



HASHR8 RESEARCH

BITCOIN MINING INDEX

The State of Bitcoin Mining in Kazakhstan



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This report would not have been possible without the contributions of leading professionals in the Kazakhstan mining industry.

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ABSTRACT

There are several advantages to Bitcoin mining in Kazakhstan. Competitive electricity rates, VAT exemptions, and legal clarity all foster favorable dynamics for Kazakh Bitcoin miners. A federal law was passed in June 2020 that legitimized Bitcoin mining as an official economic activity. The federal law was a significant development for Bitcoin miners in Kazakhstan as they can now operate with legal clarity and plan long-term. Bitcoin miners that are currently operating hold an advantage over new entrants to the industry. As the government recently increased the price cap for electricity rates, new entrants will likely secure higher power prices than those currently operating. Some mining facilities own their power plants and substations, allowing them to secure electricity rates of less than \$0.03 per kWh. Government estimates put the energy consumption of the country's Bitcoin mining industry at 620 MW. The industry is expected to continue to grow, with a government minister anticipating \$715 million in investments over the next three years. The broader cryptocurrency industry is also expected to grow, with an exchange launch anticipated in 2021.

INTRODUCTION

In our second Bitcoin Mining Index release, we explore the mining industry in Kazakhstan. In recent years, the discussion regarding the environmental impact of the Bitcoin mining industry has ramped up.

While some regions are favorable for miners securing long-term, low-cost electricity from renewable sources, others are not. In Kazakhstan, miners are incentivized to source power from private coal and gas plants. Hydropower plants are generally state-owned and charge higher electricity rates.

HASHR8's Bitcoin Mining Index is a research initiative that will allow miners to compare and contrast prospective mining regions easily. If sourcing renewable energy is a priority for miners, the index will allow miners to quickly identify and avoid which regions are predominantly powered by fossil fuels.

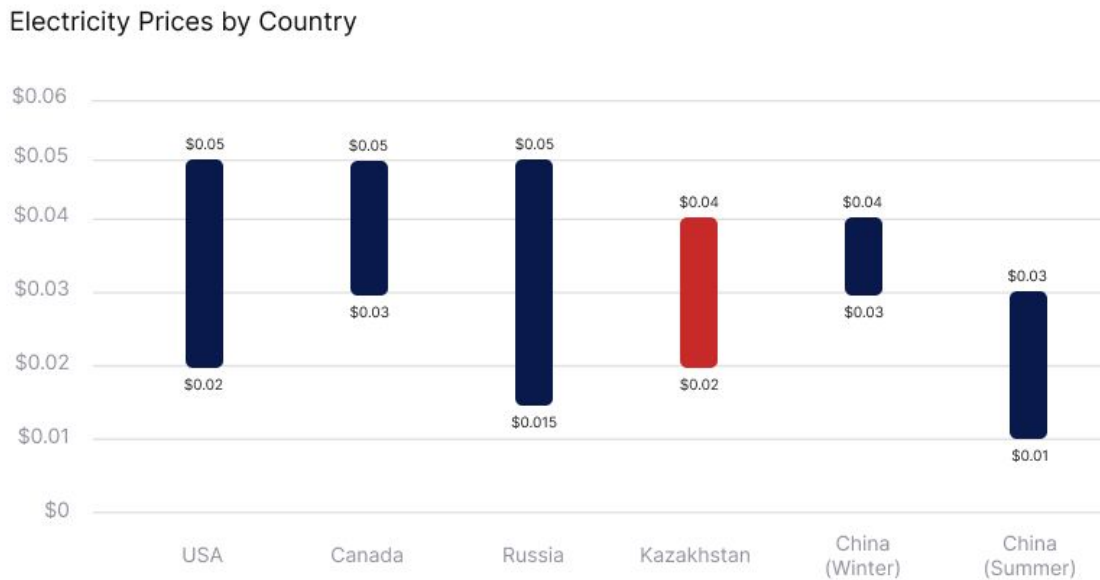
The energy mix is just one example of how miners can weigh prospective regions' benefits and drawbacks. Each report will also investigate electricity rates, the regulatory environment, capital expenditure costs, and the business setup.

METHODOLOGY

This reports' information was mainly gathered by speaking with industry professionals who are operating key firms in the region being investigated. Information was checked for veracity by cross-referencing with several professionals. Information gathered was further fact-checked and augmented through online research. Online research consisted of reviewing government websites, forums, and media releases.

