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Russia's Mining Strategy

Geopolitical Ambitions and Industrial Challenges

Florian VIDAL

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Abstract

In addition to being a leading gas and oil power, Russia also possesses vast geological resources that place it among the world's leading mining countries. Nevertheless, Russia's largely privatized mining sector faces great and numerous restrictions relating to the obsolescence of its infrastructure, lack of investment and a shortage of qualified human resources in the industry, which may be further exacerbated by the war in Ukraine.

To diversify its sources of revenue, whilst also obtaining new levers of geopolitical power, particularly in Africa, Moscow is seeking to revitalize this strategic industry. Russia may focus on several of its globally significant companies, particularly in the diamond, fertilizer and nickel sectors. It also plans to extend its mining activities by reinvesting in and modernizing historic sectors such as coal, or by developing new ones like lithium.

In a context of growing global demand for critical metals and minerals in order to meet the challenge of the ecological and energy transition, what role can Russia play? Moscow intends to overcome the challenge of maintaining its economic and industrial autonomy in the face of the sanctions imposed by the West following its invasion of Ukraine in February 2022. The future of Russia's mining industry may depend upon a reorientation away from its traditional Western markets and towards Asian countries, such as India, Malaysia, and Vietnam, which have decided to retain their economic ties with Russia. Will Russia's mining policy bolster the implementation of the "pivot to Asia" that Moscow has talked of for several years?

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Introduction

In October 1928, Stalin launched the first Five-Year Plan (1928-1933), beginning a new era of collectivization and rapid industrialization in the Soviet Union. The communist regime carried out a veritable mining revolution,[1] creating a vast infrastructure that has been largely inherited by post-Soviet Russia.

The post-communist socioeconomic transition was accompanied by a number of difficulties for Russia's mining sector: obsolete infrastructure, under-investment, a high number of accidents at mining sites, etc. In this context, many businesses in the sector adopted a "survival policy", consisting of maintaining production levels without investing in the modernization of industrial equipment, while awaiting a more favorable economic climate. Russia's role as a major mining actor has been evident for several years: on the one hand, its large size means it holds unrivaled mineral reserves;[2] on the other, global demand for such materials has been growing constantly since the beginning of the 21st century as the world seeks to achieve technological development and ecological transition.[3] Russia's natural resources are believed to represent a total value equivalent to 75,000 billion US dollars, potentially making Russia the world's richest country. The country's many resources include significant deposits of diamonds, gold, platinum, palladium and coal, as well as vast reserves of iron, manganese, chromium, nickel, titanium, copper, tin, lead and tungsten ores.

While Western economic and financial sanctions are causing inflation in the mining sector, the increase in the price of certain metals and minerals is, more generally, a response to growing

1. The Soviet regime based part of its propaganda on the mythology around mining starting from the first Five-Year Plan, embodied by the Stakhanovite movement, which commemorated the extraction of 102 tonnes of coal by Alexei Stakhanov, in the Donbas region, during the summer of 1935. The state highlighted this symbol of strength as a means of encouraging workers to be more productive. On this subject, see L. Siegelbaum, *Stakhanovism and the Politics of Productivity in the USSR, 1935-1941*, Cambridge, Cambridge University Press, 1990.
2. E. Safirova, "The Mineral Industry of Russia", *2017-2018 Minerals Yearbook. Russia [Advance release]*, USGS, February 2018, available at: https://pubs.usgs.gov.
3. O. Vidal, *Matières premières et énergie : les enjeux de demain* [Raw materials and energy: tomorrow's questions], London : ISTE Editions, 2018.

demand linked to the energy transition.[4] For Moscow, the challenge has therefore been transformed into a good deal, as it uses its mineral resources as a retaliatory weapon against the "sanctioner" countries.[5]

For a decade, Russia's ambitious mining policy has been aimed at expanding its revenue sources, whilst also weaning itself off its excessive dependency on hydrocarbons. From the exploitation of diamond deposits and the development of a high-tech value chain to the relaunch of the coal sector, Russia intends to pursue the development and modernization of an industrial sector that is not affected by sanctions and has now become strategic. This strategy offers two key advantages, particularly in the current context of partial isolation and sanctions: firstly, mining exports allow for greater flexibility than those of hydrocarbons, since their routes are adjustable; secondly, Russian expertise in this field acts as a tool of geopolitical influence, especially in Africa.[6] Once Russia has made it through its conflict with the West, can it permanently position itself as a great mining power throughout the course of the 21st century?

4. T.-Y. Kim, "Critical Minerals Threaten a Decades-Long Trend of Cost Declines for Clean Energy Technologies", IEA, May 18, 2022, available at: www.iea.org.
5. "Putin poručil obespečit' v Rossii v 2022 godu zapret na vyvoz i vvoz otdel'noj produkcii" [Putin has ordered a ban on exports and imports of certain products in Russia in 2022], *TASS*, March 8, 2022, available at: https://tass.ru.
6. On this subject, see M. Audinet, "Le lion, l'ours et les hyènes. Acteurs, pratiques et récits de l'influence informationnelle russe en Afrique subsaharienne francophone" [The lion, the bear and the hyenas: actors, practices and accounts of Russian information influence in Francophone Sub-Saharan Africa], *Étude de l'IRSEM*, No. 83, IRSEM, July 2021, available at: www.irsem.fr; A. Kalika, "Le 'grand retour' de la Russie en Afrique ?" [The "big return" of Russia in Africa ?], *Russie.Nei.Visions*, No. 114, Ifri, April 2019, available at: www.ifri.org.

The Russian Mining Sector in the Shadow of Hydrocarbons

Russia: A Mining Power of the Future

For the last century, the Soviet, then Russian, economy has based its development on an extractive model in which hydrocarbons, alongside metals and minerals to a lesser extent, are the primary source of its export revenues. Over the last five years, this extractive economy has accounted for 58.6% of the total value of Russian exports, broken down as follows: crude oil (26.4%), refined oil products (16.5%), natural gas (10.5%), and ferrous metals (5.3%).[7] Consequently, hydrocarbon revenues considerably boost the federal budget and create a structural dependency for the country's public finances. Some experts even cite the role of oil and gas as a contributing factor to the formation of contemporary Russia's identity.[8] Furthermore, Moscow has managed to use hydrocarbons as a tool to establish power relations in its favor, particularly with neighboring countries. For example, Russia has on several occasions suspended gas deliveries to Ukraine (2006, 2008, 2009, 2014 and 2015), Belarus (2004 and 2010) and Georgia (2006).[9] Against a backdrop of geopolitical tensions, these gas conflicts were caused by financial and commercial differences concerning the price of gas and its transportation between Russian group Gazprom and Russia's neighbors. Since then, Russia's invasion of Ukraine has confirmed the strategic aspect of the "energy weapon", which is now at the heart of the economic war between Russia and the EU member states.

Already a major player in the gas and oil sector, Russia also intends to reinforce its position as a mining power. The country is a vast reservoir of various metals and minerals, covering the entire

7. E. Safirova, "The Mineral Industry of Russia", *op. cit*.
8. For insight into the importance of oil and gas revenues to the federal budget, see N. Sabitova and C. Shavaleyeva, "Oil and Gas Revenues of the Russian Federation: Trends and Prospects", *Procedia Economics and Finance*, Vol. 27, 2015, pp. 423-428. With regard to the influence of hydrocarbons in contributing to Russia's national identity, see P. Rutland, "Petronation? Oil, Gas, and National Identity in Russia", *Post-Soviet Affairs*, Vol. 31, No. 1, 2015, pp. 66-89.
9. R. Newnham, "Oil, Carrots, and Sticks: Russia's Energy Resources as a Foreign Policy Tool", *Journal of Eurasian Studies*, Vol. 2, No. 2, 2011, pp. 134-143.

Periodic Table of Elements.[10] Russia's mining output represents 14% of global mineral production, according to some estimates. For many decades, Russia's mining industry has been built on longstanding practice and experience, supported by expert training.[11] Though the country absorbs a large portion of its production of iron and coal, for example, the Russian metals market is structurally oriented toward exports.

Global Positioning of Russia's Mining Industry

Rank	Minerals and metals (percentage of global production)
1st	Asbestos (~50%); diamonds (30%)
2nd	Cobalt (4%); palladium (38%); platinum (5.7%); potassium (20%)
3rd	Nickel (11.2%); gold (9.4%); titanium (13%); tungsten (3.5%)
4th	Phosphate (4.9%)
5th	Silver (6.1%); iron (4%); graphite (5%)
6th	Baryte (5.9%); cadmium (5.4%); coal (5%), lead (4.9%)
7th	Bauxite (1.7%); copper (4.3%); uranium (5.4%)
8th	Molybdenum (1%)
9th	Zinc (2.2%)
10th	Diatomite (2.4%)

Sources: International Energy Agency, US Geological Survey, World Nuclear Association

Demand for raw materials on the international market is growing exponentially as a result of various factors, such as surging trade flows, demographic growth in emerging countries and ecological transition policies. The extraction of metals provides the necessary elements for energy, communication, transport and other infrastructure. The mass adoption of "green technologies", such as electric vehicles and

10. Conceived in 1869 by Russian chemist Dmitri Mendeleev, who developed a system of classifying elements by atomic mass (up to 118 to date) that revolutionized our understanding of elements and their physical and chemical properties.
11. See, for example, Saint Petersburg Mining University (founded in 1773) in V. Yu. Bazhin, L. Nikita and S. Savchenkov, "Experience of Mining Specialists Training at the Chair of Process and Production Automation of the Mining University", *Eurasian Mining*, No. 1, 2017, pp. 42-44.

renewable energies (such as wind and solar power) is bringing about a further increase in global demand for metals. In other words, the raw materials necessary for the deployment of technologies with low CO_2 emissions—to limit the rise in average global temperatures to 1.5°C—reinforce our societies' reliance on the mining sector.[12] Among other things, Russia holds the world's third-largest reserve of nickel (7.5 million tonnes) and its fourth-largest reserves of uranium (662,000 tonnes) and copper (62 million tonnes), elements that are essential to the energy transition. While the copper market is largely dominated by Chile and Peru, this metal is indispensable in our modern societies due to its unique properties: it is a key component in infrastructure, cables, transport, and both industrial and household electrical and electronic equipment. In fact, global demand for copper is expected to rise by between 275% and 350% by 2050.[13] Copper illustrates the strategic aspect that Russian deposits could end up playing in the coming decades.[14]

Russia has already begun to take advantage of the first convulsions in the strategic metals market, generating tensions between supply and demand. Since 2009, as a result of the increase in the price of raw materials (2006-2008), it has positioned itself as a global producer with considerable potential on the raw materials market. The Covid-19 pandemic of 2020-2021 has caused lasting destabilization of the global economy, accelerating a phase of severe volatility for all raw material prices.[15] Thanks to a structural increase in demand, this context has been sustained, to the benefit of Russia.

