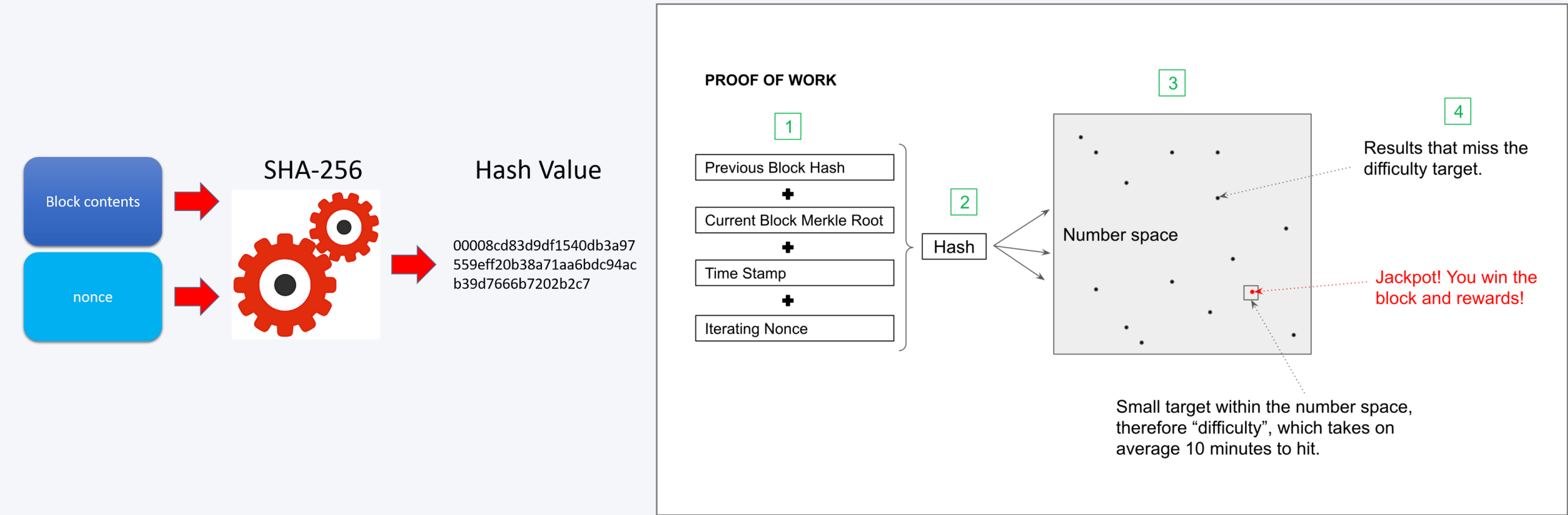


ABSTRACT

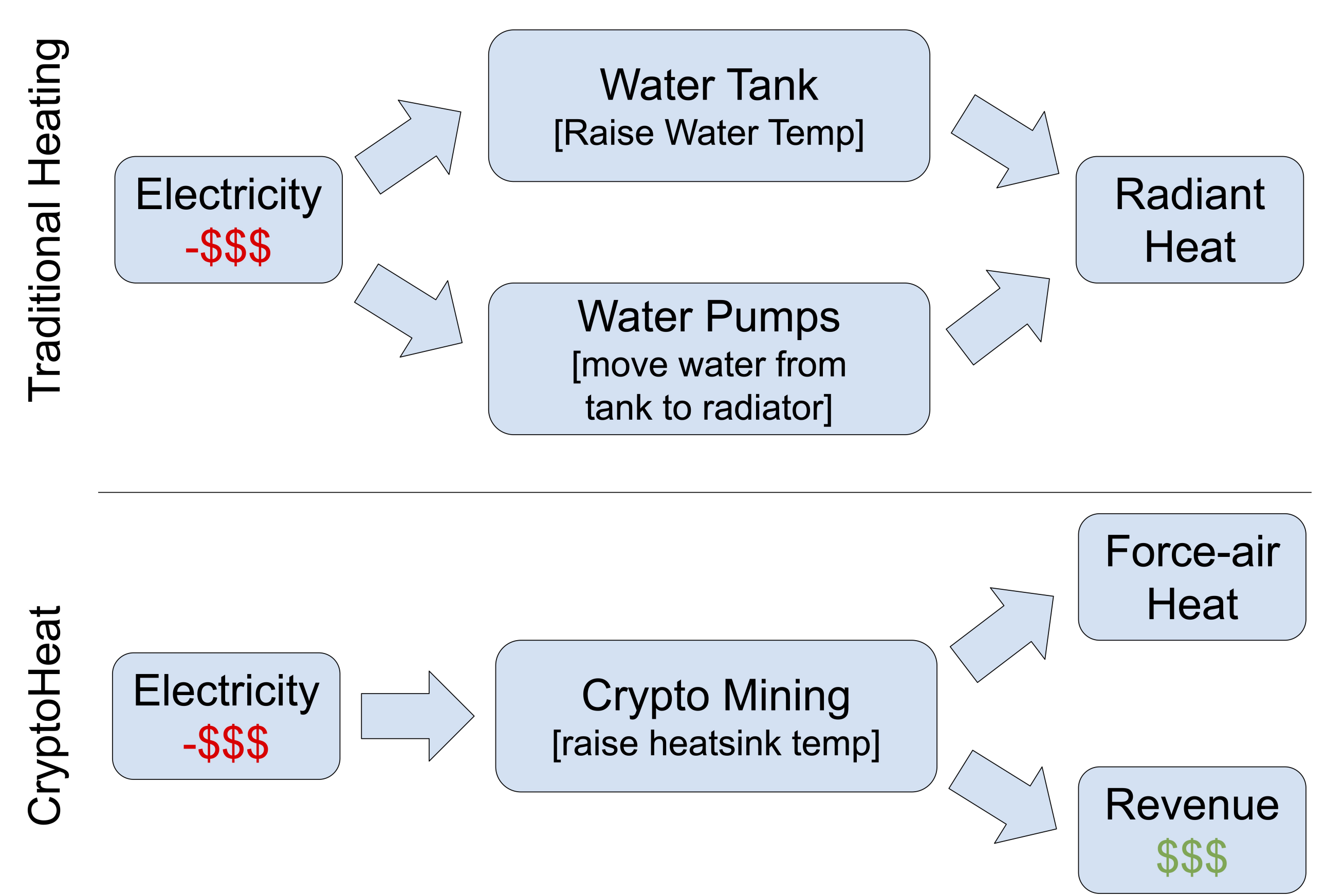
This project presents CryptoHeat, a system that repurposes mining-generated heat for personal space heating. By combining remote temperature monitoring with a GPU-based cryptocurrency mining platform, CryptoHeat transforms a single-use energy expense into a dual-purpose, cost-conscious system. The platform integrates consumer-grade hardware with control logic to maintain indoor comfort while supporting ongoing blockchain computations.

BACKGROUND

- **Blockchain** is a decentralized digital ledger where transactions are verified and stored across a distributed network [1]
- **Cryptocurrency mining** validates blockchain transactions by solving cryptographic puzzles
- **GPUs** can be used to perform these operations at high speed, measured in **hashrate** (MH/s)
- Mining consumes large amounts of electricity and generates **waste heat** as a byproduct [2, 3], which is typically expelled and wasted through cooling systems

