

Bitcoin mining as a win-win scenario for the people of Plattsburgh:
A commentary on a distributed heating system utilizing Bitcoin mining waste heat

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A local law imposing a moratorium on commercial cryptocurrency mining operations in the city of Plattsburgh

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Summary

The following topics will be covered in this commentary:

- Review of Bitcoin and Bitcoin mining.
- Review of data centers and Bitcoin mining in the city of Plattsburgh.
- Review of distributed heating and Plattsburgh's experience with co-generation and distributed heating systems.
- Consideration of a plan to embrace Bitcoin mining in the city of Plattsburgh.
- Consideration of a plan for the community of Plattsburgh to cooperatively own and operate a leasing portable distributed heating agency, in exchange for providing Bitcoin mining companies with low-cost electricity services.
- Consideration of agreements wherein outside agencies seeking to mine Bitcoin in Plattsburgh must put money toward community-owned and operated renewable energy systems over a long-term period in the Plattsburgh region, in order to help offset electricity usage, in exchange for said agencies operating in the Plattsburgh region.

Overview of Bitcoin

Bitcoin is an alternative form of currency which seeks to inject transparency into the monetary system, while decreasing the overhead cost of performing transactions.

Data centers and Bitcoin mining in the city of Plattsburgh

There are a number of driving factors behind why Plattsburgh is attractive for the location of data centers. These factors include:

- Plattsburgh has the lowest wholesale electricity price in the United States.

Bitcoin mining as a win-win scenario for the people of Plattsburgh: A commentary on a distributed heating system utilizing Bitcoin mining waste heat (March 15, 2017)

- Plattsburgh is in one of the colder regions of the United States.
- Plattsburgh has renewably-sourced energy.

These factors make Plattsburgh an ideal location for CPU processing centers, such as Bitcoin mining operations. Both traditional data centers and Bitcoin mining ventures seek locations such as Plattsburgh.

Distributed / District heating

One of the defining principles to keep in mind when considering regulation of Bitcoin mining in the city of Plattsburgh is the idea of utilization of Bitcoin mining machinery waste heat in a distributed heating scenario (also commonly referred to as "district heating"). Distributed heating is not a new concept. Utilizing waste heat from data centers is also not a new concept. One example of utilizing waste heat from a data center is suggested in a recent article¹, which notes that the social networking company Facebook is heating a Danish city using waste heat from a data center.

Plattsburgh's history of distributed heating

A number of locations throughout Plattsburgh have used distributed heating in the past. One example is the residential housing on the new and old base, which in the past utilized a shared distributed gas heating system. It is suggested that one source of the gas used in this thermal heating project was the gas produced by the manufactured gas plant (MGP) located on Saranac Street in Plattsburgh (a site which is currently in remediation² as a New York Superfund site), as documented on the NYDEC website³.

Plattsburgh's recent experience with co-generation

The people of Plattsburgh are well-acquainted with the idea of co-generation. It is, after all, a defining feature of the town's landscape, in that the Georgia Pacific (GP) paper mill, one of the largest industrial centers in town, utilizes steam that is generated by the Saranac Facility Gas Plant (SFGP). Utilizing natural gas fuel (a fuel which, when burned, creates a slew of dangerous climate-changing emissions, as well as local emissions which negatively affect local residents) from the North Country Pipeline⁴, the SFGP operates as both a 100MW-300MW⁵ thermal energy power plant, as well as a steam generation plant for the GP paper mill. In consideration of regulation of Bitcoin mining (Bitcoin machinery), the town of Plattsburgh may choose to be a leader in a different form of co-generation: Harnessing the waste heat of Bitcoin machinery to heat residences and commercial properties alike.

As an aside, an interesting questions might be raised here: Why is there a line being drawn between which industries receive the benefit of power in Plattsburgh? That is, why is 200 mWh of energy going toward a plant which produces paper products, whereas 12 mWh⁶ of energy going toward the production of digital data draws criticism and a moratorium on its expansion?

1 <http://www.decentralized-energy.com/articles/2017/09/facebook-data-center-to-heat-danish-city.html>

2 http://www.dec.ny.gov/docs/remediation_hudson_pdf/510007fs1.pdf

3 <http://www.dec.ny.gov/chemical/37562.html>

4 <https://www.eia.gov/electricity/data/eia860/index.html>

5 <https://www.eia.gov/electricity/data/eia860/index.html>

6 <http://www.wcax.com/content/news/Plattsburgh-considers-ban-on-bitcoin-mining-475877703.html>

Embracing Bitcoin and alternative currencies

Plattsburgh: A city on the forefront of a new technology wave

The city of Plattsburgh may choose to be a leader in this area. Indeed, Bitcoin mining in Plattsburgh may serve a number of important purposes:

1. Create value for residents and businesses by converting their winter heating costs into an investment in the Bitcoin network and cryptocurrency, serving to enhance monetary independence and stability within the community.
2. Reduced-cost heating because it is coming in exchange for Bitcoin generation.
3. Heating through renewable energy rather than natural gas heating.
4. Bring extra-regional investment into the community.
5. Situate Plattsburgh in a position of technological leadership.

