllable load technologies in collaboration with partners such as LoD, Braiins, Cormint, Upstream Data, Giga Energy, and Hayden Industrial Systems. As Cuddy explained, "Our bitcoin mining business, as scandalous as it is to say, is not about getting the best bottom line profits. We're not maximizing that here."

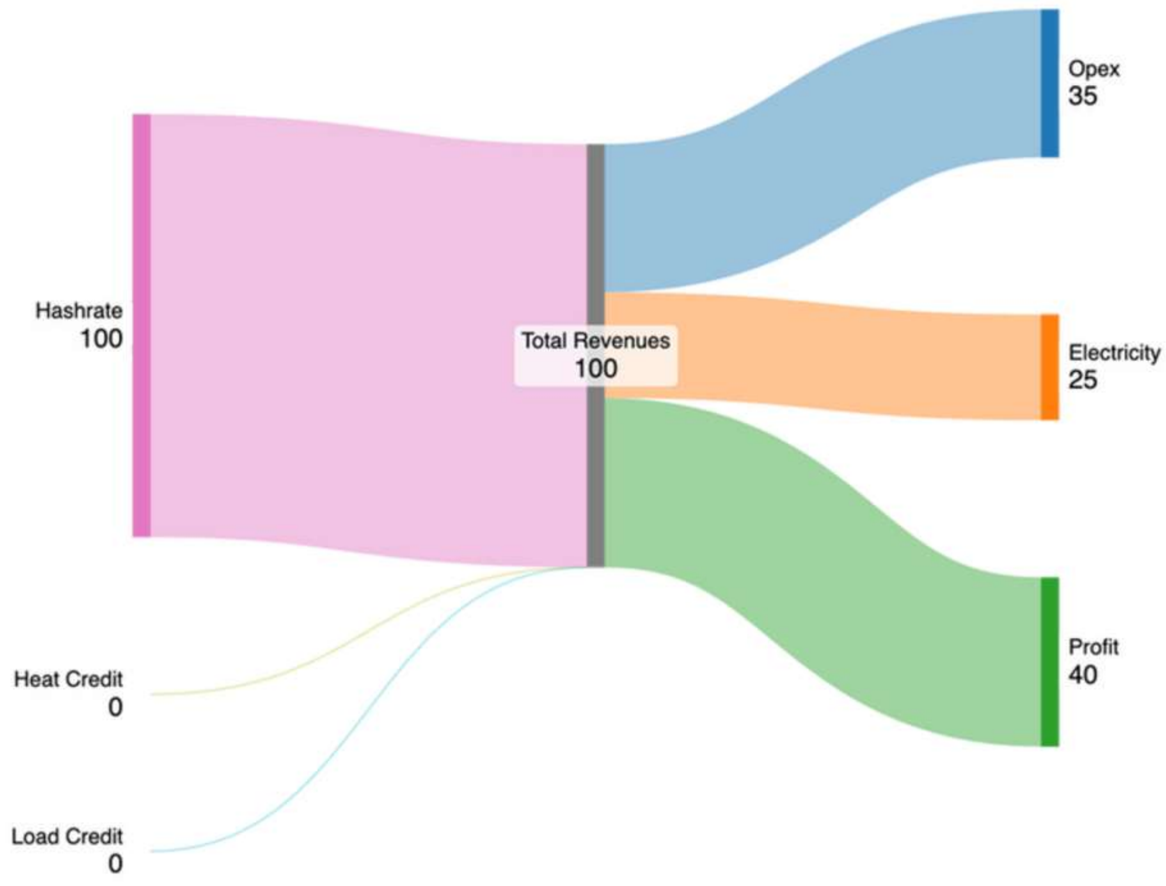
Instead, Cholla serves as an intelligence bridge between the ERCOT grid operators and the Bitcoin mining industry, demonstrating how flexible computing loads can enhance grid reliability and economic efficiency.

The lab's operational and business philosophy can be mapped over our simple parametric model. Cholla's revenue comes from its ability to monetize low-cost electricity during periods of surplus generation. Situated in Load Zone West, where the wind and solar belts converge on top of the world's most prolific oil and gas basin, Cholla benefits from some of the lowest cost and most volatile wholesale power prices in the United States. "We can't control total revenues, margins, or even uptime, but as long as we are curtailing when prices become uneconomic, we can guarantee the profitability of our operation. **If we can't make it work with incredibly cheap wind and solar power, Bitcoin mining will hardly work anywhere**."

As Cholla grows their operations, they plan to **participate in ERCOT's Controllable Load Resource (CLR) program**, which will allow them to respond to grid conditions at the nodal level rather than through the broader load zone pricing mechanism (Specifically, nodal pricing at the Cholla Innovation Lab location is more stable and lower priced than the Load Zone West average price). By qualifying as a CLR, Cuddy explained, Cholla will gain access to more granular and advantageous pricing and becomes "a beneficial reliability structure to the grid."

Electrical costs are minimized through spot price monitoring (a system where electrical grid price is priced in 5 minute intervals) and real-time response systems that automate shutdowns when power exceeds profitability thresholds. The company's operational expenditures, while higher than many due to intentional overstaffing, are treated as an **investment in community relations and education** for the Innovation Lab. "We buy used equipment, maybe spend a little bit more on opex, and employ more folks there in the local communities to get community buy-in," said Cuddy. This approach transforms the mine from an obscure local business into an embedded educational and economic asset.

The unique advantage of Cholla's model lies in its synthesis of legacy energy expertise, real-time energy market participation, and Bitcoin-native flexibility. The company positions itself at the intersection of oil, gas, data centers, and renewable energy, with the hope of playing a key role as a "true grid resource," as Cuddy put it. Their aspirations lie beyond Bitcoin into AI and high-performance computing. By proving how flexible computing can stabilize renewable-heavy grids, Cholla Innovation Lab exemplifies **the future-facing integration of digital infrastructure with physical energy systems**: pivotal actors in ERCOT's evolving landscape.



Remote Generators and Wasted Minerals with Upstream Data

Steve Barbour is the founder of Upstream Data, a Canadian company that builds **modular, off-grid power generation** systems that assist in monetizing stranded or wasted natural gas through Bitcoin mining. Founded in 2017, the company operates at the intersection of the energy and computing industries, offering mobile “Hash Generators” and “Hash Hut” load centers, that allow oil producers to capture and repurpose flared or vented associated gas, or utilized stranded gas resources.

Even with heavy investment in bitcoin mining, Barbour describes Upstream as fundamentally, “an oilfield services business,” noting that its mission remains the optimization of power generation within the oil and gas sector. The firm’s focus has grown to include distributed computing use cases, from microgrids to on-grid applications, yet its core operational advantage lies in its deep familiarity with remote industrial power systems and the economics of natural-gas-fueled generation.

