



Cryptocurrencies and processing power in Russia: a new strategic territory in eastern Siberia?

Hugo Estecahandy, Kévin Limonier

► To cite this version:

Hugo Estecahandy, Kévin Limonier. Cryptocurrencies and processing power in Russia: a new strategic territory in eastern Siberia?. *Journal of Cyber Policy*, 2021, From cyberspace to the datasphere: strategic challenges of the digital revolution, 6 (1), pp.68-80. 10.1080/23738871.2021.1939746 . hal-04070734

HAL Id: hal-04070734

<https://hal.science/hal-04070734>

Submitted on 17 Apr 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Cryptocurrencies and processing power in Russia: a new strategic territory in eastern Siberia?

Hugo Estecahandy & Kevin Limonier

To cite this article: Hugo Estecahandy & Kevin Limonier (2021) Cryptocurrencies and processing power in Russia: a new strategic territory in eastern Siberia?, Journal of Cyber Policy, 6:1, 68-80, DOI: [10.1080/23738871.2021.1939746](https://doi.org/10.1080/23738871.2021.1939746)

To link to this article: <https://doi.org/10.1080/23738871.2021.1939746>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 19 Jun 2021.



Submit your article to this journal [↗](#)



Article views: 708



View related articles [↗](#)



View Crossmark data [↗](#)

Cryptocurrencies and processing power in Russia: a new strategic territory in eastern Siberia?

Hugo Estecahandy and Kevin Limonier

French Institute of Geopolitics, University Paris 8, Saint-Denis, France

ABSTRACT

This paper analyses the emerging Russian cryptocurrency mining industry, with a particular focus on eastern Siberia. This major strategic industry provides the region with a growing calculation power and fosters potential innovations – in encryption especially. In fact, the crypto-mining industry has noticeably coalesced in eastern Siberia because the region offers a series of geographic, climatic, economic and technical advantages – the magnitude of which is hard to match anywhere else in the world. This article focuses on the oblast of Irkutsk and shows how crypto-mining has come to encompass both economic and political powers and to involve a number of Russian actors and infrastructures. Ultimately, the local dynamics in eastern Siberia teach us a lot about the fate of the industry nationally.

ARTICLE HISTORY

Received 28 February 2021

Revised 23 March 2021

Accepted 14 April 2021

KEYWORDS

Cryptocurrency; Bitcoin;
Russia; Siberia; mining

Since December 2019, Moscow has faced many fake bomb scares. The perpetrators have never been identified but they almost systematically demanded the same thing: the reimbursement of 120 bitcoins (more than €800,000 in December 2019) allegedly stolen from the users of Wex, a now-closed Russian cryptocurrencies exchange platform predominantly used to launder money. Furthermore, the BBC (Zakharov 2019) revealed that, in November 2019, the administrator of Wex has been victim of an attempt at data extortion organised by a group of FSB agents and Konstantin Malofeev, an oligarch well known for his role in diverse operations of influence abroad and for his involvement in Russian digital censorship.

Even if it is too early to draw any conclusion from this case, its complexity, depths and opacity show how cryptocurrencies have become a truly national industry in a country where the mechanisms of political power remain largely structured around the personal enrichment of the actors who hold the keys to the system. For that reason, it isn't surprising to see that mining – the process of creating certain cryptocurrencies – has become a coveted activity, protected by a few investors and oligarchs who see it as a formidable opportunity to diversify their business activities. Besides, Russia is a country where electricity is generally cheap, and the cold and dry weather that dominates part of the year is particularly suitable for running the processors, graphic cards and ASICs¹ needed to generate cryptocurrencies.

Mining is inherent to some cryptocurrencies, including the famous bitcoin. Bitcoin was launched in 2009 as a virtual currency project and as an alternative financial network to

traditional banking tools. Like other cryptocurrencies that have subsequently emerged, it is not controlled or issued by a trusted third party (such as a government or bank) but by a computer algorithm that distributes authority equally among its users. Each member of the Bitcoin network is invited to verify the information contained on the blockchain associated with the cryptocurrency – a sort of digital ledger referencing all transactions – before having to solve a cryptographic problem (Kroll, Davey, and Felten 2013). The first verifier to find the solution has their verification validated and is rewarded in bitcoins. Incidentally, bitcoin and some other cryptocurrencies (ether, etc.) are created and issued through this process.

Basically, cryptocurrency mining consists of using the computing power of various computer hardware to solve a cryptographic problem inherent to a chain of transactions. The value of some cryptocurrencies, such as bitcoins, has skyrocketed in recent years and mining has become a very lucrative activity, now developed at an industrial scale.