A Diverse Sector with Many Different Actors

Russia's mining industry is characterized by the diverse range of sectors that have been developed since the Soviet era. Unlike the hydrocarbon sector, Russia's mining industry is extremely varied and more or less private (with the exception of the uranium sector, which

12. S. Jowitt *et al.*, "Future Availability of Non-renewable Metal Resources and the Influence of Environmental, Social, and Governance Conflicts on Metal Production", *Communications Earth & Environment*, Vol. 1, No. 13, 2020, available at: https://doi.org.
13. A. Elshkaki *et al.*, "Copper Demand, Supply, and Associated Energy Use to 2050", *Global Environmental Change*, Vol. 39, No. 6, June 2016, pp. 305-315.
14. Russia is preparing to begin exploiting the Udokan mine, in eastern Siberia, in 2023. With 26.7 million tonnes, it is the country's largest copper reserve and will become the third-largest operational copper deposit in the world. See E. Gurkan Abay, "Russia's Largest Copper Mine in Siberia Eyes 2023 for Operations Start", *Anadolu Agency*, November 14, 2022, available at: www.aa.com.tr.
15. J. Jackson *et al.*, *Global Economic Effects of COVID-19*, Washington, Congressional Research Service, November 2021, available at: https://sgp.fas.org.

is under the control of Rosatom, the national state-owned atomic energy company). Russia has just under 17,000 businesses involved in the extractive economy, which illustrates how important the sector is to the country's economy. Of these firms, some 3,000 are directly engaged in the extraction of metal ores, while 800 are dedicated to coal mining. Of all the companies that operate in the exploitation of mines and quarries, 16,300 belong to Russian stakeholders/citizens, around 200 belong to foreign companies or firms held jointly by foreign and Russian entities, and approximately 100 are directly owned by public bodies (regional or municipal governments). In addition to the extractive industry, Russia has 39,800 businesses involved in the transformation of metals.[16]

Principal Russian Mining Groups

Business	Ores and metals exploited	Turnover in US dollars (per year)	Number of employees
Norilsk Nickel (Nornickel)	Nickel; copper; palladium; platinum	17.85 billion (2021)	73,000
NLMK	Steel	16.2 billion (2021)	54,000
Evraz	Steel; pig iron	13.22 billion (2021)	71,000
MMK	Crude steel; pig iron	11.9 billion (2021)	28,000
Severstal	Steel; pig iron	11.6 billion (2021)	52,000
Metalloinvest	Crude steel; iron	10.6 billion (2021)	67,000
SUEK	Coal	9.7 billion (2021)	70,000
UC Rusal	Aluminum	5.449 billion (2021)	64,000

16. Federal Statistics Service of the Russian State, *Rossijskij statističeskij ežegodnik 2021* [Russian statistical annual 2021], Moscow, Rosstat, 2021, pp. 321-331.

Mechel	Coal; iron	5.44 billion (2021)	53,000
Polyus	Gold	4.97 billion (2021)	21,000
Alrosa	Diamonds	4.2 billion (2021)	32,000
Polymetal	Gold; silver	2.89 billion (2021)	10,000
ARMZ (subsidiary of Rosatom)	Uranium; lead; zinc; silver; gold; scandium; lithium	329 million (2020)	7,200

Sources: Thomson Reuters, Statista and Russian companies' annual reports

Furthermore, part of the Russian mining industry remains vertically integrated, like the steel sector. Thus, companies own both coal mines and iron deposits that provide them with a regular supply of raw materials for their steelworks. The Russian mining sector is tightly bound to the country's industrial complex and its value chain. While the sector is fragmented, the importance of certain groups, such as Norilsk Nickel, makes mining activity both an essential pillar of the economy and an increasingly important strategic vector. More generally, this growing significance applies to both minerals that are critical to the ecological transition and the historic fossil fuel of coal.

Metals and Minerals: A Strategic Resource

Like the hydrocarbon industry, the mining sector is considered a strategic segment of the Russian economy. To that end, Russian legislation—in the form of Federal Law No. 57-FZ on procedures for foreign investment in companies of strategic importance for defense and national security, enacted on April 29, 2008—lays down a strict framework for the exploitation of mineral deposits in the country's subsoil.[17] Thus, the Russian government has a right of review if the direct or indirect acquisition of an entity involving foreign investors reaches or

17. Federal Law No. 57-FZ "O porâdke osuŝestvleniâ inostrannih investicij v hozâjstvennie obŝestva, imeûŝie strategičeskoe značenie dlâ obespečeniâ oboroni strani i bezopasnosti gosudarstva" [On procedures for foreign investment in companies of strategic importance for defense and national security], *Rossijskaâ Gazeta*, May 6, 2008, available at: https://rg.ru.

exceeds 25% of its voting share capital. For foreign government-owned entities, any direct or indirect acquisition without restriction is limited to 5%—any acquisition that exceeds that threshold is subject to a special authorization issued by the federal authorities and is capped at 25%.

Likewise, pursuant to the law on subsoil, foreign companies cannot directly hold mining rights for deposits considered "strategic" and of "federal importance".[18] This applies, in particular, to deposits of diamonds, cobalt, lithium, nickel, niobium, uranium, and rare earth metals from the yttrium group. Restrictions also apply to gold reserves exceeding 50 tonnes and copper reserves of more than 500,000 tonnes. In a largely privatized sector, these legislative mechanisms illustrate the desire of Russia's government authorities to exercise tight control over the country's mining activities. At the federal level, the institutional architecture rests on the Ministry of Natural Resources and the Environment (*Minprirody*) and two federal agencies: the Federal Agency for Subsoil Use (*Rosnedra*) and the Federal Agency for the Oversight of Natural Resources (*Rosprirodnadzor*). This institutional framework makes it possible to regulate and control extractive activities across the entire nation. Furthermore, it highlights the importance that the Russian authorities attach to raw materials within the country's economy.

Since the beginning of the century, in spite of multiple statements by its authorities, Russia has not been able to manage a diversification policy aimed at gradually weaning itself off its dependency on raw materials. At present, the current state of Russian political power leads it to favor stability over modernizing its economy, which would be riskier, since it would be impossible without political modernization.[19] In addition to the structural increase in demand on international markets, the geopolitical instability that has taken hold since the onset of the global health crisis in 2020 means that critical metals and minerals represent a new source of strategic power for Moscow.

An Industry Subject to Structural Weaknesses

While Russia plans to make its mining policy a strategic asset in the reorganization of global geopolitics, the sector must tackle some

18. "Global Mining Guide. Russia", Chicago, Baker McKenzie, 2022, available at: https://resourcehub.bakermckenzie.com.
19. P. Dunay, "Russia's Economic Engagement: Realities, Pitfalls, and Perils", *in* G. Herd (ed.), *Russia's Global Reach: A Security and Statecraft Assessment*, Garmisch-Partenkirchen, George C. Marshall European Center for Security Studies, 2021, pp. 101-108, available at: www.marshallcenter.org.

structural challenges, which are now made even harder by international sanctions. In the long term, the systemic aspect of these sanctions could lead to the dysfunction of the Russian economy. With no alternative, technological development will dry up, with lasting consequences such as the paralysis of mining projects and the gradual regression of the industry in an environment of global competition. Thus, Russian mining groups' dependency on IT software for computer-assisted design and manufacturing illustrates the breadth of the industrial challenges they face.[20] Over the last two decades, the Russian steel industry has invested some 3,200 billion roubles (50.3 billion euros) in restoring the production capacity that was lost during the 1990s.[21] These investments in achieving a better performance within industrial processes have been made with foreign providers, such as German group Siemens, which have now left the country. In this new reality, the competitiveness of Russia's mining industry within the international market is precarious.

Blessed, as we have seen, with immense reserves and a very high level of industrial expertise (coal, diamonds, nickel, uranium, etc.), the Russian mining sector is nevertheless subject to two major constraints: the capacity to continue to manage value chains competitively due to obsolete infrastructure and the lack of investment in personnel training; and the capacity to transport resources to importer countries. These two factors will be decisive in Russia's future role in the international market for critical minerals and metals.