ELECTRICITY RATES AND ENERGY MIX

Facility Electricity Rate: \$0.020 to \$0.043
 All-in Hosting Rate: \$0.037 to \$0.05



Karagandy, Pavlodar, Oskemen, and Ekibastuz are the main mining hubs in Kazakhstan. It is estimated that 80 to 85% of the country's hashrate production is generated in these areas. Bitcoin miners reside in these areas

due to the advanced power generation infrastructure. Several large-scale coal plants are based in these regions. Ekibastuz has the largest power station in Kazakhstan – the [GRES-1](#) power station – with an energy capacity of 4,000 MW [1]. The [GRES-2](#) power station has an energy capacity of 1,000 MW, and it is estimated that 75% of its energy production is exported to Russia [2]. On aggregate, [Kazakhstan is estimated to have an energy surplus of 3,000 MW \[3\]](#). The main power source in Kazakhstan is coal. It is estimated that 70 to 90% of the country’s energy production is generated from coal.



Map of Kazakhstan and key mining regions.

Several large-scale coal power plants are based in Kazakhstan’s northern and eastern regions. Bitcoin miners typically establish facilities close to the power plants. Some facilities own a substation which allows them to connect directly with the national grid operator KEGOC. Others will connect to regional grid operators which are themselves connected to KEGOC. KEGOC charges 2.5 tenge (~\$0.006) per kWh for transmitting power from their grid and the regional grid will charge an additional 2.5 tenge. Facilities that

connect directly to KEGOC, via a substation, will save roughly \$0.006 on power transmission costs. Facilities that are connected to regional grids also have a greater risk of downtime. Regional grid operators can request that energy consumption is halted for maintenance of the infrastructure. Some mining facilities have also invested in their own power plant which allows them to make further savings on electricity rates. A total of \$0.012 can be saved on transmission costs if a miner operates a power plant. Investments in power infrastructure will cost several million USD.

For electricity rates, the Kazakh government sets a price cap, which is the maximum that power plants can charge. Firms predominantly secure power contracts at the price cap. Most facilities that are currently operating have secured rates in the region of \$0.02 to \$0.023 per kWh. However, the price cap for electricity rates has recently increased and new entrants are more likely to secure rates that equate to roughly \$0.028 per kWh. Transmission costs are not included. Several firms own power plants and/or substations and will save on transmission costs. The average hosting rate is estimated to be \$0.042 per kWh. All-in hosting rates range from roughly \$0.038 to \$0.05.

HARDWARE LOGISTICS

Mining facilities typically import hardware directly from China. There is a 12% VAT obligation on imported hardware. Domestic entities can secure an exemption on this VAT by committing to the hardware staying on the company's balance sheet for five years. The equipment cannot be sold, moved, or exported for five years. It is also subject to regulatory inspections. At the end of the five years, the requirements imposed on the hardware are lifted, and it can be subsequently sold, moved, or exported. Those that wish to exit the VAT exemption agreement amid the five-year window will be forced to pay significantly higher than the original 12% obligation. The restrictions on exiting the VAT exemption agreement increases the importance of purchasing mining machines hardware at a favorable rate. Those that overpay on the cost per TH may depend on reselling their

hardware in a high-demand low-supply market to recoup their investment fully. With the VAT exemption, this will not be possible.

Overseas entities who wish to secure VAT exemptions and maintain legal ownership of the hardware must establish a domestic subsidiary or a domestic entity. The cost of forming such an entity can vary widely based on the corporation's specifications. Forming an entity with foreign shareholders will be subject to higher costs.

It is also possible for foreign entities to import hardware through a purchase agreement with a Kazakh entity. This is an alternative option for overseas customers who wish to import hardware without establishing a domestic Kazakh entity. A domestic entity will purchase the foreign entity's hardware and record it as an item on their balance sheet. A fee will be charged for such services, but it will be much less costly than forming an entity. This may be a more attractive option for smaller-scale miners who wish to import hardware into Kazakhstan. However, it also involves a degree of trust as the hardware will be legally owned by the domestic entity.

Hardware can be imported via trucks, railway, or air. It takes roughly three to five days for hardware to be imported by air. This time includes hiring cargo and coordinating delivery. The actual air travel takes less than one day. Railway and truck will take two to three weeks. Although air travel is more expensive than railway and truck, the extra time mining can compensate for the additional cost.

REGULATORY STANCE

Bitcoin mining in Kazakhstan is a legal activity after a federal law was passed in June 2020. However, exchanging between cryptocurrency and fiat is illegal and requires that proprietary Kazakh miners structure their business in a specific way. [In 2018, Kazakhstan](#) authorities considered outlawing any business activity associated with cryptocurrencies [4]. The stance from the

government has since reversed. The [legislation passed in June 2020](#) acknowledges crypto mining as an official business activity [5]. This was an extremely positive development for the industry as it legitimized Bitcoin mining as an economic activity that is clearly defined by the federal law. This allowed mining facilities to establish operations without the risk of mining being ambiguously defined in the eyes of the law.