Since the beginning of 2021, this trend has sharply accelerated as the value of bitcoins rose from \$10,500/unit in October 2020 to an all-time high of \$63,500/unit in April 2021. This rise is fuelled by the massive investments of a series of actors who saw bitcoin and other cryptocurrencies as a potential safe haven amidst the financial crisis caused by the Covid-19 pandemic. Indeed, the policies of some central banks – primarily the US Federal Reserve – to support their economies (debt buybacks, cuts in borrowing rates, etc.) are weakening the value of fiat currencies, including the dollar (Yao and Li 2020). Thus, by taking advantage of the renewed distrust of financial actors and individuals towards regulatory authorities (governments, banks, etc.), Bitcoin is returning to the purpose for which it was created: to be a tool of emancipation from centralised financial authority.

With a favourable political and economic environment, recent permissive regulations,² a cold winter climate and cheap electricity, Russia has become a preferred territory for miners from all over the world, and particularly from China. Actually, China hosts a large part of the processing power of the Bitcoin blockchain, between 50% (Doctor and Suresh 2020) and 65% (Cambridge Center for Alternative Finance, 2021) depending on the studies. But the country has started to regulate an industry that runs on the unconsumed electricity from the huge hydroelectric dams created to supply planned cities which never reached their expected size.³ As a result, Chinese miners are leaving the country to set up their equipment in Russia, which is said to represent about 7% (Doctor and Suresh 2020) of the world's Bitcoin mining power, and a few other countries (Khöler and Pizzol 2019).

This constitutes a top geopolitical opportunity for Russia. As it attracts miners, the country also brings processing power to its territory. Today, this power generates wealth, helped by the absence of legal prohibition in Russia, but it could also be used to fulfil some of Russia's geopolitical ambitions, such as achieving control over its internet.

Indeed, processing power is becoming a major issue worldwide, as humanity produces more and more data; as a personal computer requires memory *and* processing capacities to work, large information systems need both of them to fulfil their missions. In other words, the exponential growth of data produced by human societies generates new needs for calculation power. For example, data produced by social network users need to be processed to supply marketing or predictive algorithms. The massification of artificial intelligence or encryption messaging also requires increasing calculation capacities. For instance, the necessary computer capacity for the development of artificial

intelligence alone has doubled every three to four months since the early 2010s (Amodei and Hernandez 2018).

In Russia, new technologies of control, built on deciphering capabilities, are developing fast, as the federal legislation demands tougher control of data circulating on the RuNet – the Russian segment of the internet. Filtering this data has become a priority and several laws have subsequently been adopted to increase the state's 'sovereign control' over the network.

To implement such legislations,⁴ Russian authorities are investing in filtering technologies, such as DPI (deep packet inspection), that require deciphering capacities⁵ on an industrial scale. For the moment, however, Russia isn't capable of implementing the law, as shown in the failed attempt to block Telegram, the encrypted messaging app. Because they require an enormous processing capacity, the development of these filtering tools has become a strategic issue for Russian authorities. Ultimately, the development of a cryptocurrencies industry on its territory could help Russia fulfil its political goals, as the development of mining implies the growth of the country's processing power capacities.

Russia's processing capacities are lagging behind China's and the United States' – both are working on the next generation of so-called 'quantum' processors, the capacity of which will far surpass existing technology. That said, Russia offers ideal conditions for cryptocurrency miners, and it could eventually benefit from the computer capacity that a myriad of independent actors currently develop outside of the orbit of Russian authorities. The uncertain integrity of many of them could even become an asset; the case of bitcoins stolen from the platform Wex shows the tight links between security services and entrepreneurs with practices of doubtful legality. In many areas, these entrepreneurs provide the state and its structures with their expertise and their capabilities in exchange for rewards or opportunities for personal enrichment.

Finally, if the mining industry (and its computer capacity) may grow closer to the so-called 'force agencies' (the Russian Ministry of Defence or FSB, for example), this transformation is only emerging now, and that data remains fragmentary. However, the development of mining capabilities is particularly visible in certain regions, such as in Siberia, where this economic activity influences the local economy and existing political relationships. In this article, we want to highlight the emergence of this Siberian mining industry and how the region could, ultimately, become a strategic territory for the digital autonomy of Russia.

Siberia, a strategic territory for Russia's digital development

The Siberian interest in computing isn't new. The region has seen the rise of computing industries since the start of the century: data storage, innovations in artificial intelligence (deep learning) and in the internet of things.

The region, which was a centre of cybernetic research during the Soviet Union, stands as a notable beneficiary of the 2014 Russian law⁶ that compelled intermediation platforms to store the data of every Russian individual or legal entity on Russian territory. Indeed, following the Snowden revelations, the Russian government decided to adopt a series of measures intended to protect its segment of the internet. But the 2014 law on data

localisation was also a formidable opportunity for Siberia, and many projects of data centres popped up there.

At the time, Russian and Chinese investors saw advantages in deploying these activities in the region. The same criteria underpin the movement of cryptocurrency miners to Siberia.