The Modernization of the Sector: A Key Factor in Global Competition

The Russian mining sector relies on infrastructure that was inherited from the Soviet era, which is obsolete and highly polluting. The country's mining regions, such as the Norilsk area and the Kuznetsk Basin, where industrial activity dates back approximately 100 years, have been deeply affected by the negative ecological and health impacts of such infrastructure.[22] Modernization would involve a

20. "Russian Industry Faces Code Crisis as IT Providers Pull Out", *Bloomberg*, June 28, 2022, available at: www.bloomberg.com.
21. *Ibid*.
22. With regard to the consequences of mining activities on regional ecosystems, see, for example, A. Onuchin *et al*., "Pollution of Snow Cover in the Impact Zone of Enterprises in Norilsk Industrial Area", *Contemporary Problems of Ecology*, Vol. 7, 2014, pp. 714-722; and R. Kotov and Y. Formulevich, "The Impact of Kuzbass Industrial Enterprises on Environmental Safety", *IOP Conference Series: Earth and Environmental Science*, No. 670, 2021, available at: https://iopscience.iop.org.

number of different aspects, including reducing carbon emissions, reducing industrial waste and polluting substances, more efficient exploration and exploitation methods, etc. Furthermore, in order to reduce the technological lag compared with its international competitors, Russia must implement a profound change in its operations, incorporating such concepts as automation and the Internet of Things (IoT) in order to optimize costs and productivity, and the digitization of production systems.[23] The introduction of new technologies in the sector also requires bringing personnel up to standard, with the development of adequate initial and continuing training to be able to implement these new processes.

Since the beginning of the century, the mining sector has not succeeded in adapting so as to make innovation the heart of its modernization strategy, to secure its technology transfer chains in the long term.[24] Now, in a competitive environment, Russian private companies in the sector, with the support of government authorities, are making an effort to adopt, for example, more efficient methods of geological exploration and to accelerate the introduction of new technologies in terms of production and processing tools. Russia also plans to resolve the structural problems related to the economic development of its mining regions, which are seeking to maintain their competitiveness. In recent decades, high production costs and a less productive industrial system have created the conditions for low profitability in the sector. In any case, the challenges facing the industry cannot be tackled without a targeted government policy.

Led by the Russian federal government, much public support for innovation in the mining regions is provided by research and development (R&D) centers backed by the Skolkovo Foundation.[25] While the activities of the foundation are declining—a phenomenon which is aggravated by economic and financial sanctions—, universities (such as the National University of Science and Technology in Moscow and Cherepovets State University) and businesses in the sector are supporting R&D activities and generating

23. K. Bertayeva *et al.*, "Industry 4.0 in the Mining Industry: Global Trends and Innovative Development", *E3S Web of Conferences*, Vol. 135, No. 04026, 2019, available at: https://doi.org.
24. *Ibid.*
25. The Skolkovo research and development center is a project that was launched in 2009 by former president Dmitry Medvedev (2008-2012), with the aim of stimulating innovation in five key sectors of the economy: information technology, energy, nuclear technologies, biomedicine and aerospace technologies. It is currently headed by Russian oligarch Viktor Vekselberg, the founder and president of Russian conglomerate Renova Group.

synergies.[26] Such efforts are receiving particularly strong support in Kemerovo Oblast, home of the Kuznetsk Basin, a bastion of the country's coal industry. The Kuznetsk Basin (or Kuzbass) region currently has one of the world's largest coal deposits, with proven reserves of approximately 693 billion tonnes.[27] It accounts for half of the country's annual coal production.[28] The Kuzbass Technopark, the Skolkovo Foundation's regional operator since 2018, hosts businesses working to develop innovative projects that can be directly transposed to the mining industry.[29] In order to incentivize investments in R&D, small and medium-sized enterprises (SMEs) within the Technopark benefit from a reduction in their tax rate (13.5%) and are exempt from property tax.[30] To supplement this ecosystem, the Kuzbass university and research center offers R&D mechanisms aimed at helping to improve the competitiveness of the coal sector.[31] This involves both improving the training of future professionals in the sector and facilitating technical innovation for faster industrial application.

The businesses are also making substantial efforts to transform their industrial equipment: Norilsk Nickel, Rosatom and Alrosa are investing in adapting their infrastructure to comply with international standards. For example, Norilsk Nickel has planned to invest 100 billion roubles (1.3 billion euros) between 2020 and 2024 in order to modernize its energy complex.[32] Likewise, Alrosa has teamed up with ARMZ Mining Machinery and the Ministry of Industry and Commerce to develop modern domestic technologies, machines and

26. The Norilsk Nickel group has an R&D center, the "Gipronikel" institute, as well as collaborating with Russian research institutes (IPKON RAN, in Moscow) and universities (the Siberian Federal University, in Krasnoyarsk). See *Godovoj otčet 2017* [Annual report 2017], Moscow, MMC Norilsk Nickel, 2017, p. 103.
27. G. Safanov, "Economic diversification in Russia's Kuzbass coal region", *Climate Studies*, Policy Brief, September 2021, available at: https://climatestrategies.org.
28. Discovered in 1721, the Kuzbass coal basin covers a surface area of 26,700 km², and 70% of its annual production is exported. Such coal deposits are the economic engine of this Siberian region, whose industrial ecosystem employs some 133,000 people.
29. The Kuzbass Technopark hosts around 60 SMEs and 5,000 people. Information available at: https://technopark42.ru.
30. O. Kalenov and S. Kukushkin, "Innovative Ecosystem of Mining Industry", *E3S Web of Conferences*, Vol. 174, No. 02024, 2020, available at: https://doi.org.
31. For example, the center is working on the development of automated modules to support underground mining operations in reserves where coal is difficult to extract. Presentation of the "Kuzbass" university and research center, available at: https://cloud.mail.ru.
32. *Nornickel Increases Investments in Industrial Safety*, Moscow, MMC Norilsk Nickel, 2020, available at: www.nornickel.com.

equipment for both open-pit and underground mines.[33] This example demonstrates the willingness of companies in the sector to undertake and accelerate the modernization of an industry that is undergoing significant changes on a global scale. So as to give a coherent vision for the country's industrial transformation, the Russian government is promoting the National Technological Initiative (*Nacional'naâ Tehnologičeskaâ Iniciativa*), which aims to boost innovation and create the conditions for the country to have a presence in high-tech markets by 2035.[34] This federal program does not explicitly target the mining sector, however.[35]

In other words, these private and public initiatives will not result in a systemic modernization of the sector.[36] There is still insufficient integration between universities, the industry and government authorities. Furthermore, the endemic problems of the Russian economy (corruption, lack of attractiveness, low productivity) have been further worsened by the sanctions imposed since 2014—even if the government policy of "import substitution" (*importozamesenie*) has made it possible to meet the needs of the mining sector thus far.[37] However, the wave of sanctions imposed since February 2022 has disrupted the functioning of the sector and the projects under development. Problems accessing both certain technologies and capital are slowing the growth of mining activity in the country.

The Gordian Knot of the Mineral Logistics Chain

A vast region that is sparsely and unequally populated, together with difficult terrains such as steppes and permafrost, make the railway network a key part of the logistics chain and, therefore, an essential parameter for the growth of mining activities. Russia's railway network suffers from a number of weaknesses, such as the failure to create a global vision, lack of competitiveness in the sector, absence of reliable investments, and poor flow capacity. Furthermore, the lack of

33. P. Moore, "Russia Industry & Trade Ministry, Armz & Alrosa Cooperating on Advancing Domestic Nextgen Mining Equipment & Technology", *International Mining*, January 21, 2021, available at: https://im-mining.com.
34. See the presentation of the objectives of the National Technological Initiative: "Principy", Nacional'naâ tehnologičeskaâ iniciativa, https://nti2035.ru.
35. E. Dotsenko *et al.*, "Digital Modernization of the Russian Mining Sector in Accordance with the National Technology Initiative and Mining 4.0", *E3S Web of Conferences*, Vol. 278, No. 03003, 2021, available at: https://doi.org.
36. K. Bertayeva *et al.*, "Industry 4.0 in the Mining Industry: Global Trends and Innovative Development", *op. cit.*
37. J. Harder, "Russia's Mining Industry on an Upswing", *AT Mineral Processing*, March 2020, available at: www.at-minerals.com.

bridges—critical pieces of infrastructure for the viability and continuity of transport chains throughout the country—fosters under-capacity on the transportation network and hinders the possibility of increasing flows over the long term.[38] Lastly, Russia's port systems appear to be under-developed, which seriously restricts the scalability of metal and mineral freight volumes.[39] These weaknesses are damaging to the growth of Russian mining operations. Russian government authorities, including Vladimir Putin, have been aware of this deficiency for many years: Russia has vast deposits of raw materials, but they are difficult to exploit due to inadequate infrastructure.[40] However, the Russian government has not yet initiated a major works policy aimed at remedying it. Firstly, the diversity of the actors involved in the sector and the variety of minerals exploited make the development of a systemic investment policy complex. Secondly, the dysfunctional relations between the federal government and local and regional institutions can hinder the progress of infrastructure projects.