The Upstream model rests on an **energy-finance equation**. For Upstream's customers, typically oil producers or power-generation facility operators, revenue emerges from monetizing surplus natural gas by generating electricity on site and consuming that electricity via Bitcoin mining.

In most cases, producers purchase a Hash Generator and provide stranded or associated gas (both natural gas and heavy oil mixed together underground) for fuel, which is then consumed in the generator to produce usable electricity. **This transforms what was previously a wasted asset and environmental liability into a productive energy input**.

Site operating expenses consist of system maintenance, primarily the generator, and operating personnel for maximizing system uptime via regular maintenance. As with all bitcoin mining projects, mining hardware is one of the largest expenses, so typically oil and gas miners prefer to utilize late model mining hardware which costs less up front, can be depreciated in full, depreciates less overall, and will still yield attractive gross margins given the low operating costs.

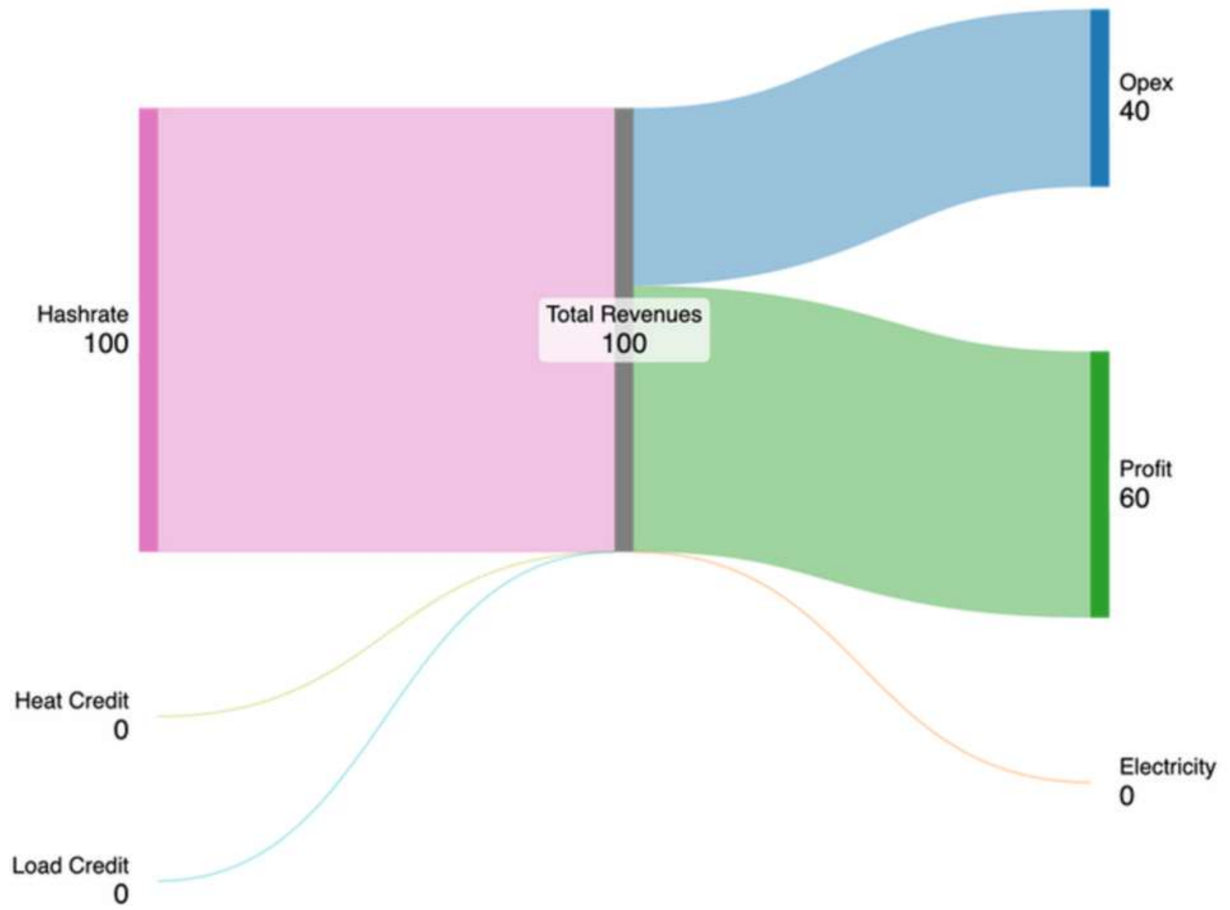
As Barbour explains, remote oil and gas sites usually install oversized natural gas generators because operators can't risk coming up short on needed power when facility demand spikes.

As a result, many generators run under-loaded, which hurts fuel efficiency and accelerates wear (for example, "wet stacking" in the combustion chamber). By adding a controllable Bitcoin mining load, Upstream keeps generators operating in a healthier range, helping to "dilute overheads across more kilowatt hours", reducing maintenance, and extending asset life—while also turning previously wasted capacity into revenue.

Bitcoin mining's flexible load lets oil and gas operators monetize both planned and unexpected excess capacity, while lowering the risk of power shortfalls at the facility. This approach contrasts sharply with data-center base loads like artificial intelligence or high-performance computing (HPC), which require constant power and lack the computing load flexibility of Bitcoin mining. "AI and HPC loads are not flexible," Barbour notes, "and I don't think they ever will be." Bitcoin, by contrast, can instantly modulate consumption in response to site needs, making it ideal for intermittent energy environments.

Unlike AI compute, **bitcoin mining compute has no customer contracts to satisfy**. This flexibility transforms Bitcoin mining into a stabilizing tool for upstream oil producers, renewable energy developers, and utilities seeking load balancing that generates incremental revenues.

Upstream Data's **unique advantage lies in its integration of engineering, manufacturing, and field-service expertise within the oil and gas ecosystem**. The company builds both generators and mining enclosures, enabling tailored deployment strategies, from on-site monetization of excess power to rental agreements that reduce generator costs by allowing Upstream to mine with unused capacity. Their business model converts stranded gas, an historically unprofitable and environmentally burdensome by-product, into a financial asset that enhances returns on power infrastructure. Through this alignment of energy optimization and digital revenue generation, Upstream Data demonstrates how Bitcoin mining functions as a kind of industrial efficiency regulator, linking the fossil-fuel economy to the digital world.