The legislation introduced terminology related to digital assets. Mining is defined as “the process of performing computational operations using computer and energy capacities in accordance with the specified encryption and data processing algorithms, which ensures the integrity of data blocks in information objects via blockchain”. Digital assets are classified into two categories – secured and unsecured. Secured digital assets are defined as “a digital means of certifying property rights to goods and (or) services”. Unsecured digital assets are defined as tokens issued as a reward for participating in a blockchain’s consensus process. Bitcoin falls under the category of unsecured digital assets.

The regulation prohibits exchanging cryptocurrencies between fiat and Bitcoin, making it difficult for firms who wish to carry out proprietary mining. However, a specific business structure can be set up to accomplish this which will be discussed in the “business setup” section. In the future, it may be possible to exchange cryptocurrencies within Kazakhstan in the special economic zone of Astana. There is a clause in the regulation which will allow bilateral cryptocurrency to fiat conversions in this zone. However, there is currently no exchange facilitating such conversions. It is anticipated that an exchange partnered with the International Financial Centre (IFC) in Astana will launch in 2021.

The [Minister of Digital Development – Bagdat Mussin](#) – has also been actively seeking to attract investment in the country’s cryptocurrency mining sector. In September, Mussin estimated that \$190 million has already been invested in domestic cryptocurrency mining operations and notes that preliminary agreements have been secured for another \$700 million worth of investments [6].

Local governments are supportive of the Bitcoin mining industry. They also follow instructions from the national government to seek and spur investment in the crypto mining industry within their respective regions.

BUSINESS SETUP

Kazakh Bitcoin mining firms structure their business to provide services in digital mining. Services like security, electricity, internet connectivity, hardware maintenance, and hardware procurement are bundled together and sold as a package to domestic or foreign entities. The hardware in such service packages is owned by the Kazakh mining firm offering the packages. There are only a few firms that solely carry out proprietary mining.

Although firms are prohibited from exchanging between cryptocurrency and fiat in Kazakhstan, the conversion can be accomplished by using the combination of a domestic and overseas entity. Firms typically establish an overseas entity in either Singapore or Hong Kong. They transfer ownership of the mined assets to the overseas entity where they can convert into USD or another fiat currency. The fiat currency can then be transferred to the domestic entity.

Firms providing hosting and service packages can operate without an overseas entity. Customers of hosting providers deal with custodianship and exchanges. Customers are regularly invoiced by the hosting firm and can pay in fiat currency.

There is no specific tax regime for this type of activity. It is taxed according to the 20% corporate tax. There is also a special regime for IT companies where they can be taxed on 1% of their total revenue. Cryptocurrency mining firms can apply for this special regime to reduce their tax.

It is also possible that an overseas hosting customer can own the hardware. In this case, a customer must establish a Kazakh corporation to import the

equipment. Hardware is imported under the ownership of the Kazakh entity, and the owner can hire the services of a hosting facility.

Most Kazakhstan mining facilities are newly constructed and are specifically designed for mining activities. Many small-to-medium-sized mining firms may congregate in one larger facility. These small-to-medium-sized firms may either carry out proprietary mining or may sell service packages at a premium to the larger facilities' hosting rate. Labor costs are estimated to be roughly \$0.002 to \$0.0025 per kW, comparable to Russian estimates.

For mining facility management, the wide variance of climate conditions needs to be considered. In summer, [temperatures average more than 30 °C and average -20 °C in winter \[7\]](#). Temperatures of over 40 °C are possible during summer and temperatures below -40 °C are possible during winter. During summer, careful consideration needs to be given to the mining facilities' air flow to lower the risk of mining machines overheating. During winter, raising the inflowing air temperature becomes important to lower the risk of damage to mining machines.

In 2020, [Kazakhstan ranked 25th in the World Bank's ease of doing business rankings \[8\]](#). The country ranked particularly strongly on the categories of "Protecting Minority Investors" and "Enforcing Contracts" with a 7th and 4th ranking, respectively. "Trading Across Borders" and "Getting Electricity" were the poorest categories for Kazakhstan as they ranked 105th and 67th, respectively. 190 countries were assessed in the rankings.

KEY DOMESTIC FIRMS AND INSTITUTIONAL PRESENCE

One of the largest Bitcoin mining facilities in Kazakhstan is EneGix. Based in Ekibastuz, EneGix facilities have an energy capacity of ~180 MW and the firm owns their substation. Owning a substation allows EneGix to secure competitive electricity of less than \$0.03 per kWh. EneGix is an example of a larger facility where smaller firms can secure space and market to their

customers at a premium. Powerry is another significant Bitcoin mining facility in Kazakhstan. The firm considers itself a vertically integrated mining company and owns a power plant and substation. Powerry can also secure rates of less than \$0.03 per kWh. Other significant hosting facilities and miners known to have a presence in Kazakhstan include Xive, Bitfury, Minebest, MyRig, and AQ Group. AQ Group is a significant customer of [NASDAQ-listed hardware manufacturer Canaan \[9\]](#).