Cheap electricity

Siberia provides some of the world's cheapest electricity, thanks to several legacies of the Soviet Union. The rivers crossing Siberia from south to north are punctuated by hydroelectric dams built, since the late Stalinist period, by Gulag prisoners who were numerous in the region. In Moscow, planners decided to settle the electricity-hungry aluminium industry on the shores of Lake Baikal, in the Irkutsk oblast. Today, these dams are still running, but the regional industries declined after the collapse of the Soviet Union and this considerably reduced the need for electricity, creating an important energy surplus that drove the price of electricity down to its lowest point in Russia – between 1 and 4 roubles per kilowatt hour (between 1 and 5 cents in USD) in 2020.⁷ As a comparison, in Hong Kong, one kilowatt hour is sold for between 11 and 22 USD cents (four times more expensive) and the price is set at 18 USD cents in France.⁸ Furthermore, Irkutsk's electricity production and distribution are monopolised by En+, a leading Russian energy company, and its subsidiaries. For that reason, these local energy suppliers can decide the electricity's price and may offer preferential rates in certain places to attract miners.

A dry and cold climate

Siberia is famous for its extremely low winter temperatures, which create the perfect conditions to reduce the energy needed to cool down the servers. In Irkutsk, for example, the temperature oscillates between -17°C in January and $+18^{\circ}\text{C}$ in July, with possible extremes of -40°C during the winter and $+30^{\circ}\text{C}$ during the summer. Additionally, the Siberian climate is relatively dry, which is also advantageous for setting up humidity-sensitive computer components.

A high-quality connection

To be efficient, miners also need to be connected to a reliable and fast internet connection so they can transmit the results of their calculations to the rest of the network as quickly as possible – they need to be the first to have their verification validated in order to be rewarded.

Luckily, Siberia is crossed from east to west by a vast optic fibre network that connects Europe and Asia from London to Hong Kong; this important backbone, named 'TEA' (Trans Europe Asia), was inaugurated in 2005 and is the shortest digital path linking Asian markets to Western Europe. It directly competes with the meridional maritime route taken by the digital data passing between Europe and Asia (from Taiwan to Suez via India). The TEA has incidentally become a major strategic asset for Russia as it puts the country at the heart of digital exchanges between the two largest global economic poles. The TEA thus constitutes a veritable 'digital Trans-Siberian'; its economic and

strategic effects are comparable to the railway's impact at the time of its construction in the late nineteenth century.

The pre-existing environment favours innovation

Siberia has long been a territory of forced relegation and colonisation (imperial penal colonies, later the Gulag) and with the end of the Stalinist period, the Soviet authorities decided to continue populating the region to foster scientific research. After 1957, the region welcomed the headquarters of numerous labs and research institutes that strove to 'study the unique natural richness of the region, to help in the development of a modern agriculture, but also to support the technological modernisation effort of the large western centres of production'.⁹ During the 1960s, cybernetics was amongst the most advanced fields of research in the region, with a department of cybernetics in Irkutsk, and a chair of cybernetics in Novosibirsk. Despite the fall of the USSR and the important 'brain drain' that ensued, the region retained some of its competencies – partly due to the maintained public subsidies. Today, the universities and research labs still form an important contingent of qualified workers.

The same factors now attract cryptocurrency miners. That said, and unlike data centres, they haven't settled homogeneously throughout Siberia. In fact, we can delineate two Siberian sub-regions with two different approaches to digital development: in western Siberia, publicly sponsored strategic projects, and in eastern Siberia, smaller projects, individual entrepreneurs and several other actors investing in more or less opaque activities.

Western Siberia – Novosibirsk and its region – hosts large technological projects endorsed by the Soviet, and later Russian, authorities. The regional branch of the Russian Academy of Sciences settled there and, in 2005, the Russian government first implemented experimental special economic zones (SEZ) dedicated to high tech in the area. Since then, SEZs and techno-parks have multiplied around Novosibirsk, with nearly 50 public-private partnerships worth €871 million (62 billion roubles) in 2020 (Krasnova et al. 2018). Akademgorodok (literally, the 'academic town'), a former mono-functional Soviet city (Josephson 1997) now cajoled by public authorities hoping to turn it into a showcase of the 'renewal' of the national technological might, is probably the most important project in the region. In Akademgorodok, research has mostly focused on artificial intelligence (deep learning), IoT solutions (internet of things), data encryption technology (i.e. the blockchain), nanotechnologies and biotechnologies.

Eastern Siberia and Lake Baikal welcome cryptocurrency mining

By contrast, the eastern part of Siberia is devoid of large strategic projects. And yet, most of the computer capacity induced by cryptocurrency mining has concentrated there, on the shores of Lake Baikal and its important tributary, the river Angara. Hydroelectric dams produce particularly cheap electricity and feed large mining farms.

Historically, most local digital activities weren't built 'from above' (by the authorities) but 'from below' – by entrepreneurs that sometimes exhibit libertarian overtones. Bearing in mind the low cost of electricity there, some local inhabitants have installed calculators in their dachas or garages. Recently, several articles in regional newspapers have testified to fire outbreaks caused by poor ASIC installations. In 2018, an evangelist church – religious

organisations benefit from a preferential price for electricity – was condemned in Irkutsk because it had mined bitcoins. The regional operator Irkutskenergo detected an abnormally high consumption of electricity coming from the church, and the courts didn't believe the accused's claim that the increased consumption was caused by the printing of bibles.