***** Note that machine depreciation and ultra-low startup costs is important for this model.***

“Lotto” Mining with FutureBit

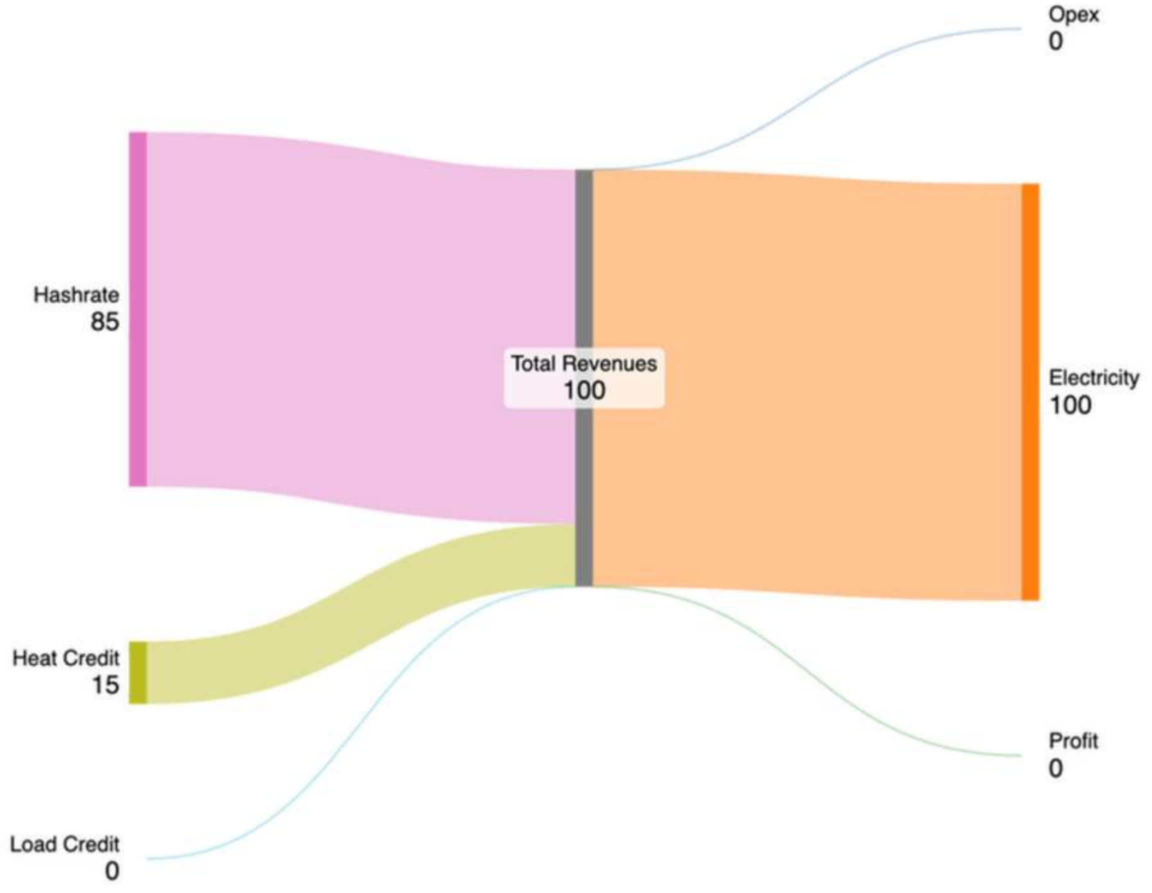
FutureBit is the brainchild of engineer and entrepreneur John Stefanopoulos, who founded the company to **restore Bitcoin’s decentralized ethos**, and make mining and node operation accessible to ordinary people. Based in Brooklyn, New York, FutureBit designs compact, consumer-friendly mining systems such as the Apollo BTC Miner and the Solo Node, which merge ease of use with the principles of self-sovereignty and network participation. Stefanopoulos frames the company’s mission simply: to “decentralize Bitcoin mining” and “make it accessible to as many people as possible.”

Unlike large-scale ASIC manufacturers or miners, FutureBit builds hardware for individuals who want to participate directly in the Bitcoin network without technical expertise or industrial infrastructure. The company’s hardware bridges a critical gap in the ecosystem, serving new entrants curious about Bitcoin’s inner workings.

FutureBit’s business model challenges the standard profit-driven assumptions that dominate industrial mining. Revenue for a home miner is minimal; a consumer using an Apollo might earn $15-$20 per month through pooled mining, or nothing at all if “lottery mining.’ But, as Stefanopoulos explains, the value proposition extends beyond immediate returns.

Many FutureBit users treat their devices as an educational and ideological investment, using the experience to learn self-custody, node management, and the core mechanics of Bitcoin. Others use the hardware for pragmatic reasons, capturing a heat credit by repurposing electrical output for space heating. “We have customers who are paying $500 a month to heat,” he said. “Why not spin up a miner and get a couple hundred dollars of Bitcoin back?” Some businesses are literally replacing electric baseboard heaters with Bitcoin miners, turning heat expenses into heat that pays you. Operational expenditures remain low because the devices are designed as consumer goods for long-term reliability and simple maintenance. “Treat it like a normal computer,” Stefanopoulos clarified, unlike industrial ASICs that demand more vigilant oversight and ongoing maintenance.

The company's unique advantage lies in its ability to **reframe Bitcoin mining from a speculative or purely financial pursuit** into a participatory, educational, and infrastructural act. Stefanopoulos argues that large mining pools have distorted Bitcoin's ethos by prioritizing predictable fiat-denominated returns over sovereignty and decentralization. Through products like the Apollo, FutureBit encourages operators to mine independently, maintain full custody of their rewards, and reinforce network diversity. The goal, as Stefanopoulos put it, is to "get more nodes out there," and remind Bitcoiners that the protocol's resilience depends on broad participation. By simplifying the hardware and demystifying mining, FutureBit transforms a complex technical process into an accessible entry point for ordinary individuals to "run Bitcoin," themselves, ensuring that the network's base layer remains distributed, sovereign, and free from corporate control.



Mining for Heat with Exergy

Exergy, founded by Tyler Stevens, positions itself at the nexus of Bitcoin infrastructure and residential/commercial heating and energy systems. Based in Denver, Colorado, the firm develops engineering solutions that repurpose the heat generated by Bitcoin-mining hardware to offset often expensive conventional heating costs, capturing a heat credit by monetizing heat itself.

They target clients with either high heating fuel costs, such as propane, or those with excess domestic generation capacity, such as rooftop solar. They design and install systems where miners serve as revenue generating heat sources that intelligently switch between traditional fuel and mining to optimize resource utilization.