Cooperative ownership: A model for humanity's future

Most importantly, this may be a cooperatively run endeavor. Wherever distributed heating systems are attached to business and residences, those residents, business owners, clients, etc., may have a share of the ownership, and likewise profit, generated through the system. The traditional capitalistic model of which America is at the head of, is dangerously positioned above the precipice of climate disaster. Traditional capitalism serves to enforce business-as-usual resource usage, in complete disregard to climate change⁷. Owners of a cooperatively run system have equal say in how the system operates. In addition, there are a number of other perks of cooperative ownership including: building community participation and community spirit; and social interaction.

Embracing Bitcoin and alternative currencies: Summary

To summarize, Bitcoin mining in Plattsburgh may be predicated upon both 1) encouraging miners to utilize waste heat to heat their houses; 2) encouraging businesses to integrate distributed heating via bitcoin mining waste heat; 3) disallowing excessive waste heat zonal dispersion—that is, excessive venting of mining waste heat to outdoors when, instead, there is a great amount of winter heat being generated and consumed by residents and businesses in the community.

Idea: Portable district heating via transportable containerized Bitcoin mining systems

A win-win solution for the community, for those who support alternative currency, and for those interested in mining cryptocurrencies, is for the community to purchase and retrofit a number of portable shipping containers with electrical and heating duct-work. These "shipping containers" would be owned by a cooperatively-owned and operated community organization and would be leased to companies throughout the region and around the world. The companies (hereby referred to as leasees) would hire workers from the cooperative-owned organization to service, install, and monitor Bitcoin machines. In exchange for the lease agreement, companies would be afforded the opportunity to utilize Plattsburgh's low electricity rates. The community organization would receive payment for services, resulting in the creation of long-term high-tech jobs.

⁷ <https://www.wsws.org/en/articles/2017/12/11/wage-d11.html>

Operation during summer months

During the summer months, winter heating is less necessary, and therefore mining activities may be reduced. The level of allowed mining activity may be a function of: 1) the ability of businesses and residents to re-use waste heat from mining operations (co-generation); 2) a percentage of the renewable energy which was installed by mining businesses may be used toward Bitcoin mining.

Plan of action: Cooperatively-owned transportable Bitcoin distributed heating system

A cooperative group, with support from the city government, may be created 1) to determine the feasibility of the plan, including the price points wherein outside agencies would be enticed to participate; and, if feasible, 2) to create the structure (infrastructure, resources, and labor) required to enact the plan.

Required specialists for this endeavor include those in the fields of:

- HVAC
- Electrical engineering
- Civil, environmental, energy, and renewable engineering
- Transportation
- Information technology
- Architecture
- Building technologies
- Site and urban planning
- Cooperative structuring
- Administration

How does Bitcoin work?

Key Terms

Bitcoin private key: A 256-bit number. Used to create a user's unique identity on the Bitcoin network.

Bitcoin address: A string of 26-35 alphanumeric characters. Used, alongside a user's private key, to send money between users.

Bitcoin mining: Confirmation of a set of transactions by computing an arbitrarily difficult mathematical problem.

Bitcoin is a shared distributed ledger system. The data stored in the ledger is basically every transaction that has ever been made. For example, if Sue pays Jon 0.01 Bitcoin, that transaction is considered "complete" when a certain share of distributed peers contain the transaction in their local data repository. Users may join the network by installing a wallet application onto a computer. The wallet creates a private password-key which identifies the user on the network. Users may create bitcoin addresses, which are then connected to their wallet via their wallet's private key, and which they may then use to accept payment from other users on the network.

According to bitcoin.org, Bitcoin mining is a "distributed consensus system that is used to confirm waiting transactions by including them in the block chain"⁸.

⁸ <https://bitcoin.org/en/how-it-works>

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The main ideas behind Bitcoin mining are as follows⁹:

- Mining enforces a chronological order in the block chain, protects the neutrality of the network, and allows different computers to agree on the state of the system.
- To be confirmed, transactions must be packed in a block that fits very strict cryptographic rules that will be verified by the network. These rules prevent previous blocks from being modified because doing so would invalidate all following blocks.
- Mining also creates the equivalent of a competitive lottery that prevents any individual from easily adding new blocks consecutively in the block chain. This way, no individuals can control what is included in the block chain or replace parts of the block chain to roll back their own spends.