The problem of transportation infrastructure particularly affects mining projects in the Arctic and the Far East. The absence of public authorities leads to direct investment in such infrastructure by businesses such as Norilsk Nickel, which is spending 6.5 billion roubles (104.5 million euros) on the modernization of the railway line linking the Norilsk industrial district to the port of Dudinka.[41] Russia's railway infrastructure, which has barely evolved over the last three decades, needs to be modernized and extended to support the planned increase in flows of the metals and minerals produced. Siberia illustrates this challenge: in 2020, 144 million tonnes of freight passed through the Siberian part of the railway network. The modernization of the region's network that is currently underway should bring this volume to 180 million tonnes by 2025.[42] The task is a daunting one, for several reasons: the very high costs of building a line; the fixed costs of maintaining the network; a shortage of manpower; and the absence of financing

38. E. Ferris and R. Connolly, "Networks and Links: Why Russia's Infrastructure is Holding Back its Pivot to Asia", *Russia and Eurasia Programme*, Chatham House, July 2020, available at: www.chathamhouse.org.
39. *Ibid*, pp. 16-20.
40. V. Putin, "Vystuplenie na rasširennom zasedanii Gosudarstvennogo soveta 'O strategii razvitiâ Rossii do 2020 goda'" [Speech at the expanded meeting of the Council of State "On Russia's development strategy between now and 2020"], Official site of the Russian presidency, February 8, 2008, available at: http://kremlin.ru.
41. "Nornickel Invests $83 million in Upgrade of Norilsk Railroad's Locomotive Park", *TASS*, October 29, 2022, available at: https://tass.com.
42. N. Astrasheuskaya, "Slow Train Across Siberia Offers Glimpse of Russia's Rail Ambitions", *The Financial Times*, July 15, 2021, available at: www.ft.com.

mechanisms to facilitate lasting development.[43] In this respect, the fact that the three leading providers of ball bearings for rolling stock have ceased production threatens the very functioning of Russia's railway system.[44] The consequences of the war are further destabilizing certain rail network development projects, such as the new expansion of the freight hub (*Vostočnyj poligon*) in eastern Siberia, which has seen some of its contractual employees conscripted into the Russian army.[45] This critical infrastructure aims to meet businesses' needs in terms of the transportation of goods to the ports and overland routes of the Far East.

Alongside the development of road and rail infrastructure, the federal authorities are targeting the Northern Maritime Route (NMR)[46], a critical hub for Russia's geopolitical, economic and military ambitions. Maritime transport, particularly via the NMR, gives rise to more flexible flow management, thereby making it possible to meet demand from markets located far away from Russian territory, such as Malaysia and Vietnam.

43. See, in particular, P. Kurenkov *et al.*, "Study of the Current State of the Transport Infrastructure of Road and Rail Transport of the Russian Federation", *IOP Conference Series: Materials Science and Engineering*, No. 698, 2019, available at: https://iopscience.iop.org. With regard to the shortage of manpower, see N. Skorlygina and T. Dâtel, "BAM i ne snilos" [The BAM is not the stuff of dreams], *Kommersant*, April 26, 2021, available at: www.kommersant.ru.

44. The three companies are SFK (Sweden), Timken and Amsted Rail (United States). See "Russian Railway is on the Verge of Collapse", *Railway Supply*, September 2, 2022, available at: www.railway.supply.

45. N. Skorlygina, "OAO RŽD splačivaet podrâdi" [OAO RZD mobilises contractors], *Kommersant*, October 3, 2022, available at: www.kommersant.ru.

46. The NMR appears to be, above all, a starting point for exports of raw materials from Russian territory to the international market, rather than a transit route.

Geographical Priorities and Vectors of Influence

The Arctic: The Centerpiece of Russia's Grand Mining Plan

The multiplication of mining projects on Russian soil in recent years reflects the federal government's desire to support and develop the extractive sector while the hydrocarbon segment is being targeted by Western sanctions. Since 2014, mining exploitation has not been directly targeted by these sanctions, which has made it possible to maintain the attractiveness of Russia's Arctic territory as a destination for investments in this area. While the sector is largely privatized, the Russian government intends to guide and stimulate the development of this territory using tax cuts and incentives, such as grants to fund infrastructure. In this respect, the mining sector is an important part of the grand plan for the economic development of the Arctic region.[47] The historic presence of big groups in the region such as Norilsk Nickel (Krasnoyarsk Krai and Murmansk Oblast) and Alrosa (Arkhangelsk Oblast and Sakha Republic) is a reminder that mines are a key component for the economic development of the northern region.

A number of projects are under discussion in the polar region in light of the growing demand for minerals for low-carbon technologies. Thus, Eurasia Mining, a UK-based company run by James Nieuwenhuys, a former executive at Polyus Gold, partnered with Russian state-owned firm Rosgeologiya in 2021 to exploit the deposits at Monchetundra (Murmansk Oblast), which contain significant reserves of cobalt, copper and nickel.[48] Furthermore, the subsoil in

47. With regard to Russia's development strategy in the Arctic, see: Presidential edict, *O strategii razvitiâ Arktičeskoj zony Rossijskoj Federacii i obecpečeniâ nacional'noj bezopasnosti na period do 2035 goda* [Strategy for the development of the Arctic region of the Russian Federation and for provisions relating to national security up to 2035], Moscow, Presidential Office of the Russian Federation, October 26, 2020, available at: www.gov.spb.ru.

48. A. Staalesen, "Bolstered by Battery Boom, Mining Company Eyes 9 New Open Pits in Kola Peninsula", *The Barents Observer*, December 20, 2021, available at: https://thebarentsobserver.com. See also the presentation by Eurasia Mining, "Kola Battery Metals and PGM", *Eurasia Mining PLC*, 2022, available at: www.eurasiamining.co.uk.

this region—located in the Monchegorsk district—is believed to hold up to 400 tonnes of platinum and gold.[49] Also in the Arctic, the mining firm Beloye Zoloto ("White Gold") holds the license to the Kyuchus deposit, located near to Tiksi, a port on the Laptev Sea, which contains more than 175 tonnes of gold. This project would make it one of the country's most important gold-mining sites, with energy supplied thanks to the construction of a small nuclear power station with a capacity of 35MW.[50] More recently, Russia's Rustitan Group and Chinese state-owned China Communication and Construction Company signed an agreement to develop a titanium deposit in the Republic of Komi.[51]

Alongside projects involving the construction and deployment of floating nuclear power stations in the Russian Arctic[52], state-owned firm Rosatom has also positioned itself in the last two years as an ambitious mining operator, through its subsidiary AtomRedMetZoloto (ARMZ). Historically, this company has focused its extractive activities on uranium deposits, a sector in which Russia has renowned industrial expertise, which enables it to position itself as a leading actor on the global stage. ARMZ is diversifying its mining activities. Firstly, the Pavlovskoye deposit (lead and zinc) on the Novaya Zemlya archipelago is under development, representing an investment of 72 billion roubles (1.3 billion euros).[53] Secondly, in association with the Norilsk Nickel group, ARMZ plans to exploit the Kolmozerskoye deposit (Murmansk Oblast), the country's largest lithium reserve (accounting for 18.5% of national reserves).[54] To this

49. T. Dzâdko, "Eurasia Mining polučila pribavki ot 'Summy'" [Eurasia Mining receives a "Summa" boost], *RBK*, September 19, 2019, available at: www.rbc.ru.
50. A. Staalesen, "A planned New Russian Arctic Gold Mine Would Be Run on Nuclear Power", *The Barents Observer*, October 10, 2021, available at: https://thebarentsobserver.com.
51. F. Jones, "China to operate in the development of Russian arctic titanium mine", *Mining Technology*, February 6, 2023, available at: www.mining-technology.com.
52. In order to support the development of extractive activities in the Arctic region, Rosatom plans to build four floating nuclear power stations that can supply the necessary energy for the industrial sites currently under development. See interview with Aleksandr Bengert, CEO of Gidrograficheskoye Predpriyatiye (a subsidiary of Rosatomport). A. Bengert, "Novij glava Gidrografičeskogo predpriâtiâ Aleksandr Bengert : 'Ožidaem, čto uže v etom godu srednââ zarplata uveličitsâ na 30%'" [Aleksandr Bengert, the new manager of the hydrographic company: "We expect the average salary to rise by 30% starting this year"], *Strana Rosatom*, February 1, 2021, available at: https://strana-rosatom.ru.
53. This mining project, the furthest north in the country, covers a reserve of 47.7 million tonnes of minerals (2.49 million tonnes of zinc, 549,000 tonnes of lead, and 1,194 tonnes of silver). See Rosatom, "Rosatom Receives Green Light for Pavlovskoe Deposit Mining, Secures $90 mln as State Subsidies", *JSC Rosatom*, October 20, 2020, available at: https://rosatom-europe.com; *Performance of State Atomic Energy Corporation Rosatom in 2020*, Moscow, JSC Rosatom, 2021, available at: https://report.rosatom.ru.
54. "Nornickel and Rosatom Sign Cooperation Agreement", *PJSC MMC Norilsk Nickel*, April 25, 2022, available at: www.nornickel.com.

end, Rosatom and Nornickel have established the joint venture Polar Lithium to exploit these deposits.[55] Of the country's 12 proven lithium reserves, 55% are located in Murmansk Oblast. Eventually, Rosatom aims to supply 10% of the global lithium market.[56] More generally, this growing significance applies to both minerals that are critical to the ecological transition and the historic fossil fuel of coal.

A Tool for Moscow to Use in the Economic War?

Since the annexation of Crimea in 2014, Western countries have imposed a regime of sanctions against Russia which has dictated relations between the two blocs ever since. Following the Russian invasion of Ukraine on February 24, 2022, Russia became the most-sanctioned country in the world.[57] Though Russia's mining industry has not been directly targeted and identified by name in relation to the successive waves of sanctions, the systemic effect on the economy as a whole is having a disruptive effect on its activities.