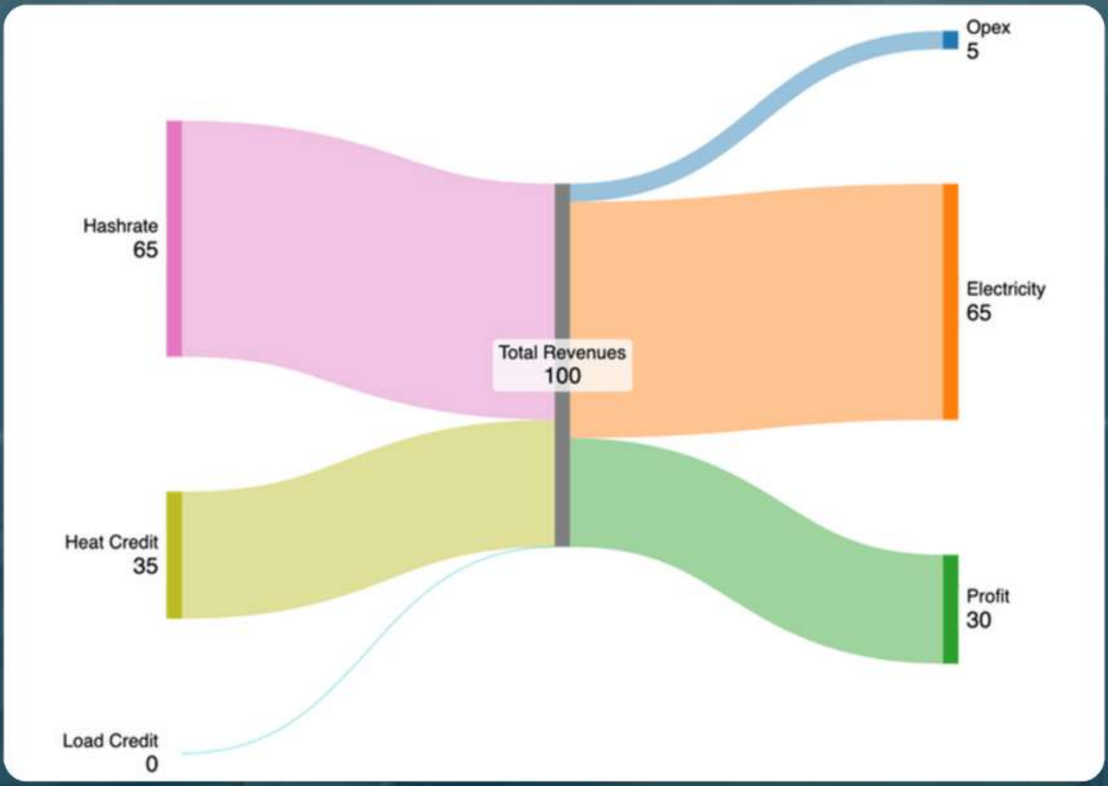
Mapping business assumptions through the lens of our parametric model, Exergy installations derive revenue from the value of the bitcoin mined as well as a heat credit. Electrical rates vary based on the local rate a miner pays (and potentially rooftop solar access), deployed against the cost of heating fuel and solar utilization.

Operational expenses are typically slight and include basic hardware maintenance, cooling infrastructure, and supervision. **Heat credit becomes a primary driver of revenue**, offsetting what the customer would have paid for heating fuel by instead using the mining equipment's waste heat and excess solar production. In practice, a homeowner's cost of home heating is treated as the cost hurdle for using miner heat.

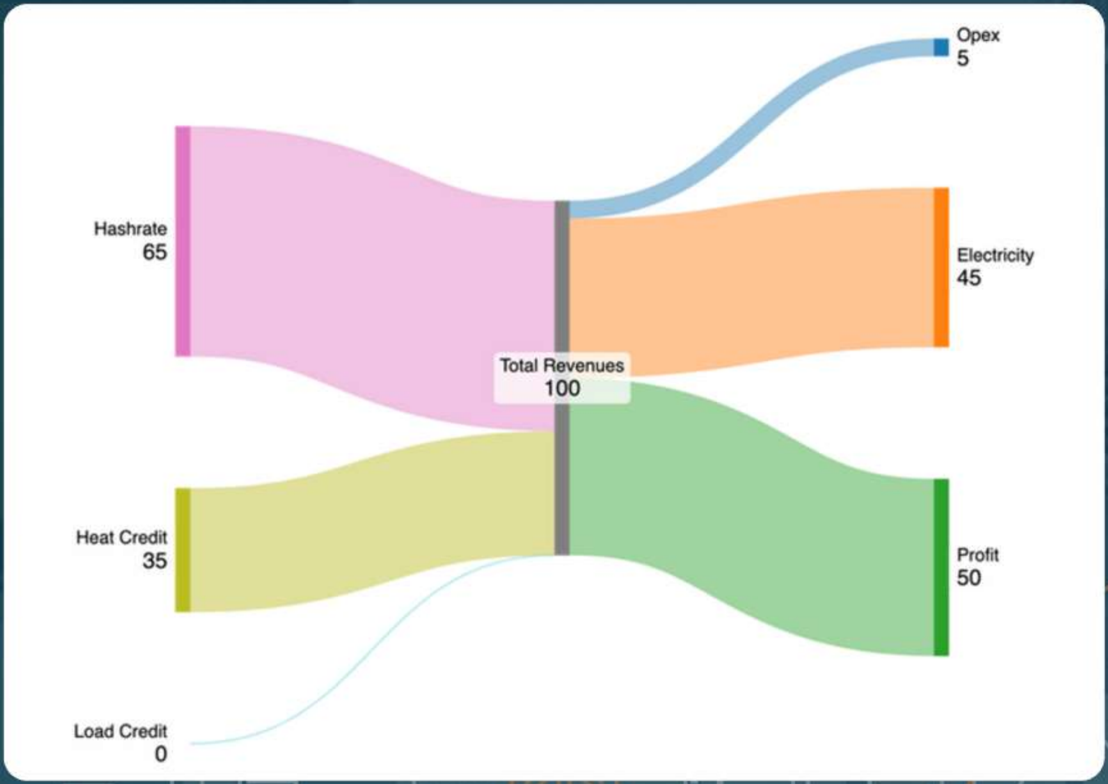
Exergy focuses on designing modern heating systems that optimize for cost efficiency. By providing heat through bitcoin mining when it is a lower cost option, and by using excess generation resources, such as rooftop solar, as a no-cost input, they modernize a legacy system that treats heating as a largely passive function of a household. The unique advantage of Exergy's business lies in its fusion of three under-leveraged asymmetries: the large and historically fixed cost of heating in many climates; the decoupling of mining profitability from pure hash-rate returns by anchoring value to real heating savings (meaning the miner system needs only to beat the heating alternative rather than conventional mining break-even); and excess or under-utilised home generation such as rooftop solar which otherwise exports power to a grid that pays very little for it.