The Bitcoin network will reach its maximum number of mined blocks by about 2020. By this time, Bitcoin miners will no longer be operating to find new blocks. Instead, the only value of owning machines will be to process transactions.

Bitcoin network's high power consumption

News of the Bitcoin network's high power consumption is common nowadays. However, it is important to remember that Bitcoin is not alone in resource consumption when it comes to currencies. For example, both gold mining and the modern banking system either consume resources, or drastically alter the environment, or both. There are a number of sources of information to dispute the idea that Bitcoin as a currency is more wasteful than other forms of currency. Notwithstanding, Bitcoin currency is currently in many ways equivalent to gold; that is, Bitcoin, in its current form, is most useful as a reserve currency.

There is no doubt that traditional forms of money, similar to Bitcoin, incur large resource and labor costs. Printing and distributing paper money is costly in its use of resources. Creating and distributing coinage is an equally resource-intensive process. Stores of wealth such as gold require inordinate amounts of energy and labor to be extracted, during which time considerable havoc is wreaked the surrounding environment; after which, require huge amounts of security and building/space resources for their storage. Even forms of wealth such as stock investments require systems to be constantly maintained.

Bitcoin is not a currency that is used to purchase everyday items. Although there has been discussion in the Bitcoin community about moving Bitcoin to a mini-transaction system, for the time being each transaction costs up to ten dollars (USD). In addition, the Bitcoin network as a whole is currently designed to handle only about three transactions per second¹⁰. (In contrast, millions of credit card and bank transactions are processed daily.)

Bitcoin mining at present in the city of Plattsburgh

There are a number of companies moving into the Plattsburgh area to pursue "commercial-grade" mining operations, where "commercial-grade" here refers to systems consuming upward of 1 megawatt of electricity. As noted previously, according to a recent article¹¹ there is approximately 12 MWh of energy going toward the production of Bitcoin in the city of Plattsburgh.

9 <https://bitcoin.org/en/how-it-works>

10 <https://www.bitcoinunlimited.info/resources/feemarket.pdf>

11 <http://www.wcax.com/content/news/Plattsburgh-considers-ban-on-bitcoin-mining-475877703.html>

Our Bitcoin machinery

We operate approximately 7 TH/s (tera-hashes, equivalent to 7,000 gigahashes/s) of Bitcoin miners. We own eight machines, approximately half of which are turned off during the warm months of the year due to inefficiency. During the colder months of the year, we typically use around 2,500-3,500 kWh per month of electricity. This also includes other household electronics, such as lighting, electric stove, etc., in addition to Bitcoin machinery. During the warmer months of the year, we typically turn down the machines to their lowest settings, with our household's typical energy usage falling to as low as 500 kWh per month of electricity. The two largest machines that we own consume approximately 1,050 watts each (2x Canaan Avalon6)¹².

We operate machines more during the cold months than during the warm months. In fact, we do not heat our apartment with the supplied natural gas but instead opt to heat with electricity—essentially, the waste heat of our Bitcoin machines. Our apartment is approximately 1,600 sqft (10 Maryland Road, Plattsburgh). We have lived here since October 2016. During this period of time (approximately 1.5 years), we have likely paid less than \$15 worth of natural gas for heating the apartment. Bear in mind that the apartment is setup to run a natural gas hot water radiant heating system for winter heating, does not have any alternative heating sources (such as a woodstove), and we own no space heaters.

Previous to living in our present location in the city of Plattsburgh, we lived in Peru, New York, at 166 Dashnaw Road. We lived at this address from August 2015 to October 2016. This apartment was approximately 1,200 sqft. The apartment was heated via in-floor radiant heating using propane from two large propane storage tanks placed in the backyard of the building. It was during the one-year period of living at this address that we first experimented with using Bitcoin machinery to heat our apartment. We purchased four Bitcoin machines (2x Bitmain AntMiner S5, 2x Bitmain AntMiner S3). We also utilized a space heater for part of the winter months. For the most part, there was no need to utilize the propane heating system during our time at this location.

More history regarding our motivations to operate Bitcoin machinery

Prior to moving to the North Country, we lived in Ithaca, New York for a number of years. In all of our time living in Ithaca, we lived in apartments which mainly utilized baseboard electric heating. Being faced with a change to heating by propane when moving to Dashnaw Road (Peru), we endeavored to purchase a Bitcoin machine, in hopes that it would both offset the amount of propane we purchased. (Burning propane causes climate change emissions. In addition, burning propane creates hazardous emissions at the source at which it is burned—which happened to be right outside our back door, coming out of an emissions pipe attached to the propane furnace.) Hence, the three of us (Sora, David, and Benjamin) agreed to jointly pursue the endeavor of Bitcoin mining.

12 <https://en.bitcoin.it/wiki/Avalon6>