

Article

Russia's policy in the coal sector in the context of Energy Transition

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Abstract

In this article, the authors discuss Russia's approach to coal in the context of the climate agenda and explain the reasons why Russia will not abandon coal mining in the next 20-30 years. These reasons include the demand in international markets (international market fundamentals), desire for profit from companies, regional leaders, and governments (economic factor); the need to ensure energy security in certain regions in the East (political-economic factor); the presence of single-industry towns that currently rely solely on coal exports (domestic political factors); and the prospect of coal remaining highly competitive and the potential for cost reduction in the future (Sakhalin, Yakutia). Additionally, Russia is not being offered assistance by any external players in a "just" transition to an energy sector without coal mining.

Keywords

Russia, coal, energy transition, decarbonization, coal phase-out, just transition, energy policy, energy strategy

Introduction

The future of the Russian coal industry, as well as the global coal sector, is closely tied to efforts to address climate change. The international community is increasingly focused on phasing out coal-fired energy, a major contributor to greenhouse gas emissions. This shift is central to global

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strategies aimed at limiting the rise in global temperatures compared to pre-industrial levels.

Recent discussions among major coal-producing nations, which include Russia, and proponents of rapid energy transition highlight the significance of the coal phase-out concept. Given the strained relations between Russia and the West, there is speculation that the Kremlin could contemplate sacrificing its coal sector to improve relations. This article seeks to assess the viability of this proposal.

The coal sector is a pivotal component of Russia's energy portfolio, contributing to more than 10% of its energy mix. Despite generating lower budget revenues compared to oil and natural gas, coal serves as a vital economic engine, providing employment to over 140,000 individuals (Petrenko, 2023; Rosstat, 2021b). The coal sector demonstrates significant geographical concentration and is closely linked with other major industries, notably metallurgy. Moreover, coal serves as the primary freight for Russia's rail transport, making it a crucial revenue source for this essential aspect of the country's infrastructure.

In 2022, Russia's coal sector achieved record output (Energy Institute, 2023; Petrenko, 2023). Preliminary data for the first half of 2023 indicate a continuation of this trend, driven by increased domestic demand and a recovery in exports (Meshkov et al., 2023).

Literature on the Russian coal sector covers a wide range of topics:

- Research on the *Russian coal industry during the tail end of the Soviet Era* problematizes the political participation of miners – in light of the 1989 miners' strike – within the context of Perestroika. (Crowley, 1997b, 1997a; Kuhnert, 1991; Teague, 1990)
- *Post-Soviet scholarship on Russian coal transitions* away from Sovietology's focus on political and sociological questions to so-called "transition studies," seeking to understand the reasons for the successes and shortfalls of privatization in Russia. (Artemiev & Haney, 2002; Crowley, 2001; Solovenko et al., 2014; Stallings, 1992; Stiglitz, 2002)
- Scholarship on the *Russian coal sector during the Putin era* has moved on from issues of privatization to addressing the shortfalls of the industry and ways that it could increase financial viability and competitiveness in the global market. (Balabanova et al., 2017; Cherdantsev & Thurner, 2017; Gorbacheva & Sovacool, 2015; Petrenko, 2006; Plakitkin, 2010; Plakitkin & Plakitkina, 2016; Popov & Garkavenko, 2007; Rashevsky, 2006; Rozhkov & Solovenko, 2018; Shaydullina, 2018; Vodneva et al., 2019; Zhironkin et al., 2016)
- Scholars have also studied the importance of a concrete state *strategy for the development of the coal sector* as a way to modernize the industry. (Kozhukhovskiy et al., 2016; Lyubimova & Linnik, 2019; Novoselov, 2015; Plakitkin & Plakitkina, 2017)
- Academic research on *Russia's "Pivot to the East"* since the 2010s has been at best cautious, and at most pessimistic about the country's ability to execute a successful economic reorientation toward the Russian Far East and the Asia Pacific Region. (Fortescue, 2016a, 2016b; Henderson & Mitrova, 2016; Ponomarev & Kuznetsova, 2011)
- Literature on *international coal markets* can be split into the following categories: theoretical aspects of coal market functions (Cameron, 1997; ECS, 2007); overview of the current market status (IEA, 2012, 2013, 2014, 2022a); statistical reports on international energy (BP, 2022; Energy Institute, 2023) and annual statistical reports on Russian coal sector published in the *Ugol'* magazine (Tarzanov, 2016, 2017, 2018, 2019; Tarzanov & Gubanov, 2020, 2021); perspectives of the coal market, including historical outlooks (Barnes, 1990; IEA, 1995, 1998, 2021, 2022b, 2023; Makarov et al., 2019).
- Scholarship addressing the *challenges of climate change* in the Russian coal sector focuses principally on Russia's slow progress on emissions reduction and unique challenges posed by

the Paris Agreement framework to both the coal sector and national energy policy at large. (Golub et al., 2019; Kokorin, 2016; Korppoo & Kokorin, 2015; Lyubimov, 2019; Makarov & Sokolova, 2017; Makarov et al., 2020; Martus & Fortescue, 2022; Plakitkin & Plakitkina, 2021)