A “home brain” control system that ties solar, miners, and thermostats into a unified stack automatically switches between mining/heat generation and conventional systems, creating dual revenue and cost-offset streams. This combination of hardware, software/control logic, and energy economics gives Exergy a differentiated edge: unlike a strictly 'business oriented' bitcoin miner, **they operate as a bespoke systems integrator** by turning heat into value, aligning the economics of Bitcoin mining with building energy management.

Mining as substitution for propane heating:



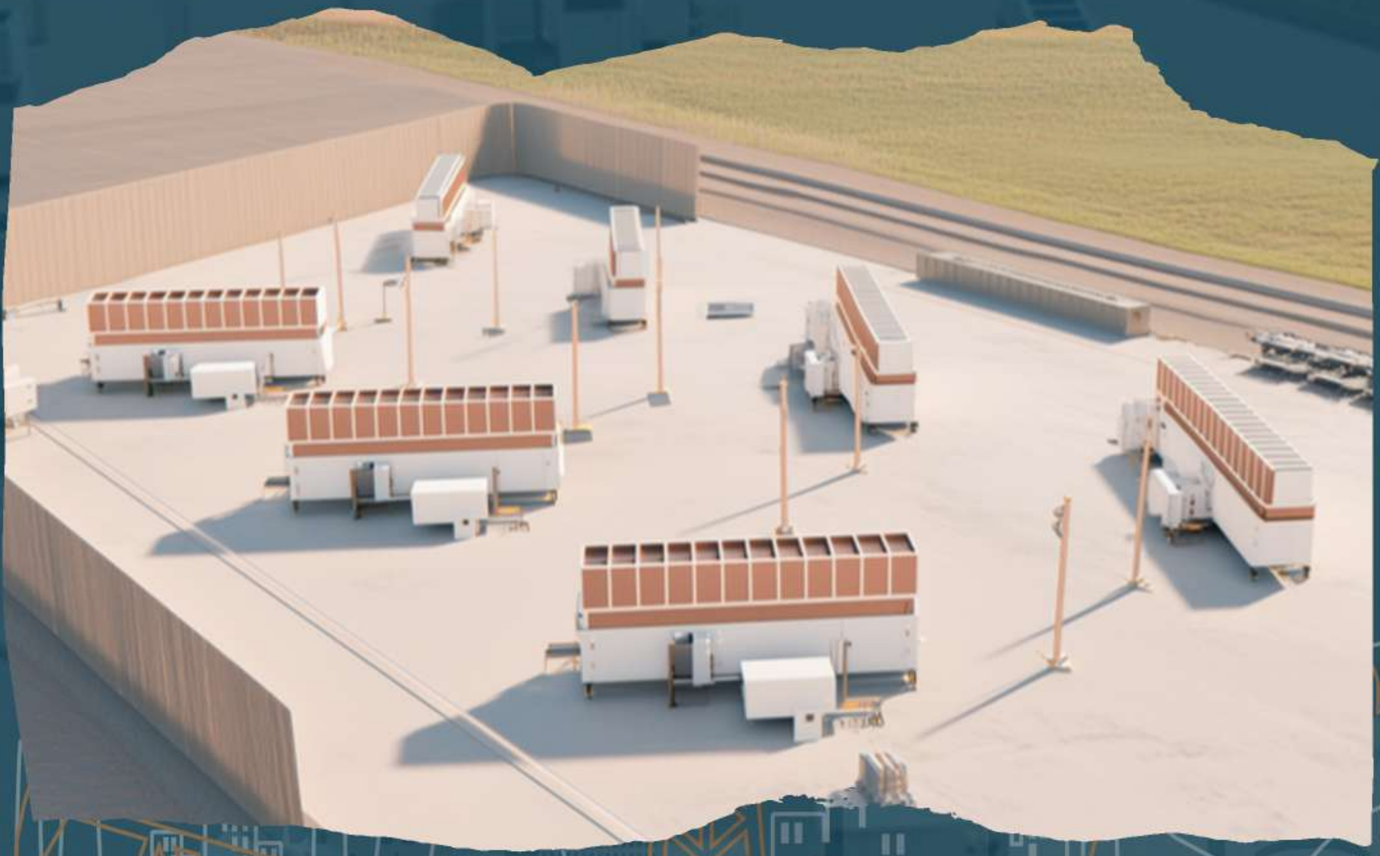
Mining as substitution heat with supplementary solar:

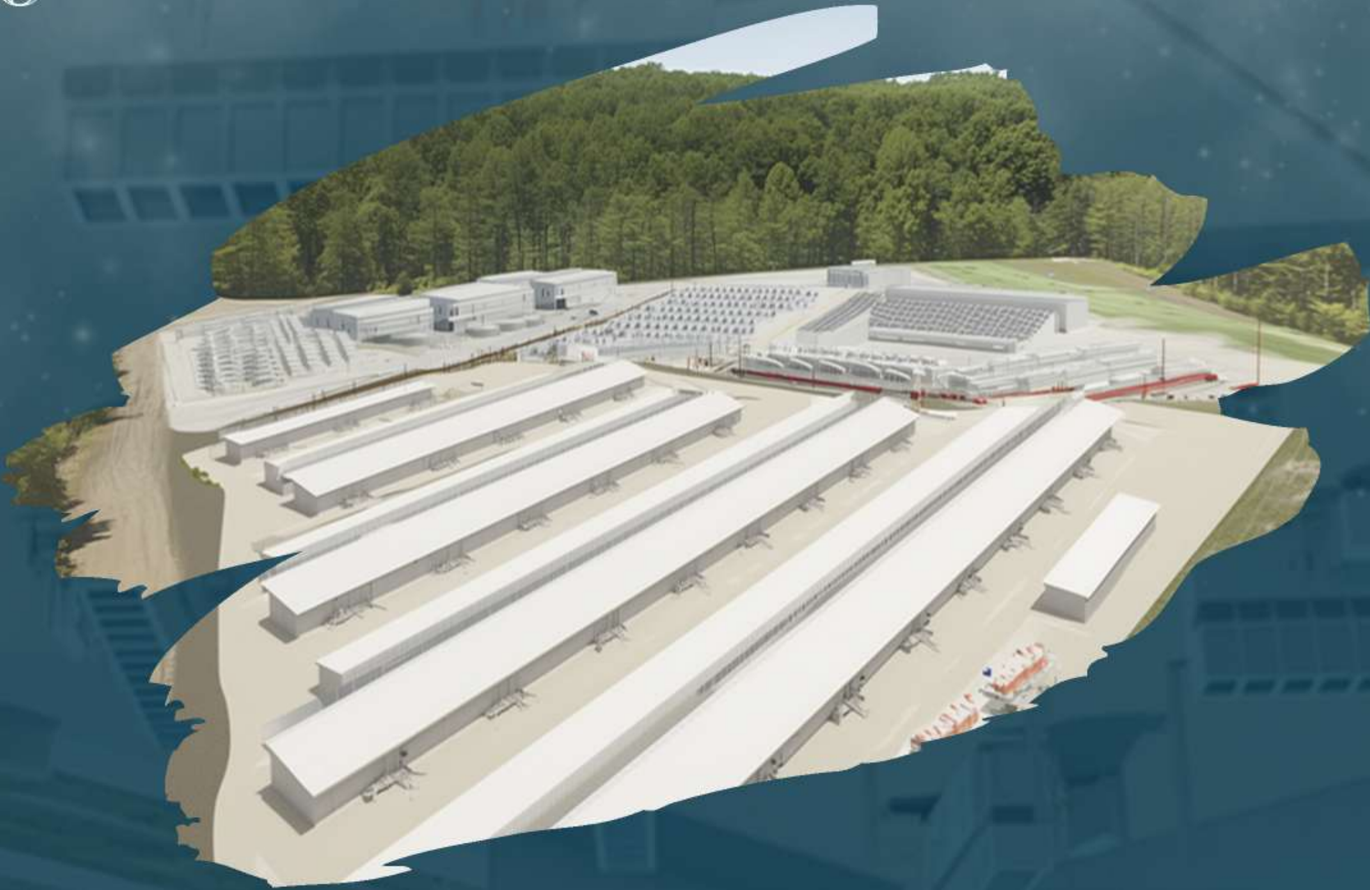


High Finance, Scaled AI, and HPC with CleanSpark

Rory Murray, Vice President of Digital Asset Management at CleanSpark, speaks from the vantage point of one of the fastest growing Bitcoin miners in North America, publicly traded on Nasdaq, and operating large scale facilities across Georgia, Mississippi, Wyoming, and Tennessee.

CleanSpark operates 50 exahash, and is now expanding into high density AI data center development. Murray describes his role at a juncture where **megawatts become financial assets**. “Once we have turned the megawatt into bitcoin, there is another layer,” he explained, emphasizing that CleanSpark’s business model involves far more than the conversion of electricity into commodity hash rate. The company also holds, trades, hedges and borrows against Bitcoin while simultaneously negotiating decades long energy and AI compute contracts.



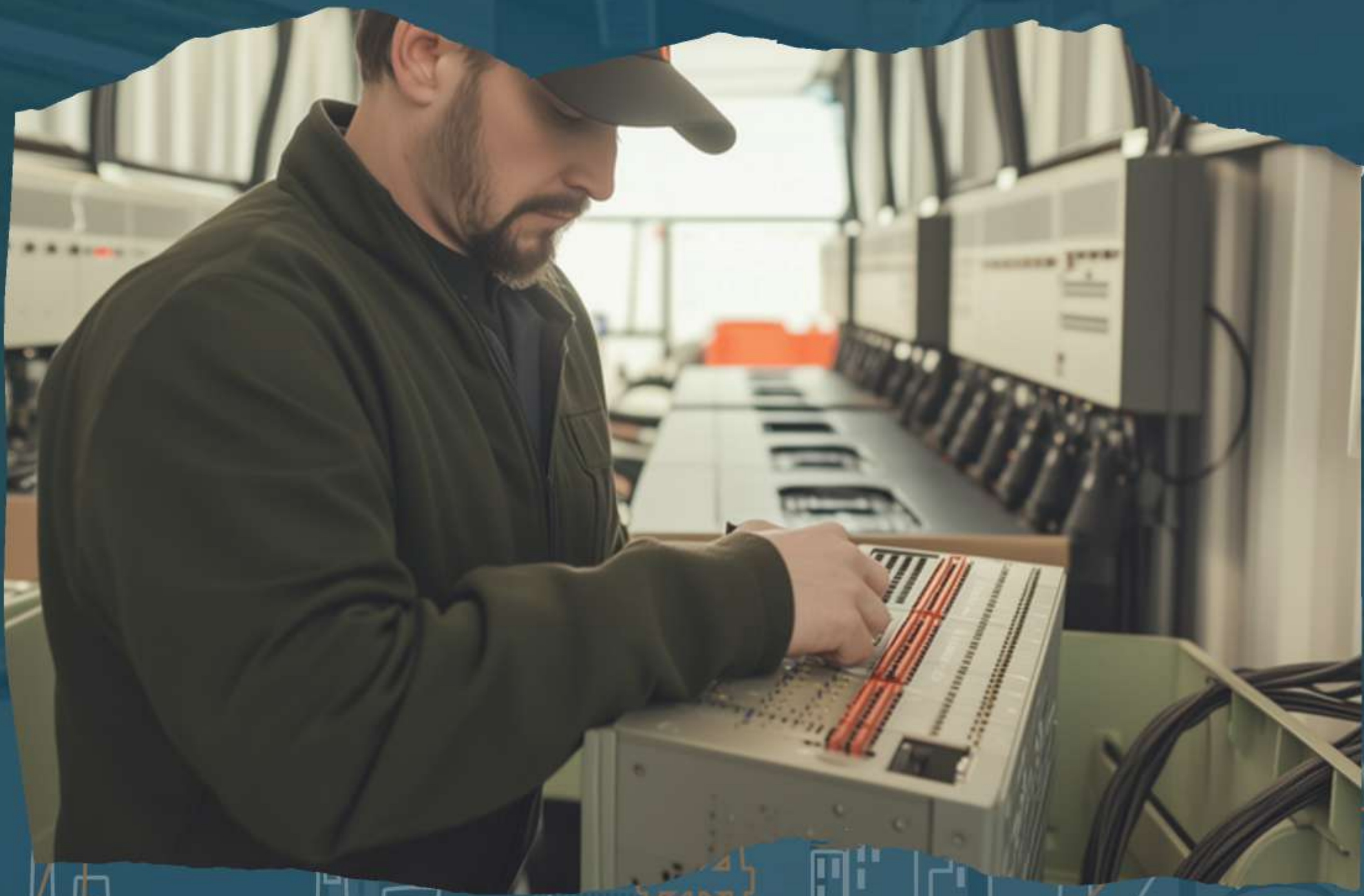


Firm revenue comes from mined bitcoin, as well as complex financial instruments, treasury deployment, and forthcoming contracted AI compute demand. Electrical costs are shaped by CleanSpark's strategy of securing low cost, high reliability power in regions such as Georgia, Tennessee, and Wyoming, where co-located transmission infrastructure allows for scalable power procurement and optionality across AI and Bitcoin loads.