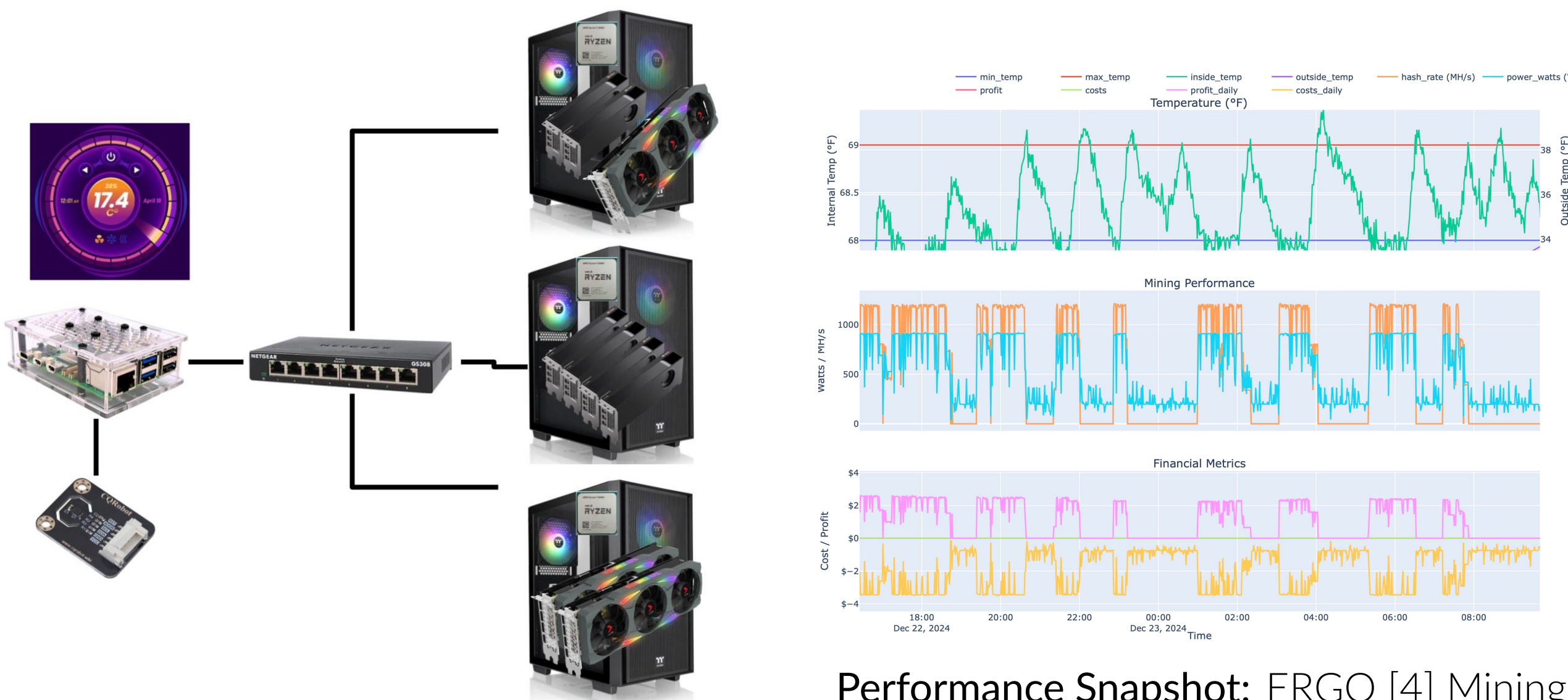


CRYPTOHEAT APPROACH



HARDWARE/SOFTWARE

Component	Description
Controller	Raspberry Pi 4 (2GB RAM)
Sensor	STS35 digital temperature sensor
Network	1Gb/s Ethernet switch with CAT6 RJ45 cables
Appliance #1	4× NVIDIA A2000 GPUs
Appliance #2	2× NVIDIA A2000 + 1× 3080 Ti GPU
Appliance #3	2× NVIDIA 3080 Ti GPUs
System Cost	Approx. \$3600 total (compute, sensors, and network-ing, used pricing from eBay)