For Western powers, the fact that Russia is so deeply integrated into the global metals and minerals market makes it difficult to adopt sanctions against this segment as a whole, when the world economy has already been shaken by the Covid-19 pandemic since 2020. However, the UK has adopted individual sanctions against several individuals involved in Russian mining groups: Roman Abramovich (shareholder of Evraz and Rusal), Oleg Deripaska (chairman of Rusal), Andrey Guryev (founder and CEO of PhosAgro), Sergey Ivanov (CEO of Alrosa) and Vladimir Potanin (CEO of Norilsk Nickel).[58] Nevertheless, sanctions targeting the Russian mining sector reveal different approaches. Thus, in the US, Boeing suspended its partnership contract with Russian titanium producer VSMPO-AVISMA, a subsidiary of state-owned group Rostec, which has been

55. "Polar Lithium, a joint venture of Nornickel and Rosatom, receives right to develop Kolmozerskoye project", *PJSC MMC Norilsk Nickel*, February 8, 2023, available at: www.nornickel.com.
56. "Russia's Rosatom Plans to Launch Lithium Mines in Siberia, Arctic", *Engineering & Mining Journal*, August 5, 2021, available at: www.e-mj.com.
57. As at February 24, 2023, Russia is subject to a total of 14,153 sanctions, far ahead of Iran (4,268), Syria (2,643) and North Korea (2,133). Since February 24, 2022, 11,458 international sanctions have been imposed on Russia. On this subject, see "Russia Sanctions Dashboard", *Castellum.AI*, February 24, 2023, available at: www.castellum.ai.
58. "UK Sanctions Russia's Second Richest Man", *Foreign, Commonwealth & Development Office*, June 29, 2022, available at: www.gov.uk. To consult the list of persons subject to financial sanctions in the UK, see "Consolidated List of Financial Sanctions Targets in the UK", *Office of Financial Sanctions Implementation, HM Treasury*, July 5, 2022 (latest update), available at: https://ofsistorage.blob.core.windows.net.

subject to financial and trade sanctions since 2014.[59] At the same time, European group Airbus continued to receive its titanium supplies from subsidiaries of Rostec.[60] For its part, the UK increased its customs tariffs for imports of platinum and palladium from Russia and Belarus.[61] With regard to the Alrosa mining group, divergences have appeared between the US and the EU: while the Office of Foreign Assets Control (OFAC) of the US Treasury Department placed the diamond giant on its sanctions list[62], the EU decided not to impose similar sanctions under pressure from Belgium; the fact that the city of Antwerp is one of the world's largest diamond trading centers probably had a lot to do with that decision.[63]

It is difficult for "sanctioner" countries to target a sector that is deeply integrated into the value chains of numerous segments of the economy (aeronautics, the car industry, communication, energy, etc.). Russia is one of the leading suppliers of several minerals and metals (aluminum, titanium, palladium, nickel) and therefore wields considerable influence over the market for these raw materials.[64] Its integration within the global economy is such that the London Metal Exchange (LME) ultimately decided not to prohibit trading and storing metals originating from Russia within its system.[65]

Since 2020, the inflation resulting from the disruption to supplies has offered Moscow the chance to impose an embargo on these strategic metals for Western countries.[66] In other words, Russia could threaten to redirect its mining and metal production flows towards "non-sanctioner" countries. However, this would be a "single-shot weapon". The sanctioned countries would simply diversify their supply chains or seek substitutes for the industrial

59. "Titanium Producer VSMPO-AVISMA to Shift Supplies from US to Other Markets", *TASS*, March 7, 2022, available at: https://tass.com.
60. R. Schuurman, "Airbus Continues to Source Russian Titanium via Subsidiaries", *AirInsightGroup*, April 12, 2022, available at: https://airinsight.com.
61. P. Sandle, "Britain to Increase Tariffs on Russian Platinum, Palladium in New Sanctions", *Mining[dot]com*, May 9, 2022, available at: www.mining.com.
62. "The United States Sanctions Major Russian State-Owned Enterprises", *U.S. Department of the Treasury*, April 7, 2022, available at: https://home.treasury.gov.
63. L. Abend, "Russia Produces a Third of the World's Diamonds. Now They're Coming Under Scrutiny", *Time*, May 5, 2022, available at: https://time.com.
64. Since the outbreak of war on February 24, 2022, the US and the EU have increased their imports of aluminum and nickel from Russia. Between March and June 2022, imports of Russian aluminum in the EU were 13% higher than in the same period of the previous year. See E. Onstad, "Exclusive EU, U.S. Step Up Russian Aluminum, Nickel Imports since Ukraine War", *Reuters*, September 6, 2022, available at: www.reuters.com.
65. "LME Decides Not To Ban Russian Metal From Its System", *Mining Technology*, November 14, 2022, available at: www.mining-technology.com.
66. B. Aris, "Russian Metals Are Deeply Embedded in Global Markets and Hard to Sanction", *BNE IntelliNews*, March 14, 2022, available at: www.intellinews.com.

sectors affected.[67] But the variety of Russian minerals leaves Moscow with a wide range of options in terms of counter-sanctions. Palladium, in particular, of which 38% of global production takes place in Russia, could represent a powerful lever: an embargo or a slowdown in export procedures would have a minimal financial impact for the Russian state—palladium accounts for just 0.43% of domestic GDP—but would cause a major shock to the Western car industry and a global market upset.[68] Likewise, the exponential growth in demand for nickel—an essential component in the manufacture of certain models of electric-vehicle batteries—gives Russia an additional advantage in its economic war against the West.[69]

Africa: A Laboratory for Russian Mining Diplomacy

Russia's widely analyzed diplomatic return to the African continent is part of a combination of synchronous actions: the growing involvement of the private military firm Wagner, operations in the field of information influence, the reactivation of the networks established during the Cold War, and business diplomacy in the natural resources sector.[70] With regard to this last point, Moscow's activism appears to be focused on the continent's mineral riches, particularly its reserves of cobalt, diamonds and gold.[71] Russia's presence in the mining sector in Africa rests both on its expertise and value chain management in certain segments, and on its security and military assistance. These two factors respond to different logics.

The first—economic—logic concerns the exploitation of minerals and metals in which Russian mining groups are present and renowned in the sector. This is the case for Alrosa (which is well established in Angola, Zimbabwe and, more recently, the Democratic Republic of the Congo)[72], and for Rusal (active in Guinea), operators

67. B. Dahdah, "Russian Metal: Sanctions vs. Weaponization?", *Commodities Report*, Natixis, February 24, 2022, available at: https://home.cib.natixis.com.
68. *Ibid*.
69. A. MacDonald, "This Russian Metals Giant Might Be Too Big to Sanction", *The Wall Street Journal*, March 7, 2022, available at: www.wsj.com.
70. See, for example, P. Stronski, "Late to The Party: Russia's Return to Africa", *The Return of Global Russia*, *Carnegie*, October 16, 2019, available at: https://carnegieendowment.org; N. Edwards, "Coup-Proofing: Russia's Military Blueprint to Securing Resources in Africa", *Africa in Transition*, *Council on Foreign Relations*, March 10, 2021, available at: www.cfr.org.
71. C. Jamasmie, "Russia's Comeback in Africa Favors Profit over Long-Term Influence — Analyst", *Mining[dot]com*, February 4, 2020, available at: www.mining.com.
72. P. Devitt, "Russian Diamond Miner Alrosa Boosts Cooperation with Congo After Angola Leak", *Nasdaq*, September 9, 2021, available at: www.nasdaq.com.

in the diamond and bauxite sectors respectively. These activities in Africa reinforce the position of Russian mining actors on the international market. While they may indirectly serve Moscow's interests on the continent, their objective is primarily an economic one.

The second logic concerns Moscow's geopolitical interests in Africa. In this respect, the exploitation of mineral deposits constitutes a means rather than an end: the Wagner, group, led by Yevgeny Prigozhin, makes money from security activities in certain African countries where it operates.[73] Thus, in exchange for their support for contested regimes, such mercenaries benefit from "lucrative mining contracts".[74] This means that minerals act as a currency for African governments wishing to consolidate their power by making use of paramilitary services. In the Central African Republic, the links between the activities of Wagner and the mining companies M Finans (based in Russia) and Lobaye Invest (based in the Central African Republic), both allegedly controlled by Prigozhin[75], reveal the nature of such ties, a far cry from the economic logics that traditionally operate in the mining industry. In 2018, licenses to exploit diamond and gold deposits were awarded to a Russian company believed to be close to the founder of Wagner.[76] In order to reinforce this dominance, the mercenary group has even sought to amend the local mining code so as to establish a monopoly on these two precious commodities in the country.[77]

In the context of Russia's military offensive in Ukraine, this diplomacy is proving useful for counterbalancing the effects of the economic and financial sanctions imposed on Moscow. The exploitation of African mineral resources is a means of bypassing the sanctions regime, particularly Russia's isolation from the international banking system.[78] Used as alternatives to the traditional