Operational expenditures reflect the company's vertically integrated approach, where it builds, owns and manages data centers of multiple load types. Heat Credits are not a key initiative at scale for the organization, while Load Credit, understood as the financial benefit derived from flexibility, curtailment and participation in electricity markets, is highly leveraged. "We monetize the megawatt in a pure financial electricity market way, we monetize the megawatt into bitcoin and then we monetize the bitcoin itself," Murray expounded.

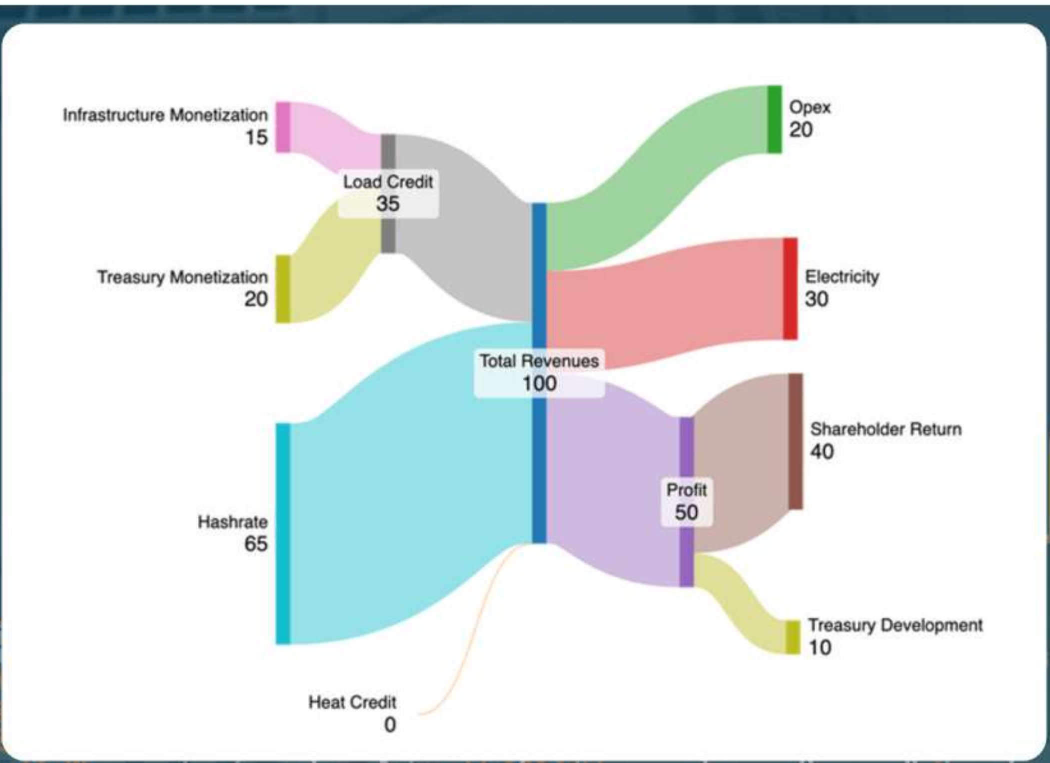
CleanSpark's treasury strategy utilizes their tens of thousands of mined Bitcoin as pristine collateral. Because the firm earns revenue in bitcoin and pays expenses in dollars, Murray notes that **the volatility relationship becomes an asset in the world of high finance.** "The asset-liability mismatch of USD is zero, a dollar versus a dollar never changes, whereas a dollar versus a bitcoin changes."

CleanSpark can borrow against Bitcoin to purchase additional energy resources or expand infrastructure, use derivatives to monetize volatility without selling BTC, or sell limited quantities to fund operations. This optionality creates what Murray calls a "growth engine," where bitcoin's long term appreciation and short term volatility both improve the firm's financial standing.



The most significant new development is the emergence of large multiyear AI compute contracts. Hyperscalers such as CoreWeave and poolside.ai have entered agreements with miners, and CleanSpark is among the companies positioning itself to supply 100+ megawatt scale AI footprints. “AI gives you 5, 10, 20 year visibility into what the contracted off-take demand is going to be for that energy,” Murray said. That **level of forward certainty strengthens underwriting**, boosts institutional credibility, lowers the cost of capital, and materially expands access to financing.

Counterparties can now underwrite long term contracts backed by stable demand. CleanSpark can then run a true ‘barbell strategy’ where long duration AI revenue anchors the business and Bitcoin mining provides flexible load and upside exposure. By integrating land, power, data center construction, bitcoin mining and AI hosting, CleanSpark isn’t simply buying and selling megawatts, but rather, capturing margin across the entire lifecycle of the megawatt. Murray believes this “virtuous cycle” will redefine the sector’s relationship with capital markets and demonstrate how a miner can simultaneously be a utility scale energy partner, a bitcoin treasury operator, and an AI infrastructure provider.



Stranded African Power Generation with Gridless Compute

Gridless Compute is a Kenya-based Bitcoin mining company founded in 2022 by Erik Hersman, Philip Walton, and Janet Maingi. Designed to **monetize stranded renewable energy in Africa** and power rural communities, the company builds small-scale, containerized data centers next to underutilized electrical generation, splitting revenue with site owners.