Bitcoin mining farm in Pavlodar, Kazakhstan.

Several professionals in the Kazakhstan mining industry formed The National Blockchain and Cryptocurrency Association to advocate for legislation that would clearly define cryptocurrency mining activity in the country. The association was formed in 2017.

Chilkoot is a hardware distributor to the CIS region. While larger-scale miners will typically secure hardware directly from the manufacturer, Chilkoot is an option for smaller-scale and retail miners in Kazakhstan.

ESTIMATED HASHRATE SHARE

The [Cambridge Center for Alternative Finance](#) estimated that Kazakhstan's share of global hashrate ranged from 1.37% and 6.17% between September 2019 and April 2020 [10]. The share gradually grew over the timeframe investigated, with Kazakhstan's share for September 2019 being 1.42%. The estimate for Kazakhstan's share in April 2020 was 6.17%.

Industry professionals currently estimate that 400 to 500 MW of energy is consumed by Bitcoin mining in Kazakhstan. In September 2020, Bagdat Mussin estimated that the energy consumption from 13 Bitcoin mining facilities in Kazakhstan was 620 MW. Combining these estimates, we can approximate a range of 400 to 620 MW for the Bitcoin mining industry energy consumption in Kazakhstan.

[Current Cambridge Center of Alternative Finance](#) estimates put the total network draw at 11.5 GW. If these estimates are accurate, Kazakhstan represents between 3.47% and 4.34% of Bitcoin network hashrate [11]. This is roughly half of the estimated [Bitcoin mining energy consumption in Russia](#) [12].

CONCLUSION

From September 2019 to April 2020, the Cambridge Center for Alternative Finance estimated that Kazakhstan's hashrate share grew from 1.42% to 6.17%. Kazakhstan's Bitcoin mining industry has certainly rapidly advanced, with government minister Bagdat Mussin estimating that \$190 million has been invested in the industry. The growth of the industry was driven by several factors that are favorable to Bitcoin mining in Kazakhstan. Facilities can secure extremely competitive electricity rates, with many currently operating at a rate between \$0.03 and \$0.033 per kWh. [Previous research has estimated that only 27.5%](#) of the Bitcoin network has secured electricity rates of \$0.04 per kWh or lower [13]. Miners that invest in energy infrastructure can secure rates as low as \$0.02 per kWh. Research suggests such rates are among the lowest 5% [13]. Securing a VAT exemption on imported hardware will also help miners save significantly on CapEx costs.

[Electricity costs are estimated to account for 79% of a miner's OpEx costs, and CapEx](#) is estimated to account for between 37% and 52% of a miner's total costs [14]. Kazakhstan offers an environment that is favorable for miner's lowering both of these costs. However, the exemption comes with restrictions, and miners need to be careful not to overpay for hardware. A federal law was passed in June 2020, which recognizes the industry as an official economic activity. Legal clarity is extremely positive for the advancement of the Bitcoin mining industry in Kazakhstan. [Government minister Askar Zhumagaliyev anticipates that 300 billion tenge \(\\$715 million\)](#) will be invested over the next three years [15]. Advancement in the broader cryptocurrency industry in Kazakhstan is also expected with a domestic exchange for converting between fiat and cryptocurrency potentially launching in 2021.

BIBLIOGRAPHY

1. https://en.wikipedia.org/wiki/Ekibastuz_GRES-1
2. https://en.wikipedia.org/wiki/Ekibastuz_GRES-2_Power_Station
3. <https://www.kazpravda.kz/en/news/economics/inexpensive-flood-electricity-will-be-distributed-among-consumers-in-kazakhstan>
4. <https://sputniknews.com/asia/201803301063085023-kazakhstan-digital-currency-mining-ban/>
5. <https://www.conventuslaw.com/report/kazakhstan-amendments-to-digital-technology/>
6. <https://www.btctimes.com/news/kazakhstan-to-make-a-700-million-bet-on-mining>
7. https://en.wikipedia.org/wiki/Geography_of_Kazakhstan#cite_note-1
8. <https://www.doingbusiness.org/en/rankings>
9. <https://canaan.io/878.html>
10. https://cbeci.org/mining_map
11. <https://cbeci.org/>
12. <https://www.hashr8.com/research/bitcoin-mining-index/russia/>
13. <https://www.blockwaresolutions.com/research-and-publications/2020-halving-analysis>
14. <https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/3rd-global-cryptoasset-benchmarking-study>
15. <https://astanatimes.com/2020/06/kazakhstan-plans-to-attract-738-million-of-cryptocurrency-investment-in-next-three-years/>