Performance Snapshot: ERGO [4] Mining over 24-Hour Period

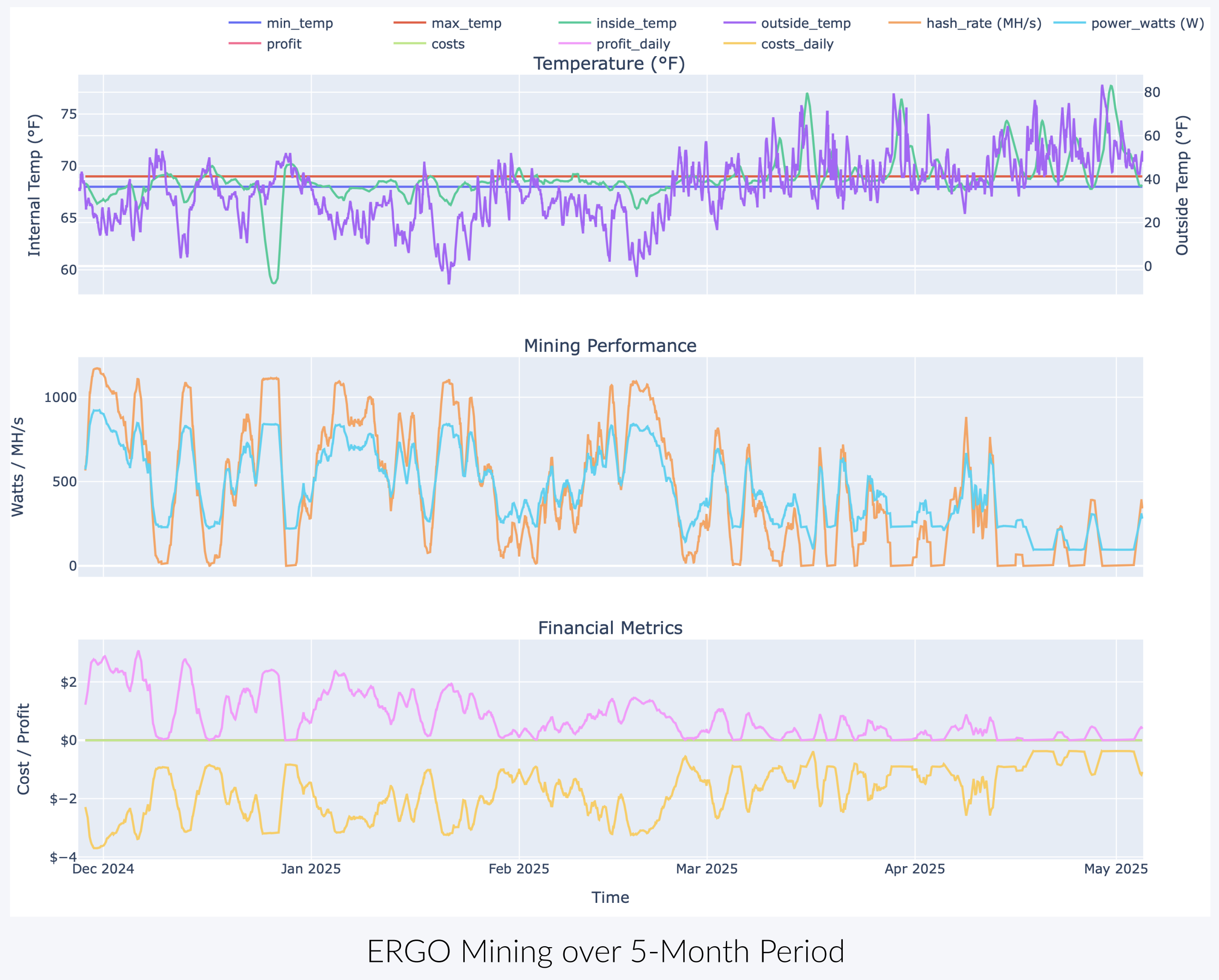
Description	Range	Notes
Power Consumption	200W – 900W	1.6A – 7.5A @ 120V
Noise Level	36 dBA – 42 dBA	Suitable for indoor use
Monthly Power Cost	\$23 – \$104	Based on \$0.16/kWh
Monthly Mining Income	\$0 – \$50	Up to 0.06 ERG/hr
Net Monthly Cost	\$21 – \$50	Heating offset via mining
Heat Output	682 – 3070 BTU/hr	Comparable to room heaters

CHALLENGES

We have identified six main challenges in developing this cost-efficient heating system.