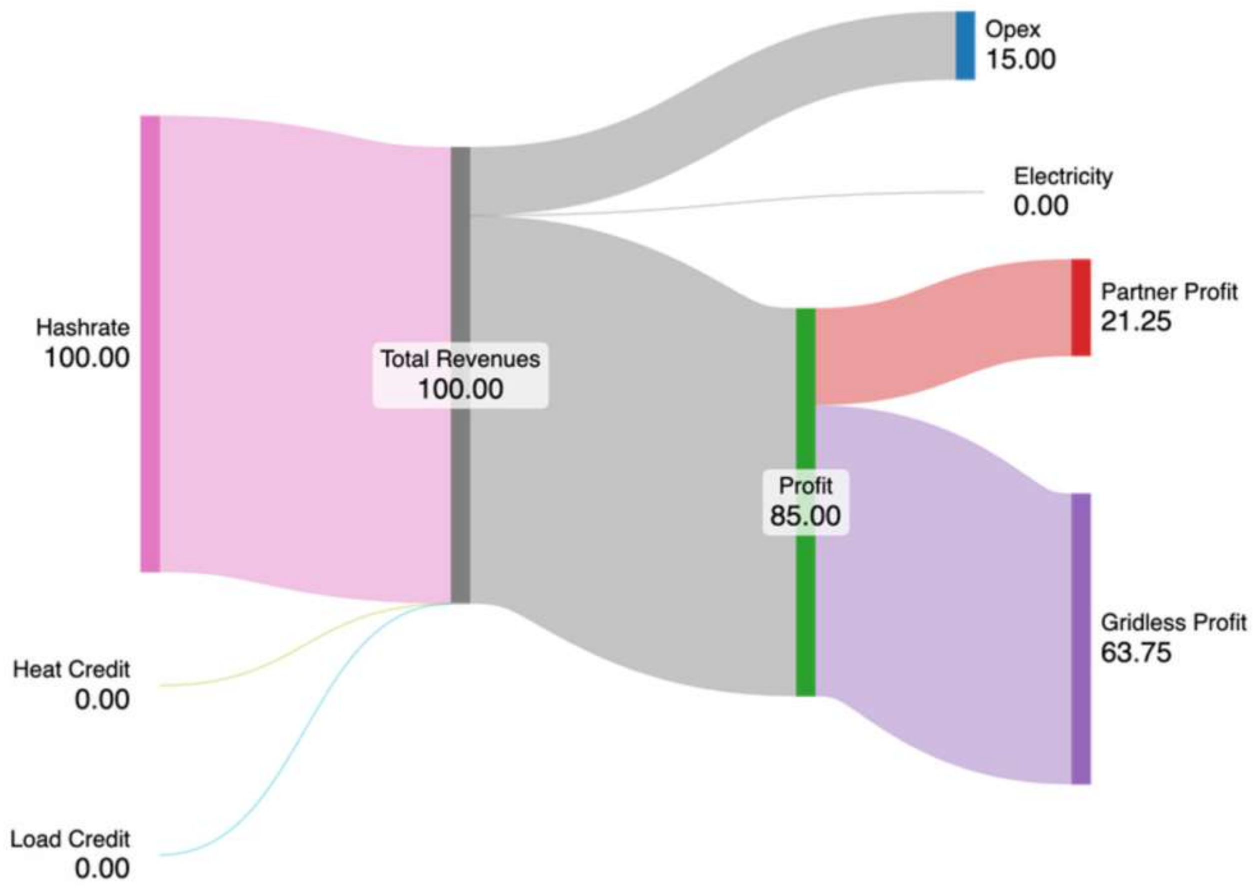
Walton recalled the launch of their Zengamina site in rural Zambia, where a 700-kilowatt run-of-river hydro plant, with 500 kilowatts sitting dormant for 16 years, became "operationally sustainable," overnight through Bitcoin mining. In the following twelve months, over 400 households and 40 small businesses gained electricity access, a surprising positive externality. The generation owner, after years of deficit, "completely changed their business and stabilized the grid at the same time…[with] a reliable source of revenue that he knew would come in regardless of what was going on economically." noted Walton.

Gridless' model reverses the traditional logic of monetizing energy infrastructure. Instead of electricity production following demand, Gridless introduces guaranteed, price-agnostic demand through Bitcoin mining.

Their model is straightforward: **electrical cost is zero.** The firm operates on stranded or otherwise wasted power, and compensates energy producers through revenue sharing rather than fixed purchase agreements. As Walton notes, "we make money no matter what," because they receive Bitcoin-denominated revenue directly from mining, and partners gain immediate cash flow without adding meaningful operating costs. This transforms mining from a speculative pursuit into a stabilizing mechanism for microgrids.

By treating Bitcoin mining as a "buyer of last resort" for excess electricity, Gridless ramps up mining revenue when local demand is weak, providing a baseline monetization path despite fluctuations in local load. "Bitcoin becomes the floor price for wholesale energy," Hersman explained. In practice, community customers pay more than the mining alternative (e.g., "22 cents per kWh" versus sub-$0.10/kWh for mining) so the operator serves local load when available and mines when it is not. The result is effectively an energy market arbitrage model, not a single-purpose compute business.

The unique advantage of Gridless' model is that it eliminates exposure to electrical prices, and energy markets that cripple conventional, grid-connected miners. Because they rely on profit sharing rather than metered billing, they maintain "the same percentage gross margin regardless of prevailing economics." Even using older, fully depreciated ASICs, their "marginal cost of production is a fixed percent of revenue," far below Western peers. As Hersman summarized, **"The people that win in the long term are the ones that control the energy."** Gridless' synthesis of decentralized compute and rural electrification establishes it as a bridge between Bitcoin mining, and stranded resources across developing nations.



The 21st Century Crystal Palace

We've profiled profitable operators of 21st-century loads and worked to illustrate each business via a simple parametric model and associated Sankey diagram. We have worked to show where the electrons go, and how business profitability results.

We hope to take a landscape that feels scattered and overly technical, and make it more immediately apprehensible to the layperson. As you've explored each operator's story and the advantages they've leveraged, we hope you have begun to sense the common shapes these businesses take. Common underlying trends in innovative modeling, conscientious deployment, and prudent financial management is powering the rapid growth of these businesses.

Human progress has always followed a self-similar story: find energy, improve it's highest value and purpose, continue to build while standing on the shoulder of proverbial giants. Twenty-first-century loads evolve the lessons of earlier industrial eras, adding new and decisive capabilities, mostly the ability to operate anywhere. Permissionless compute allows both the micro operator and the global firm, to turn remote, constrained, or otherwise wasted power into a healthy business.

For the first time, **energy innovation has a standing bid: a known buyer of both first and last resort**. From the grid of the American Midwest to Albertan oilfields, from rural Kenya to the HVAC system in your laundry room, Bitcoin mining and AI/HPC loads are changing what “useful energy” means, and democratizing who can monetize it.

The models highlighted within these case studies are already performing practical work by stabilizing grids, funding rural electrification, lowering the cost of heat, and widening the runway for both monetary and human flourishing. In fewer than twenty years, 21st-century loads grew from nonexistent to indispensable, and have already reshaped the economics of both generation and consumption by ensuring demand can appear wherever power is produced. If you can generate electricity, you no longer have to wonder whether someone will buy it.

A 21st-century load arrives like Ford’s Crystal Palace, a modern marvel of continuous production, ready to stand beside power generation, convert surplus into revenue, and turn fears of energy stagnation into a future of abundance.

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