The relative freedom from Moscow's administrative regulations is a representation cultivated by local authorities. It furthers, in the digital age, the belief that Siberia has been, for centuries, fertile ground for the experimentation of political, economic and social alternatives – led by intellectuals-turned-colonists – that moved beyond the reach of the central authorities. Indeed, the Baikal used to welcome those who had conflictual relations with the central authorities and were relegated to a pioneer front that the empire struggled to colonise. The nature of the pre-revolutionary settlements in the region fostered a 'frontier psychology' among the settlers, who had fiercely independent attitudes toward the authorities and believed in the virtues of self-management among rural communities (Hugues 1989). The cultural and intellectual life of the city, and later of the Irkutsk region, was also greatly influenced by the Decembrists who were forcibly exiled to the territory following the failure of their December 1825 revolution (Grandhaye 2008). Some of the 'Decembrists', as these insurgent imperial officers were named afterwards, gradually took up administrative or teaching positions from the 1850s onwards and imbued several generations of local inhabitants with their anti-imperial ideas and discourses. This collective regional identity – built on a representation of independence and critical attitudes towards the government, and reinforced by the presence of numerous Gulag camps in the region from the 1930s to the 1960s (Afanasov 2002) – created a fertile ground for the political ideas that underlie cryptocurrencies.

Some cryptocurrency miners have subsequently reclaimed this particular identity as, far away from the central authorities, they experiment on alternative economic models with a discourse sometimes similar to Anglo-Saxon libertarians (Golumbia 2016) (Map 1).

Industrial farms

That said, if these representations are often found among miners, they are totally contradicted by the reality of their development of industrial size farms.

First, the business model encourages large mining farms to rent space to third-party (Russian or foreign) individuals or companies that are invited to set up their computing equipment inside their infrastructures. Indeed, not all the processors mining cryptocurrencies in a farm belong to the owners of the building, nor do all the revenues generated. For the sole purpose of generating profits, Chinese, French or American entities may set up their machines in a farm in Siberia, where renting space for computational tools is cheaper than in other parts of the world due to the low local price of energy. Besides, it is nearly impossible to know exactly the identity or the origin of the clients of these farms, or even the amount of bitcoins generated there (it depends on the quantity and versions of ASICs used); this data is known by the farm managers only. The Irkutsk region has seen a continued concentration of computer capacities in small spaces usually controlled by prominent local political and economic actors.

Certainly, the concentration of miners in these areas is encouraged by Irkutskenergo (amongst others), a local subsidiary of En+ and the Russian leader in electricity and aluminium production. Thanks to the miners, this company can sell the surplus of electricity



Map 1. Cryptocurrency mining farms in Russia: a strategic spatialization?

it has been struggling to deal with since the disappearance of many industries from the Baikal region after the fall of the USSR.

In fact, the relationship between electricity producers and mining farm operators goes further than that. Irkutskenergo has directly invited miners to settle inside its coal-fired power plant in Irkutsk city. In a call for proposals published on its website, the electricity provider advertised the empty land it owns as propitious to the development of a mining farm. It also offered a preferential price for cryptocurrency miners.

With this initiative, Irkutskenergo clearly showed its desire to conduct business with miners, hence launching an invitation to settle inside the plant. But an electric plant is critical infrastructure; it provides vital energy to the city of Irkutsk and its region, and it is required to respect a number of security norms – especially in granting access to third-party individuals. In that context, the devotion shown by Irkutskenergo for its cryptocurrency mining clients illustrates the importance of the mining market for the company. For the owners of the mining farms, it is a resource-savvy offer (in energy and connections) and it also secures their computer material, which is particularly sought after and encourages robberies when the value of some cryptocurrencies increases rapidly (such as the bitcoin in 2017 and at the beginning of 2021). Following the heights reached by cryptocurrencies in 2017, the price for mining computing tools went up and many mining farms were targeted by robberies, as happened to a miner near Irkutsk (Estecahandy 2019), or in Iceland in 2018, where hundreds of ASICs were stolen (Map 2).¹⁰