73. On this subject, see S. Sukhankin, "Sociétés militaires privées russes en Afrique subsaharienne : atouts, limites, conséquences" [Russian private military companies in sub-Saharan Africa: assets, limits, consequences], *Russie.Nei.Visions*, No. 120, Ifri, September 2020, available at: www.ifri.org.
74. D. Walsh, "Putin's Shadow Soldiers: How the Wagner Group Is Expanding in Africa", *The New York Times*, May 31, 2022, available at: www.nytimes.com.
75. "Treasury Increases Pressure on Russian Financier", Washington, *U.S. Department of the Treasury*, September 23, 2022, available at: https://home.treasury.gov.
76. F. Saini Fasanotti, "Russia's Wagner Group in Africa: Influence, Commercial Concessions, Rights Violations, and Counterinsurgency Failure", *Nonstate armed actors and illicit economies in 2022*, *Brookings*, February 8, 2022, available at: www.brookings.edu.
77. G. Clooney *et al.*, "Putin's Exploitation of Africa Could Help Him Evade Sanctions", *Time*, April 8, 2022, available at: https://time.com.
78. *Ibid.*

financial circuit, precious commodities such as gold and diamonds are useful for escaping banking sanctions because they can be sold and traded without oversight or restrictions. Russia's activities in Sudan in recent years offer a good illustration of its pre-emptive policy. The Wagner group's behind-the-scenes activities there have become "a much broader and more sophisticated tool than the power of the Kremlin".[79] In 2017, Prigozhin's group obtained significant mining concessions for gold and diamond deposits in the country. Sudan, the world's third-largest producer of gold, appears to be a strategic supplier for Russia, which already has gold reserves equivalent to 130 billion US dollars. These reserves act as a powerful shield with which to mitigate the economic consequences of the war in Ukraine. The ties between Moscow and Khartoum have deepened in recent years—Russia's invasion of Ukraine has not changed their relationship—and Russian mercenaries are helping Sudan's security forces, led by General Abdel Fattah al-Burhan, to repress the country's pro-democracy movement.[80] Russia also relies on the support of General Hamdan Dagalo, the Deputy Chairman of the Transitional Sovereignty Council, to promote its geopolitical ambitions in the region, particularly by means of the project to build a naval base in Port Sudan, on the Red Sea.[81] Though the two countries have been linked since 2020 by a formal agreement, it is uncertain whether this project will be completed due to the Sudanese government's procrastinating under pressure from the US. Here, once again, the Wagner group is an essential cog in the system in terms of support for Russia's objectives in the country: to strengthen economic and military ties. Nevertheless, the mobilization of the paramilitary group in Ukraine and international criticisms of its actions are weakening Russia's position in Sudan.

More broadly, dialogue platforms such as the Russia-Africa economic forum, supported by the Roscongress Foundation, serve as intermediaries in the development of mining activities and the strengthening of Moscow's position on the continent.[82] Taking an opportunistic, short-term view, this mining diplomacy supplements

79. D. Walsh, "'From Russia with Love': A Putin Ally Mines Gold and Plays Favorites in Sudan", *The New York Times*, June 5, 2022, available at: www.nytimes.com.
80. *Ibid*.
81. Under negotiation since 2017 with former president Omar al-Bashir, this naval base project has been called into question since the start of the Russian offensive in Ukraine, with Sudanese authorities seeking to maintain a balanced position. On this subject, see A. Mackinnon *et al.*, "Russia's Dreams of a Red Sea Naval Base Are Scuttled—for Now", *Foreign Policy*, July 15, 2022, available at: https://foreignpolicy.com.
82. "Moscow Hosts Discussion on Development of African Mining Industry", *Roscongress*, June 20, 2019, available at: https://roscongress.org.

the typical economic approach that Russian mining operators may carry out there or elsewhere, such as in Latin America.[83] Regardless of who the protagonists are—paramilitary actors or Russian industrial groups—their methods reflect the general situation of the mining sector in Africa, and are denounced by the international community and by NGOs: a disregard for human rights, failure to observe safety standards, degradation of natural ecosystems, etc.

83. Recently, Uranium One, a subsidiary of Rosatom, launched a strategy to enter Argentina and Bolivia in order to exploit lithium deposits, in competition with other foreign companies. See P. Devitt, "Russian State-Controlled Firm Enters Lithium Project in Argentina", *Mining*, November 29, 2021, available at: www.mining.com; C. Valdez, "Argentina se acerca a Bolivia para industrializar el litio" [Argentina joins forces with Bolivia to industrialise lithium], *AP News*, July 5, 2022, available at: https://apnews.com.

The Cases of Four Segments of the Mining Industry: Coal, Diamonds, Fertilizers and Nickel

The sheer number of different segments within Russia's mining industry leads to diverse industrial activities. These make it possible to make a profit from minerals and their respective properties. In light of the heightened tensions between Russia and the West, certain commodities that are integrated into the global economy appear to be difficult to substitute. This is the case with diamond, phosphate and nickel. These three segments represent the complexity of the mining sector, as well as the associated industrial and geoeconomic issues at play. Whether in relation to the high-tech sector for diamonds, agriculture for phosphate or the energy transition for nickel, Moscow has numerous assets that it is mobilizing with a view to maintaining its sectoral competitiveness for each segment concerned. Finally, Russia is still relying on its historic industry—coal—and intends to pursue its development over the course of the next decade.

Coal: The Relaunch of a Historically Significant Sector

In terms of absolute value, global coal consumption has never been as high since the Industrial Revolution. According to the International Energy Agency (IEA), consumption reached a record 8,025 million tonnes (Mt) in 2022 and is likely to remain stable until 2025 (8,038 Mt).[84] In light of this, Russia intends to pursue the development of this mining segment, as indicated by Prime Minister Mikhail Mishustin in June 2020 during the presentation of a program to relaunch the coal industry up to 2035.[85] Going against the ethos of the UN Sustainable Development Goals (SDGs) and the

84. *Coal 2022. Analysis and Forecast to 2025*, International Energy Agency (IEA), December 2022, pp. 7-11, available at: www.iea.org.
85. "Programma razvitiâ ugol'noj promyšlennosti Rossii na period do 2035 goda" [Programme for the development of Russia's coal industry up to 2035], *Government of the Russian Federation*, Decree No. 1582-r, June 23, 2020.

recommendations of the Intergovernmental Panel on Climate Change (IPCC), the Russian government has made plans to boost this historic industry. Firstly, it plans to make considerable investments in the modernization of industrial infrastructure, particularly in the Kuzbass basin (Kemerovo Oblast). Secondly, the exploitation of new deposits is under development in the Siberian Arctic.[86]

Over the last decade (2010-2020), Russia's share of the international coal trade has grown from 9% to 15%, due in particular to its conquest of markets in the Asia-Pacific region (India, Malaysia, Vietnam). Though Russian researchers believe annual production could reach between 330 and 365 Mt by 2035, the Russian government envisages, in its most optimistic scenario, annual production of up to 670 Mt—which seems unrealistic given the capacity limits on achieving such a production volume.[87] In reality, although coal production rose gradually between 2000 (258 Mt) and 2019 (439 Mt), the global health crisis caused production to fall in 2020 (398 Mt).[88] The federal authorities' keenness to revive this industrial sector, which has been largely privatized since the liberalization of the 1990s, reflects the slow restructuring underway. Lastly, the Russian government plans to streamline the costs of transportation between production sites and consumption sites, in order to make the segment more efficient and more attractive, with half of production destined for export.

The Diamond Segment: Industrial Domination and Diplomatic Tool

The Republic of Sakha (Yakutia) accounts for some 80% of Russia's national diamond production and 25% of global production. There are 24 diamond deposits under exploitation in the country as a whole. These diamond deposits are exploited by the Alrosa group—controlled respectively by the federal state (33%) and the regional government and municipal districts of Yakutia (33%).[89] For many decades, the exploitation of diamonds in this region of Siberia has led to a

86. The exploitation of the Syradasayskoye deposit, on the Taymyr peninsula, aims to extract 7 MT of coal per year as of 2026. See A. Staalesen, "Coal Diggers Are Building a Settlement on the Taymyr Tundra", *The Barents Observer*, October 15, 2021, available at: https://thebarentsobserver.com; "Five Arctic Investment Project to Get 1.4 bln Rubles Subsidies in 2022", *Interfax*, June 24, 2022, available at: https://interfax.com.
87. A. Prosekov and A. Rada, "Forecasting the Coal Industry Development in Russia in the Context of the Transition to Carbon Neutrality", *SHS Web of Conferences*, Vol. 128, No. 02002, 2021, available at: https://doi.org.
88. "Rossijskij statističeskij ežegodnik" [Federal statistics service of the Russian state], *Federal statistics service of the Russian state*, 2021, pp. 368.
89. "Shareholders structure", *Alrosa*, 2022, available at: https://www.alrosa.ru.

disastrous environmental situation, particularly in terms of the contamination of soil and waterways near the mining sites.[90] This case is highly representative of the uncontrolled consequences of the exploitation of mineral deposits on Russian soil since the Soviet period.

On the international market, the Alrosa group sells its diamonds through the global diamond syndicate, the Central Selling Organization, established by South African company De Beers.[91] This cooperation between De Beers and Russia began in 1959, with the launch of mining activities in Yakutia. The world's leading supplier of natural diamonds, Alrosa produces between 35 and 40 million carats (equivalent to between 7 and 8 tonnes) each year.[92] In terms of diplomacy, Russia plays a crucial role in the Kimberley Process, the international trade forum set up in 2000 to certify that "the sale of rough diamonds is not used to finance an armed conflict and to prevent conflict diamonds from arriving on the legal market".[93] This forum operates under the mandate of the UN and aims to confer greater transparency on diamond production, especially in Africa. When Moscow was chairing the forum in 2021, the exploitation of diamond mines was still fuelling armed conflicts in certain countries, such as the Central African Republic, a country under considerable Russian influence. Attempts to expand the definition of "conflict diamonds", particularly by including the use of private or government-backed paramilitary forces, have thus far failed.[94] Despite criticism from civil society following the invasion of Ukraine[95], Russia remains at the head of two of the six working groups of the Kimberley Process, which reinforces its influence in

90. To facilitate mining activities and support the extraction of diamonds in Yakutia, 10 nuclear explosions were carried out between 1974 and 1987 for "peaceful" purposes, in accordance with the doctrine developed by the Soviet authorities. This practice resulted in radioactive contamination of the soil in areas close to the deposits. See N. Yakovleva *et al.*, "Natural Resource Use in the Russian North: a Case Study of Diamond Mining in the Republic of Sakha", *Environmental Management and Health*, Vol. 11, No. 4, October 2020, pp. 318-336.

91. The De Beers Group, founded in 1888, largely dominated the diamond market until the end of the 20th century, when it accounted for 90% of global production.