- Hardware costs limits usage to retired computers (or purchased used off eBay)
- Relatively high power consumption when idle (solvable through IPMI-enabled motherboard)
- Occasional temperature Sensor or API failures due to web-scraping and throttling issues (required additional data cleaning)
- Limited profit estimation accuracy due to variable electricity rates, fluctuating coin prices, and ever changing system-wide hash rates
- Identifying coins with favorable power-to-noise efficiency; quiet operation limits power consumption, limiting heat generation and limiting potential revenue generation

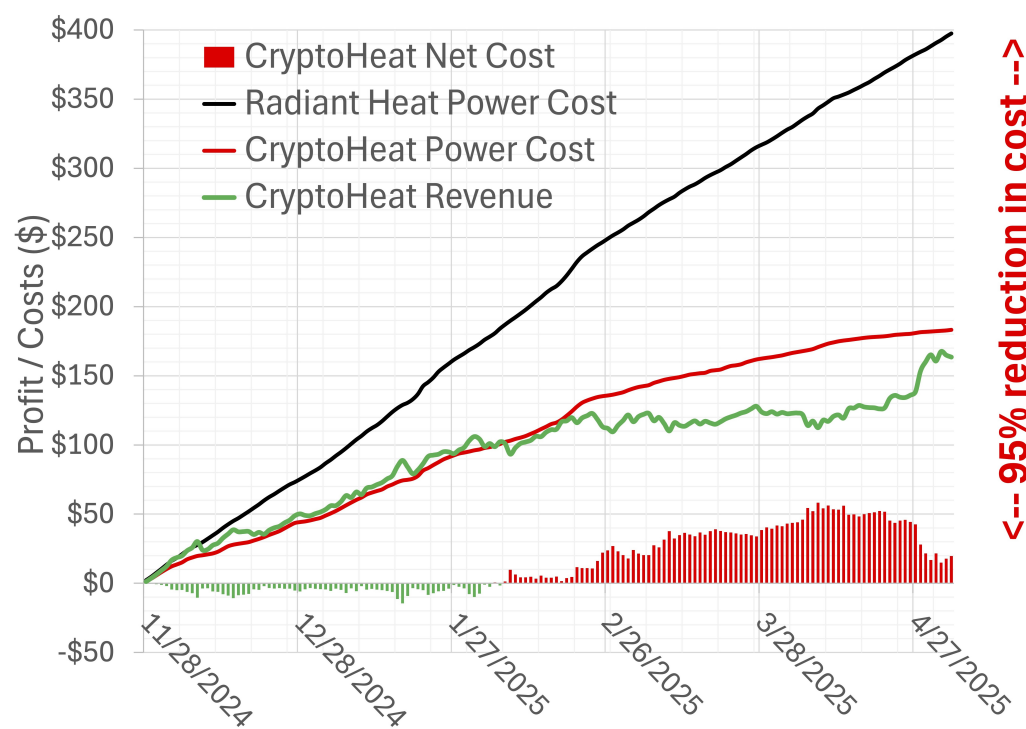
RESULTS



ERGO Mining over 5-Month Period

CONCLUSION

Description (5-months)	Value
Power Consumption	1703 kWh
Heat Output	5,810,877 BTUs
Noise Level	36 dBA–42 dBA
Power Cost (variable)	\$183.21
Mining Income	\$163.50
Net Cost	\$19.70
Traditional Heating Cost	\$397.47
Cost Reduction	95%



CryptoHeat reimagines energy use in computing, turning inefficiency into opportunity.

REFERENCES

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- [3] Wei Li, Yong Zhang, and Jun Chen. Waste heat recovery from cloud data centers: Techniques and research trends. *Energy*, 101:561–569, 2016.
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