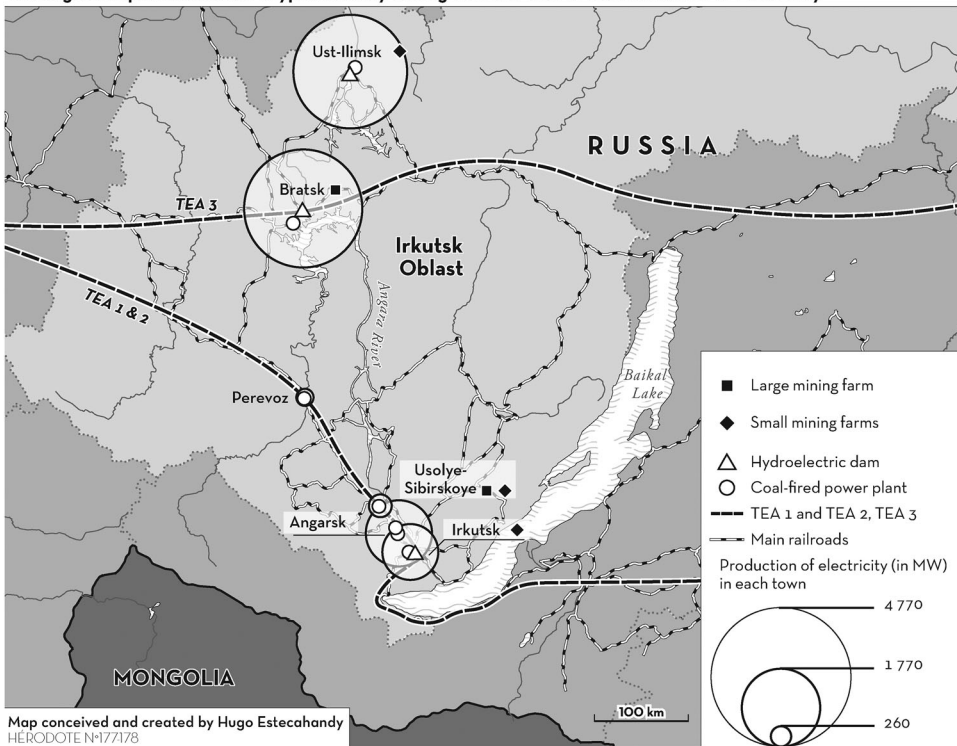
Does the political elite see an opportunity in mining?

The example of the Irkutsk electricity plant isn't unique in the region; several other mining 'enclaves' have emerged under the patronage of local industrial groups and, probably, local authorities. For instance, this is the case in the industrial area of Usolye-Sibirskoye, a city north of Irkutsk where an important Gulag camp used to be. This city of 70,000 inhabitants was one of the so-called 'monofunctional' cities in Russia, i.e. an urban centre planned and organised around one economic activity considered as strategic – the production of pharmaceutical goods in this case. Such as with most monofunctional cities dedicated to non-strategic activities – i.e. outside of the aerospace, nuclear or military complexes – Usolye-Sibirskoye is now in crisis; the production of drugs has collapsed after the fall of the USSR and the population decreased as unemployment and poverty took hold of the city.

The agglomeration of Usolye-Sibirskoye is surrounded by industrial areas where access is limited and controlled. In these walled and surveilled areas, several farms have been settled. They took advantage of the industrial wastelands resulting from a declining pharmaceutical industry, and from existing security systems, to install one of the largest mining farms in the region, with a capacity of 110 megawatts, according to some local miners interviewed.

As in Irkutsk, the miners of Usolye-Sibirskoye benefit from the electricity produced by a coal-fired power plant built to feed all the pharmaceutical plants that provided the USSR

The Regional Spatialization of Cryptocurrency Mining Farms is Tied to the Production of Electricity



Map 2. The regional spatialization of cryptocurrency mining is linked to the electricity production.

with drugs. Hence, a little less than one third of the 350 megawatts produced by the plant now feeds cryptocurrency mining.

There again, and similar to the owners of the coal-fired power plant in Irkutsk, the concentration of farms in closed and secured areas close to the production of electricity testifies to the sensitive dimension of these activities for the entrepreneurs. It also raises the possibility that there is a community of interest between miners, electricity producers and local authorities.

To get access to these closed areas, the miners probably received the approval of city authorities and/or of the management of the former pharmaceutical combine which still exists under the name Russol. Indeed, in monofunctional cities, the same group of individuals usually heads the city administration and the company that brings wealth to the town (which is called *Градообразующее предприятие*, literally 'the company giving its form to the city') – a situation that often induces generalised nepotism (Limonier 2018).

We can postulate here that the holders of local power saw in mining a new opportunity for personal enrichment and, in the end, for a renewal of their influence. Indeed, the system of informal allegiances that prevails in contemporary Russia and that underlies the political hierarchy is organised around this prospect of personal enrichment offered to actors who agree to 'play the game' (i.e. to obey Moscow's injunctions, even when these are devoid of legal basis). In fact, rigged public contracts and kickbacks, as well as instances of nepotism are parts of the power mechanisms on which what is generally called the 'Putin system' is based (Raviot 2007). However, this system is far from being as vertical as is generally understood in Western countries. Apart from sensitive sectors (armament, nuclear power, aerospace, etc.), decentralisation prevails; 'ordinary' industries are generally under the control of local or regional personalities, who often hold political responsibilities. These entrepreneurs generally derive a large part of their profits, not from the competitiveness of their firms, but from their ability to bypass the tax and competition rules normally imposed by the state. These privileges are particularly coveted; in order to obtain them, one must of course show allegiance, but, above all, be able to pay a set of actors whose favours one must ensure (Galeotti 2017).