92. E. Lipatov and D. Genin, "Introductory Chapter: Some Aspects of Diamonds in Scientific Research and High Technology", *in* E. Lipatov (ed.), "Some Aspects of Diamonds in Scientific Research and High Technology", London, *IntechOpen*, 2020, available at: www.intechopen.com.

93. More information is available on the official website of the Kimberley Process: www.kimberleyprocess.com.

94. H. Merket, "Russian Diamonds and the War in Ukraine", *IPIS insights*, IPIS, 2022, available at: https://ipisresearch.be.

95. "Kimberley Process Should Stop Turning Blind Eye to Russia's Invasion of Ukraine and Take Fight Against Conflict Diamonds Seriously", *Kimberley Process Civil Society Coalition*, June 14, 2022, available at: www.kpcivilsociety.org.

such instances. Thus, Moscow has both economic and political dominance over this segment, with the conditions of the diamond market evolving rapidly.

While natural diamonds are reserved primarily for jewelery, their characteristics make them a unique material for industry. Due to their abrasive properties and resistance to wear, they are widely used in the extractive industry for drilling, grinding and polishing hard rocks and structural materials such as alloys. Despite its potential, this precious mineral is still rarely used in semiconductors in the fields of electronics and optics, due to the technological limitations on large-scale production.[96] In order to meet the needs of the high-tech industry, the production of synthetic diamonds is growing rapidly and is shaking up the sector: China, Japan and India are emerging as top-level competitors in the field. With 8 million carats produced every year, synthetic diamonds represent approximately one quarter of the annual production of Alrosa, which also dominates this market at the global level. According to estimates, its market share is expected to grow by 9% each year up to 2028.[97] While 70% of synthetic diamond production is destined for the extractive industry, 13% is used directly for the production of semiconductors, sensors, laser systems and optical fibers.[98] In order to respond to this competition, Russian company Synthesis Technology (Syntechno), based in Saint Petersburg, has opened a factory for the production of synthetic diamonds in Pskov Oblast, and planned to expand it.[99] Russia intends to maintain its dominant position in this segment, despite the severe restrictions imposed by international sanctions.

Russian Fertilizers: A Complete Value Chain

In Russia, the fertilizer sector is without doubt the one with the most complete and accomplished value chain, from the extraction phase right through to distribution on the market. Four groups dominate the country's fertilizer segment: Acron, EuroChem, PhosAgro and Uralchem. It is structured around the Russian Association of Fertilizer Producers (RAFP), founded in 2008, which reports directly

96. E. Lipatov and D. Genin, "Introductory Chapter: Some Aspects of Diamonds…", *op. cit.*
97. T. Ap, "Russian Sanctions Could Boost Lab-Grown Diamonds", *Quartz*, March 16, 2022, available at: https://qz.com.
98. G. Semyonova, "Vladislav Zhdanov - "The Use of Diamonds in High Technologies Is the Main and Key Target of the Diamond Synthesis Technologies", *Rough&Polished*, November 15, 2021, available at: www.rough-polished.com.
99. V. Malakhov, "Synthesis Technology will double synthetic diamond production this year", *Rough&Polished*, January 3, 2022, available at: www.rough-polished.com.

to the Ministry of Industry and Trade (Minpromtorg).[100] Russian fertilizers account for 20% of the global market, equivalent to 12.5 billion US dollars.

PhosAgro, established in 2001, is a vertically integrated structure and Europe's leading supplier of phosphate-based fertilizers. It carries out its extractive activities in Kirovsk (Murmansk Oblast), with six deposits currently under exploitation. This site is the world's biggest in terms of production of highly concentrated phosphate rock. According to the Russian group's estimates, the deposits have a remaining lifespan of 60 years.[101] PhosAgro is the primary distributor of fertilizers to Russian farmers, selling 3.54 million tonnes in 2020.[102] In other words, 30% of its production is destined for the domestic market. While the group has a number of distribution points around the world, such as Bayonne in France, it is planning investments to improve its distribution network throughout the country. In particular, PhosAgro is focusing on the development of liquid mineral fertilizers, which are becoming indispensable in regions that are regularly exposed to episodes of drought, such as the country's south.[103]

Since the launch of the "special military operation", the international community has worried about a global food crisis, due to Russia's and Ukraine's weight in the agriculture sector. Fertilizers are an essential link in the proper functioning of the food supply chain, which puts Western countries off directly targeting Russian products. Their priority is to contain rapid inflation in crop prices on a structurally destabilized international market.[104] Nevertheless, the systemic aspect of the sanctions imposed since February 24, 2022, frightens international buyers and transporters, thereby limiting exports of Russian fertilizers.[105] Some heads of Russian groups who have been sanctioned have stepped down from their official position in an attempt to stem the negative fallout on their respective companies' activities. For example, the oligarch Dmitry Mazepin resigned as CEO of Uralchem and sold some of his shares. He now

100. For more details on the association, see its official website, available at: https://rapu.ru/.
101. "A Framework for Sustainable Soil Fertility: Integrated Report 2021", *PhosAgro*, 2022, available at: www.phosagro.com.
102. P. Luck, "PhosAgro Supplies Russian Farmers with Over 3.5 million T of Mineral Fertilizers", *World Fertilizer*, January 25, 2021, available at: www.worldfertilizer.com.
103. *Ibid*.
104. The price of wheat has risen consistently since 2020, due to large purchases of stocks by China, global logistics tensions and rising energy costs.
105. T. Burns, "Why the Fertilizer Market Could Be Russia's Hidden Leverage", *The Hill*, June 7, 2022, available at: https://thehill.com.

holds just 48% of the company's equity and is therefore a minority shareholder.[106] This group is one of the global leaders in the production of potassium, via its subsidiary Uralkali.

For the Russian government, the threat of an embargo on fertilizer exports to "sanctioner" countries has been mentioned, but the measure has not been implemented to date. The prospect of a reduction in fertilizer supplies for the global farming sector appears to have had a devastating effect on harvests in 2023. In other words, reduced fertilizer usage would result in a proportional drop in global agricultural yields. In this context, the increase in the price of fertilizer, combined with rising energy costs, is creating the conditions for a long-term global food crisis.[107] Farming powers such as Brazil—one of the world's leading exporters of maize, soya, sugar and coffee—are continuing to trade with Russia and replenish their fertilizer stocks, while bypassing banking and logistics restrictions.[108] Though Russia does not dominate the fertilizer sector, it is still a key actor due to the global economy's heavy dependence on an intensive farming model. In fact, Russian industrial groups, which dominate the value chain in this sector, constitute an indispensable link in the planet's agricultural system.

Nickel: A Segment Undergoing Changes

In May 2020, the spillage of 21,000 tonnes of diesel oil into the Ambarnaya river, in the Siberian Arctic, following the failure of a storage tank, put the spotlight on mining group Norilsk Nickel (Nornickel). For Russia, this new accident perpetuated a negative image of its management of industrial activities and their impact on the surrounding natural ecosystem. An independent inquiry revealed two major factors behind the spillage: breaches during construction (completed in 1985); and the thawing of permafrost due to global warming.[109] In February 2021, a Russian court ordered the mining group to pay a record

106. "Mazepin Reduces Stake in Uralchem To Below 50%, Steps Down as CEO", *Interfax*, March 11, 2022, available at: https://interfax.com.
107. E. Cousin, "The War in Ukraine and the Rush To Feed the World", Boston, *Boston Consulting Global*, May 17, 2022, available at: www.bcg.com.
108. J. Nicas and A. Spigariol, "Good News for Food, Bad News for War: Brazil Buys Russian Fertilizer", *The New York Times*, May 8, 2022, available at: www.nytimes.com.
109. With regard to the breaches identified during the investigations, several stakes supporting the storage tank were shorter than the initial lengths established during the tank's design. MMC Norilsk Nickel, "Staying Sustainable", *Sustainable Report 2021*, 2022, p. 55, available at: www.nornickel.com.

fine of 146.2 billion roubles (approximately 2.46 billion euros).[110] This had a seismic effect on Nornickel's management in terms of the group's handling of environmental matters. In response, Vladimir Potanin, the leading shareholder and CEO of Nornickel, decided to initiate a profound transformation of the group's environmental policy.[111]

Under pressure, Nornickel has now begun to modernize its obsolete industrial equipment, inherited from the Soviet period, which does not comply with international environmental standards. In this respect, it is pursuing an ambitious plan to reduce its sulfur dioxide (SO_2) emissions, which are extremely harmful to the environment and to human health. Norilsk's metallurgical complex is one of the biggest emitters of SO_2, making this region of Russia one of the most polluted in the world.[112] The industrial renovation project, which aims to reduce SO_2 emissions by 90%, concerns the entire polar division, which covers both the Norilsk region and the Kola peninsula in the Arctic. In December 2020, the closure of the foundry complex in Nikel, a border town close to Norway, made it possible to cut SO_2 emissions by 78% in 2021 compared with the previous year.[113] The Norilsk site is now the subject of significant investments with a view to achieving this substantial reduction by 2026.

Such requirements in terms of environmental issues and, more broadly, in the context of the UN SDGs and environmental, social and governance (ESG) criteria, now guide a number of investments, under the umbrella of responsibility and sustainable development. Nevertheless, the group continues to receive a great deal of criticism from NGOs, particularly those linked to the region's indigenous populations. Such groups believe that Nornickel's commitment to protecting the environment and human rights remains insufficient.[114] Nevertheless, the significance of these causes for criticism of the Russian group's practice is too small to damage its reputation at the international level.