- Finally, a small and emerging section of the literature has begun to address *challenges faced by the coal sector as a result of increased sanctions* following the 2022 escalation in the conflict in Ukraine. (Bashmakov, 2023; Pankov et al., 2022; Simonin et al., 2022; Tsivileva & Golubev, 2022)

Therefore, the body of literature on Russian coal is substantial, covering a wide range of topics with in-depth research. However, there are unresolved issues that either continue to spark debates or have not been thoroughly studied. These include the challenges of reconciling climate change mitigation and energy transition with the social and political complexities of a country's existing coal industry. This article aims to provide insights into the reasons behind Russia's hesitance to phase out coal, despite its significant contribution to global CO₂ emissions.

This research article holds significance on multiple fronts. Firstly, it aims to conduct an interdisciplinary analysis of Russia's oldest energy sector, providing valuable insights for experts in Russian studies, energy security, climate change, and the global political economy. Secondly, the article seeks to contextualize contemporary coal developments in Russia within complex historical and political contexts, offering a nuanced understanding of the sector's evolution. Thirdly, the research sheds light on the political economy of conducting business in Russia's coal sector, highlighting the nature of Russian dirigisme in energy politics. Lastly, the article examines the key aspects of the ongoing dialogue between Russia and other major coal mining states, as well as those advocating for a rapid energy transition to phase out coal, providing a comprehensive overview of the current discourse in this area.

The article also adds to the broader discourse on energy transition and just transition, especially concerning Russia's coal sector. Through an analysis of the potential effects of climate change policies on the Russian coal industry and its position in the country's energy mix, this research offers valuable insights into the obstacles and prospects linked with moving towards a more sustainable energy paradigm. Moreover, the article aims to debunk overly simplistic narratives that paint Russia as staunchly against the energy transition, underscoring the complex nature of the country's energy policies and approaches.

The article is structured as follows: firstly, we discuss the conceptual framework of Energy Transition and Just Transition, framing our research question: **To what extent does the Russian coal sector risk becoming a bargaining chip in relations with the West within the context of Energy Transition?** Subsequently, we explore the answer to this question in the Results and Discussion section, which is divided into two subsections: international coal market fundamentals and domestic economic factors. Finally, we conclude with a summary of our findings and their implications.

Conceptual framework and research question

Energy transition VS Just transition

The concept of "Energy Transition" signifies a progression through different stages of energy system development. Historically, each of these stages has been characterized by the dominance of various energy sources in the global energy mix. Initially, wood and peat were predominant.

Then, with the advent of the steam engine, the first energy transition occurred, and coal became the primary energy source. The second energy transition to oil was marked by the introduction of the internal combustion engine. The development of combined-cycle gas turbine (CCGT) technologies in the power sector signaled the third energy transition towards natural gas. The duration of these stages has sequentially decreased (70, 50, and 30 years), with fuel prices doubling, and each stage culminating in a crisis-induced decline in energy demand. (A. A. Makarov et al., 2019, pp. 14–16)

The slowdown in global energy consumption that commenced after 2008–2009 may indicate that the world's energy sector is at a new transitional juncture. The current shift towards “green” themes typifies the transition to a new phase of global energy development. In this fourth energy transition, there is a notable emphasis on the increased utilization of renewable energy sources and a gradual phasing out of fossil fuels.

Since the late 20th century, there has been a growing focus on climate change. The emissions of CO₂ and other greenhouse gases have resulted in a rise in global average temperatures compared to the pre-industrial era. According to scientific consensus, if these trends are not addressed, our planet is at risk of facing a catastrophe. (IPCC, 2023) Hence, the shift to the next phase of energy development is closely tied to CO₂ emissions issues. Reducing greenhouse gas emissions is crucial in the current context. Energy transition policies often involve a move towards a less complex carbon-intensive energy model, resulting in significantly lower greenhouse gas emissions.

The primary driver of rising global temperatures attributed to human civilization is the combustion of fossil fuels – coal, oil, and natural gas. Currently, three-quarters of the world's energy consumption relies on fossil fuels. Completely phasing out traditional energy derived from fossil hydrocarbons in the near term is not feasible. Therefore, alongside the development of alternative energy systems, whose impact will only be realized in the future, immediate action is needed to address greenhouse gas emissions within existing supply chains, power plants, and factories.

A comprehensive emissions reduction policy should not only prioritize the adoption of renewable energy sources but also focus on minimizing the carbon footprint of traditional energy models. However, there is a notable emphasis on phasing out coal, particularly evident during the annual Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC). Recent COP meetings have placed significant emphasis on the abandonment of coal-fired energy, a sector that represents a substantial portion of global coal consumption. (Hodgson, 2022; Siddiqui, 2021; UNFCCC, 2021).