Therefore, it can be postulated that for small local actors such as those in Usolye-Sibirs-koye, cryptocurrency mining is an un hoped-for source of enrichment, allowing them not only to secure their livelihoods, but also – and more importantly – to expand their network of associates and gain influence at the regional level. Cryptocurrency mining creates wealth and is thus a lucrative business. This wealth, if it is not directly converted into fiat currencies (roubles, dollars, euros), has the particularity of evolving within an alternative financial network beyond the reach of the Western economic sanctions to which certain Russian personalities or companies are subjected. This means that the acquisition of cryptocurrencies can bring a double benefit to a number of actors.

In fact, the mining opportunities in Siberia did not escape the attention of a number of established individuals. Oleg Deripaska is one of them. This oligarch, under sanctions from the American government, owns En+ (of which Irkutskenergo is a subsidiary) and Rusal – the world's leading aluminium producer – among other companies. These two companies are important for Siberia; the first controls a large part of the Siberian production of electricity and the second maintains considerable control over land there. Rusal is an heir to the large Soviet aluminium combines which used to be responsible for mass production on the shores of the Baikal. The Rusal factories are thus situated immediately near the

sources of electric production (producing aluminium requires considerable amounts of energy), and the industrial wastelands it possesses are areas sought by miners – such as in Bratsk, where a 100-megawatts-capacity farm has settled on a former Rusal factory. It is one of the country's most powerful mining farms and its operating company benefits from the energy surplus of the second most powerful hydroelectric dam in Russia, installed on the Angara river. The Bratsk farm owners and En+ are now planning a 40-megawatts mining farm (Baydakova [2020a](#)) near this same location.

Other huge mining projects are planned in the cold Siberian lands. West of the Angara river, in the Krasnoyarsk region, a 160-megawatts mining farm is planned near the town of Kodinsk. In the same region, but north of the Arctic Circle, a 10-megawatts farm is under construction in Norilsk, the most northerly – and one of the most polluted – cities in the world, with a population over 100,000 (Baydakova [2020b](#)). Finally, one farm notably illustrates the collusion between cryptocurrency mining and economic and political power players. Gazprom Neft, a subsidiary of the Russian giant Gazprom – the state-owned company and world's tenth largest oil producer (in 2019) – recently installed a mining farm at one of its infrastructures. By taking advantage of electricity directly generated by processing surplus gas, which was previously released into the air and which subjected the company to fines, the company, which is also targeted by US economic sanctions, offers cheap electricity to a private partner that generates cryptocurrencies. Recently, the company planned the construction of a new small farm (Redman [2021](#)).

Conclusion

The geography of cryptocurrency mining highlights its development in the Siberian region of Irkutsk, especially because of the abundance of necessary resources, such as cheap electricity and a favourable climate environment. Mining allows Irkutsk to build a future for itself in the digital industry, despite its exclusion from larger national policies that focus on Novosibirsk in Siberia. The development of mining furthers the emergence of a particularly dynamic local community of digital entrepreneurs and developers. Consequently, several atypical projects, particular to the region, have emerged, such as the cryptohouses (*kriptodom*) – houses heated with the heat of the processors mining bitcoins, following the private initiative of a local entrepreneur.

In addition, the massive hydroelectric dams on the Angara River provide a surplus of electricity produced with a moderate environmental impact, an attractive argument for miners sensitive to the ecological consequences of their activity. Indeed, one of the main arguments used by the critics of bitcoin and other cryptocurrencies that require computing power to operate, is their allegedly high environmental impact, due to the large amounts of energy required for mining. One estimate solely for Bitcoin puts its annual electric cost at 130 terawatt-hours, or about 0.6% of the world's electricity consumption – slightly more than the entire electric consumption of Ukraine and slightly less than that of Sweden.¹¹ In order to measure the real impact of mining on the environment, it would be necessary to analyse the electricity production methods – currently impossible because the data available on the location of these infrastructures is too fragmentary. However, as we have seen in some mining farms in Siberia and China, a huge amount of the energy surpluses that are accessible are close to hydroelectric power stations, which cause less pollution. This is what Sébastien Gouspillou, co-founder of a French company that has

installed mining equipment in the former USSR (Siberia, Kazakhstan and Ukraine), explained in an interview (Posch 2021).¹² He added that global warming caused by global environmental pollution, already noticeable in Siberia with hotter and longer summers, makes less efficient the use of natural cold weather to cool the machines and that it is therefore in the interest of miners to make mining a sustainable industry. This is a view shared by several miners interviewed in eastern Siberia, where the proximity to Lake Baikal has created a significant regional ecological awareness, making Irkutsk a suitable territory for environmentally friendly digital projects (Batsiun, Jakobson, and Jakobson 2020).