Moreover, this evolution is taking place in a context of transformation of the global nickel market. The market is being upended by the policy of decarbonization, which calls for the implementation of a

110. "Sud udovletvoril isk Rosprirodnadzora k 'Nornikelû' na 146 mlrd rub." [The Court upholds Rosprirodnadzor's claim against Nornickel for a sum of 146 billion RUB], *Interfax*, February 5, 2021, available at: www.interfax.ru.
111. "White Paper on NTEC's HPP-3 Incident Clean-up and Response", *MMC Norilsk Nickel*, 2021, p. 5, available at: www.nornickel.com.
112. "Russia's Norilsk and South African Coal Town Kriel Top SO_2 Emissions Hot Spots: NASA Data", *Reuters*, August 19, 2019, available at: www.reuters.com.
113. "Navigating the Transition to a Net Zero World. Annual Report 2021", *MMC Norilsk Nickel*, 2021, available at: www.nornickel.com.
114. "Russia's Indigenous Peoples Call for International Support to Save the Arctic", *IWGIA*, October 29, 2021, available at: www.iwgia.org.

transition based on renewable energies and the electrification of transport. Nickel is an essential component of the technologies needed for this transition, including lithium-ion batteries for electric vehicles. In this respect, studies indicate exponential growth in demand for nickel ore, which is expected to grow by up to 100% by 2050 compared with current levels of demand.[115] In this extremely competitive environment, certain industrial actors are positioning themselves and anticipating tension on the nickel market in the future. Having been in discussions with Nornickel before ultimately signing a number of commercial agreements with other (non-Russian) partners to secure its supplies, carmaker Tesla, headed by Elon Musk, perfectly illustrates this aggressive positioning.[116] In this context, the Russian group is targeting growth of between 25% and 35% in its nickel production by 2030 compared with 2017, when it produced 210,000 tonnes.[117] In recent years, Nornickel has confirmed its essential role by becoming the world's leading producer of nickel, accounting for some 17% of the global total production volume. Nevertheless, the Russian group must absorb the economic and financial shock linked to the regime of sanctions imposed by Russia.

Subject to British sanctions since June 29, 2022, Vladimir Potanin has had his assets frozen and been forbidden from traveling to the UK. In December 2022, the United States also sanctioned the Russian oligarch. This decision put the group in difficulty and heralded a possible restructuring, with the oligarch stepping down from the group's management and reducing his shareholding, as has been the case in other segments of the mining industry (see the case of the fertilizer segment). A rapprochement with the Rusal group was under discussion but has been ruled out for now because of the open conflict between V. Potanin and O. Deripaska.[118] In general, this type of restructuring could make it possible to bypass the sanctions regime and serve Moscow's interests in its economic clash with the West.

115. K. Hund *et al.*, "Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition", *World Bank*, 2020, p. 73, available at: www.worldbank.org.
116. Without having reached an agreement with the Russian group, Tesla secured its sources of nickel provision, which include in particular the Brazilian mining giant Vale. In May 2022, the two companies signed a long-term agreement for the provision of nickel extracted in Canada. See "Vale Confirms Supply Deal with Tesla for Low-Carbon Nickel", *Vale*, June 5, 2022, available at: www.vale.com.
117. "Navigating the Transition to a Net Zero World…", *op. cit.*
118. "Russia's Rusal files London lawsuit against Potanin over Nornickel pact", *Reuters*, October 24, 2022, available at: www.reuters.com; on the rivalry between Potanin and Deripaska see G. Tognini, "Russian Oligarch Oleg Deripaska May Have Probed Vladimir Potanin Using Ex-FBI Agent Who Was Thorn In Trump's Side", *Forbes*, January 30, 2023, available at: www.forbes.com.

Conclusion: Russia's Mining Industry Faces a Strategic Upheaval

Russia, which has a considerable stock of different metals and minerals in its subsoil, is being called to remain one of the world's leading producers of such commodities. Its capacity to increase production levels is not guaranteed, however. In fact, the vagaries of the war are taking the Russian mining industry on a new trajectory, opening up a long period of uncertainty.[119] The noose of international sanctions that is gradually tightening around the industry is cutting off access to bank loans to facilitate investments, as well as to the technologies that are essential for the functioning and development of the national economy. The mining sector cannot escape this new paradigm.

As the sanctions affect industrial groups in the sector more directly, the risk of the country being marginalized on the metal and mineral market could increase. Access to technologies and components is a prior condition for the execution of the major mining projects that are planned. The first immediate consequence, the departure of foreign suppliers of machines and equipment necessary for these activities, is considerably slowing the increase in production volumes in Russia. At the same time, the collapse in imports is exposing the Russian mining sector to enormous difficulties in terms of procuring essential components, while potential commercial partners are now hesitant.[120] Generally speaking, the risk of a widespread shortage of supplies is a long-term threat to the national economy.

119. The social, economic and demographic consequences of the war could have a lasting destabilising effect on Russian society. On this subject, see V. Inozemtsev, "Final'nij otsčet putinskoj epokhi. Vladislav Inozemtsev – o posledstviâkh mobilizacii dlâ ekonomiki i Kremlâ" [The final countdown of the Putin era. Vladislav Inozemtsev on the consequences of the mobilisation for the economy and the Kremlin], *The Insider*, September 25, 2022, available at: https://theins.ru.

120. J. Sonnenfeld *et al.*, "Business Retreats and Sanctions Are Crippling the Russian Economy", *SSRN*, July 2022, available at: https://papers.ssrn.com.

In order to tackle this phenomenon, Russian authorities are relying once again on the "import substitution" policy. However, it is hard to imagine that the issue of access to technology can be resolved by this policy, which will ultimately isolate the country from the continuous innovation taking place in the global economy. This competition between industrial powers contrasts directly with Russia's industrial reality, which remains clearly inferior in terms of scale and capacity to the former Soviet industry.[121] In other words, the strategy being defended by the Russian government does not represent a long-term solution for overcoming the structural obstacles threatening the sector. At best, the sector will see a decline in the quality of its products and an increase in costs. It remains to be seen how the mining industry can sustainably tackle these obstacles.

Moscow therefore needs to meet two pressing needs: access to technology and the adaptation of its industrial model in this new paradigm. Firstly, Russia must undertake to import high-tech products from countries that still have commercial relations with it. This strategy of getting around the obstacles could be built around invisible financial circuits and trade flows that are unaffected by the sanctions currently in force.

Secondly, the creation of a broad-based industrial synergy could be part of the necessary restructuring of Russia's economy. For example, Russian industrial actors are thinking about "creating a database of spare parts that could be shared if necessary".[122] In other words, the mining sector is facing the prospect of its activities becoming more complex. It is also dealing with the reorientation of metal and mineral export flows, which has two main consequences: the abandonment of certain projects oriented towards Western markets—such as the construction of port infrastructure for the transshipment of coal to Murmansk—and a heightened dependency on Chinese communication infrastructure by pivoting to the East.[123]

In an economy that is heavily dependent on such flows, the growth of the Russian mining industry is subject to its global integration. The pursuit of its gradual evolution will depend on

121. V. Inozemtsev, "Zameŝenie importa ili ego 'parallelizaciâ'?" [Import substitution or 'parallelisation'?], *Riddle*, July 7, 2022, available at: https://ridl.io/ru.
122. "Russian Industry Faces Code Crisis…", *op. cit.*
123. A. Goubin, "Net puti dlâ 'poâsa': složnosti s transportnoj sostavlâûŝej rossijko-kitajskogo sotrudničestva na Dal'nem Vostoke" [No way out for the "belt": the difficulties of the transport aspect of Russo-Chinese cooperation in the Far East], *Valdaï Club*, November 26, 2021, available at: https://ru.valdaiclub.com; T. Nilsen, "Murmansk Transport Hub Gets Status as Strategic Important", *The Barents Observer*, July 26, 2022, available at: https://thebarentsobserver.com.

the duration and solidity of the sanction's regime, as well as on how quickly it can access alternative technologies from its Asian partner countries. While the sanctions are making Russian companies in the sector more fragile, paradoxically they are also making all industrial value chains on which all global economies depend more complex. Taken individually, each segment of the mining industry does not position Russia as a specialist mining power—such as Peru for copper or the Democratic Republic of the Congo for cobalt—but considered in their entirety as a compact network, these diversified and integrated mining segments could make the country an essential actor for meeting the needs of major industrial powers, particularly in Asia.[124] Russia definitely has the potential to become a "master of mining"[125] during the course of the 21st century, provided that it retains its industrial strength and modernizes a sector that will be sorely tested over time.

124. At the Vladivostok economic forum in September 2022, Indian Prime Minister Narendra Modi reiterated his ambition to boost strategic cooperation between his country and Russia in the mining sector (coal, diamonds, etc.). See N. Modi, "English Translation of Address by Prime Minister, Shri Narendra Modi at the Plenary Session of the Eastern Economic Forum 2022", *Official website of the Ministry of Foreign Affairs (Government of India)*, September 7, 2022, available at: www.mea.gov.in.

125. To use the expression coined by historian Mathieu Arnoux, which refers to medieval Germany, then considered the leading mining power of the European continent, with both the technical expertise and the language necessary for this economic activity.

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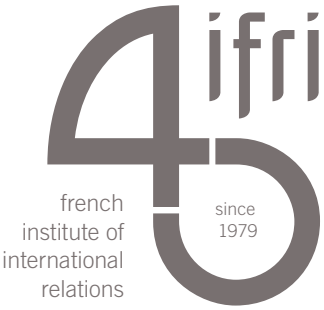

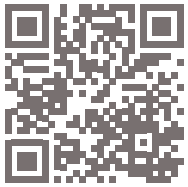

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