Because the expansion of cryptocurrency mining in Irkutsk remains understudied and dominated by a secretive culture, it opens an avenue for research. First, this industry seems primarily to benefit an already established political and economic circle, a hypothesis illustrated by Oleg Deripaska, whose companies hold a monopoly on some necessary resources for mining (electricity and real estate). Furthermore, the strong involvement of En+ in this opaque and unregulated activity, and the discrete engagement of local authorities that benefit from it – either financially or through consolidated political relationships – denote the strategic interest that mining represents for a Russian elite for whom personal enrichment shapes political authority. In the community of Irkutsk miners, rumours suggest the presence of major Russian political figures in the mining sector, especially in the Irkutsk oblast, via companies to which they are close. The presence of political personalities in the development of mining can also be translated into an important computer capacity placed in the hands of individuals close to the political power. And this capacity becomes more strategic every day, especially in the development of a ‘sovereign’ Russian internet.

For these reasons, observing the development of the mining industry in western Siberia highlights an emergent phenomenon: the development of an opaque, yet critical, activity, and its progressive appropriation by the political and economic elites.

Today, this topic remains understudied. But what is currently happening in Siberia probably represents the emergence of a new strategic territory where processing power is concentrated, and calculation capacities are crucial to Russia’s ambitions of digital control. Furthermore, the growth of a new industry that brings wealth to local elites can be delineated locally. And, as the case of the Wex platform shows, it has increasingly come within the radar of the security agencies. The mining industry represents a formidable opportunity for personal enrichment for the *siloviki* (politicians who emerged from the ranks of the military or security agencies), especially as the value of some cryptocurrencies rise. Ultimately, it also represents a potential catalyst for technological innovation and digital power in Russia.

Notes

1. If the first miners used the simple processors of their personal computers, several high-functioning graphic cards have been used before being replaced, in some cases, by dedicated processors, such as ASICs (application-specific integrated circuit) for bitcoins.
2. Federal Law 259 has been in force since January 1st, 2021 and is the first legal framework applied to cryptocurrencies in Russia. It authorizes the mining and financial speculation on cryptocurrencies but prohibits their use as a means of payment. Before this, cryptocurrencies industries were evolving in a legal void in Russia.

3. Report on 'Technological Stakes of Blockchains' [in French], Office parlementaire d'évaluation des choix scientifiques et technologiques, French Senate, June 20, 2018.
4. Federal Law 374, also known as 'Yarovaya', adopted on July 6, 2016.
5. DPI technology is designed to distinguish encrypted from unencrypted data flows. In its most complicated uses, DPI could make it possible to separate the encrypted data from authorized apps in Russia from the encrypted data or apps which don't follow the 'Yarovaya' legislation that forces app owners to provide their decryption keys to the FSB in cases of anti-terrorist investigations.
6. Federal Law 242, adopted on July 4, 2014.
7. *Energo-24.ru*. 2019. 'Рейтинг тарифов на электроэнергию в России с 1 января 2020 года [Electricity rate in Russia on January 1, 2020]'. <https://energo-24.ru/news/13438.html>
8. Europe's Energy Portal. 2016. *Energy Prices Report*.
9. History of the Siberian branch of the Russian Academy of Sciences, quoted from Tyumen's Academy branch IKZ institute official website (ikz.ru).
10. *The Guardian*. 2018. 'Hundreds of bitcoin-mining servers stolen in Iceland', March 7. <https://www.theguardian.com/world/2018/mar/07/hundreds-of-bitcoin-mining-servers-stolen-in-iceland>
11. Cambridge Centre for Alternative Finance, 'Comparisons', *Cambridge Bitcoin Electricity Consumption Index*. Accessed on March 21, 2021. <https://cbeci.org/cbeci/comparisons>
12. Interview of Sébastien Gouspillou by Anita Posch. 2021. "Sébastien Gouspillou: Bitcoin Mining Funds Green Energy." *The Anita Posch Show*, March 1. <https://bitcoinundco.com/en/sebastien-gouspillou/>

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Hugo Estecahandy is a PhD candidate at the French Institute of Geopolitics (University Paris 8) and a member of the research project GEODE – Geopolitics of the Datasphere. His thesis is about the geopolitical stakes of cryptocurrencies and their industries in the Russian Federation. Hugo Estecahandy graduated with a Master's degree from the French Institute of Geopolitics in 2019.

Kevin Limonier is an associate professor in Slavic studies at the French Institute of Geopolitics (University Paris 8). He is also deputy director of the GEODE research project and scientific director of the Russian-speaking infosphere observatory. He is involved in several training courses on cybernetic issues and was for several years a teacher at the Russian State University of Humanities (RGGU, Moscow). His research focuses on the development of new methods for mapping cyberspace, especially in the post-Soviet context. He is more broadly a specialist in the Russian-speaking Internet (Runet).

References

- Afanasov, Oleg V. 2002. "Documents on the History of the Lake Camp in the Irkutsk Oblast' (1948–63)." *The Journal of Slavic Military Studies* 15 (1): 145–164. doi:10.1080/13518040208430515.
- Amodei, Dario, and Danny Hernandez. 2018. "AI and Compute". *OpenAI*, May 8. <https://openai.com/blog/ai-and-compute/>.
- Batsiun, Natalia V., Anatol Ya. Jakobson, and Yuri A. Jakobson. 2020. "Irkutsk as a Potential Growth Point of Greenling Processes in Russia." *Studies of the Industrial Geography Commission of the Polish Geographical Society* 34 (3). doi:10.24917/20801653.343.12.
- Baydakova, Anna. 2020a. "A New Company Claims It's Opening the Biggest Mining Farm in Russia." *CoinDesk*, October 23. <https://www.coindesk.com/minespot-russia-mining-farm>.

- Baydakova, Anna. 2020b. "A Russian Company Is Opening a Mining Farm in the Arctic." *CoinDesk*, October 14. <https://www.coindesk.com/russia-opening-mining-farm-arctic>.
- Cambridge Bitcoin Electricity Consumption Index. 2021. Cambridge Centre for Alternative Finance. <https://cbeci.org/>.
- Doctor, Sam, and Rishabb Suresh. 2020. "Bitcoin Power Analysis. Hashrate Implications and Miner Economics." *BitOoda*, July 15. <http://bitooda.io/public-files/Bitcoin%20Mining%20Hashrate%20and%20Power%20Analysis.pdf>.
- Estecahandy, Hugo. 2019. *Géopolitique des applications de solutions blockchains en Fédération de Russie* [Geopolitics of blockchain-based solutions applications in the Russian Federation]. Master degree thesis, Paris: French Institute of Geopolitics, University Paris 8.
- Galeotti, Mark. 2017. "Moscow's Mercenaries Reveal the Privatisation of Russian Geopolitics." *openDemocracy*, August 27. <https://www.opendemocracy.net/en/odr/chvk-wagner-and-privatisation-of-russian-geopolitics/>.
- Golumbia, David. 2016. *The Politics of Bitcoins: Software as Right-Wing Extremism*. Minneapolis: University of Minnesota Press.
- Grandhay, Julie. 2008. *La république des décembristes. Pour une histoire de la modernité politique en Russie (1760-1870)* ["The Republic of the Decembrists. For a History of Political Modernity in Russia (1760-1870)"]. PhD diss., Paris: Université Panthéon-Sorbonne – Paris I.
- Hugues, James R. 1989. "The Irkutsk Affair: Stalin, Siberian Politics and the End." *Soviet Studies* 41 (2): 228–253. <https://www.jstor.org/stable/152226>.
- Josephson, Paul R. 1997. *New Atlantis Revisited: Akademgorodok, the Siberian City of Science*. Princeton: Princeton University Press. <https://digitalcommons.colby.edu/facultybooks/1>.
- Khöler, Susanne, and Massimo Pizzol. 2019. "Life Cycle Assessment of Bitcoin Mining." *Environmental Science & Technology* 53 (23). doi:10.1021/acs.est.9b05687.
- Krasnova, Yulia, Lora Zmlyanskaya, Mikhail Gordeev, and Yulia Afanasyeva. 2018. "Novosibirsk Region. A Look at the Region's Business and Innovation Potential." *Deloitte CIS Research Centre*. <https://www2.deloitte.com/content/dam/Deloitte/ru/Documents/research-center/novosibirsk-region-business-and-innovation-potential-en.pdf>.
- Kroll, Joshua A., Ian C. Davey, and Edward W. Felten. 2013. "The Economics of Bitcoin Mining, or Bitcoin in the Presence of Adversaries." Paper presented at The Twelfth Workshop on the Economics of Information Security (WEIS 2013). Washington, DC, June 11–12. http://www.infosecnet.org/workshop/downloads/2013/pdf/The_Economics_of_Bitcoin_Mining,_or_Bitcoin_in_the_Presence_of_Adversaries.pdf.
- Limonier, Kevin. 2018. *L'Archipel des savants. Histoire des anciennes villes d'élite du complexe scientifique soviétique* [The Archipelago of Scientists. History of the Former Elite Cities of the Soviet Scientific Complex]. Paris: Éditions B2.
- Posch, Anita. 2021. "Sébastien Gouspillou: Bitcoin Mining Funds Green Energy" (interview). *The Anita Posch Show*, March 1. <https://bitcoinundco.com/en/sebastien-gouspillou/>.
- Raviot, Jean-Robert. 2007. *Qui dirige la Russie?* [Who Rules Russia?]. Paris: Lignes Repères.
- Redman, Jamie. 2021. "Russian Oil Giant Provides Excess Gas to Operations Powering Bitcoin Mining Devices." *Bitcoin.com*, January 10. <https://news.bitcoin.com/russian-oil-giant-provides-excess-gas-to-operations-powering-bitcoin-mining-devices/>.
- Yao, Can-Zhong, and Hong-Yu Li. 2020. "A Study on the Bursting Point of Bitcoin Based on the BSADF and LPPLS methods." *North American Journal of Economics and Finance* 55. doi:10.1016/j.najef.2020.101280.
- Zakharov, Andrei. 2019. "Bitcoins to 'FSB fund': How \$450m Disappeared from Cryptocurrency Exchange Wex." *BBC*, November 15. <https://www.bbc.com/russian/features-50420738>.