The shift from one energy source to another frequently precipitates significant social, economic, and political transformations, sometimes even sparking conflicts and revolutions. These changes play a crucial role in shaping the dynamics between resources, labor, and the state. (Etkind, 2021) The evolution of Russia's coal sector, especially since 2014 when external cooperation declined, provides valuable insights into the practicalities of transitioning to a market economy. This experience challenges common stereotypes and offers lessons for nations navigating comparable transitions without external aid, often termed the ‘just transition’ away from coal.

While some argue that Russia is fundamentally opposed to the energy transition or that it will put Russia at a disadvantage (Hafner & Tagliapietra, 2020), this view oversimplifies the situation.

Soviet archival records indicate that environmental considerations were taken into account in decision-making as early as the 1920s, and the Soviet Union actively engaged in international environmental agreements during the 1970s and 1980s. (Ponomareva, 1999) Moscow developed a class-based perspective on ecology, with figures such as Grigory Khozin, Peter Kapitsa,

and Mikhail Budyko contributing to the conceptualization of ecology and the environment as universal values. (Khozin et al., 1978)

Following the Soviet era, Russia has backed various international initiatives. This includes ratifying the Kyoto Protocol after negotiations with the European Union (EU), which made ratification a condition for Russia's accession to the World Trade Organization (WTO). (Aalto, 2008) Despite voicing rhetorical support for international endeavors to combat climate change, Russia's energy strategy implicitly prioritizes addressing energy poverty and supporting its exports of coal, oil, and natural gas. (Lomagin et al., 2023)

Yet, the Kremlin has grown increasingly skeptical of Western climate initiatives, viewing the EU's climate policy as a foreign policy tool aimed at diminishing Russia's competitiveness in energy markets. Russia's 2019 Energy Security Doctrine portrays international efforts to enact climate policy and expedite the transition to a 'green economy' as a foreign policy challenge to its energy security. (President of the Russian Federation, 2019)

The agreement to "phase down" unabated coal power at the 2023 Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC, 2023) poses a threat to Russia's coal industry and global coal production. Decarbonization and the energy transition hold significant socio-economic implications for Russia, especially considering its history of miner strikes. The government faces the challenge of reducing coal production and consumption without adequately addressing this historical challenge.

Research question

To what extent does the Russian coal sector risk becoming a bargaining chip in relations with the West within the context of Energy Transition? This question is significant for Russia, given its diverse energy sector comprising oil, natural gas, coal, hydro, nuclear, and emerging renewables like solar and wind. The future of coal, often viewed as a vestige of the past in light of the Paris Agreement signed by 195 countries, including Russia, at the end of 2015, raises important considerations. Will Russia be willing to sacrifice its coal sector, a major source of pollution, to support global efforts to reduce greenhouse gas emissions? The abundance, low price, and global availability of coal make it a challenging fuel source to relinquish, not to mention the social impact of coal mine closures. Additionally, alongside the climate change agenda, the challenge of combating energy poverty, especially in less developed countries, persists. While some nations are transitioning away from coal, others are increasing their reliance on it.

Despite the global consensus of the Paris Agreement, different regions and countries are employing diverse strategies to phase out coal, highlighting the absence of a uniform, global transition to lower-carbon energy. In this context, what role does Russia play, and how does it perceive the climate agenda? The vast Russian coal sector, which spans regions from the Arctic to Siberia and the Far East, underscores the complexity of these questions.

Results and Discussion:

To what extent does the Russian coal sector risk becoming a bargaining chip in relations with the West in the context of Energy Transition?

1. International coal market fundamentals

Global energy demand is increasing with the advancement of economies and the development of

nations. However, the supply of renewable energy alternatives like wind and solar is not keeping pace, leading to supply constraints. As a result, competition among different fossil fuels largely drives the energy supply, with coal currently occupying a prominent position.

Coal plays a crucial role in the global energy system, ranking as the second-largest source of energy worldwide after oil. Its significance lies in its substantial contribution to the electricity sector, with over one-third of global electricity being generated at coal-fired power plants, according to the International Energy Agency, making it the leading source of electricity globally. As the role of electricity in daily life continues to expand, so does the importance of coal, which is expected to remain a primary energy source and a key factor in promoting economic growth and alleviating energy poverty. (IEA, 2012, p. 3). Coal prices play a significant role in determining electricity market dynamics in various regions. Importantly, coal is also the primary source for steel and cement production. (Fernández Alvarez, 2022, pp. 395–396)

While there is a common belief that coal is uniquely impacted by the global climate change agenda, the trends vary worldwide. According to the IEA, coal is at risk due to potential backlash from climate policies and increasing concerns over emissions. (IEA, 2012, p. 3) In Europe and the US, coal use is declining due to factors such as decreasing electricity demand, stringent climate policies, lower gas prices, and direct coal phaseout policies. In contrast, coal demand is on the rise in Asia.

Coal trade is less international compared to other fossil fuels, with over 80% consumed domestically. However, seaborne coal trade is the second-largest bulk commodity globally by mass, following iron ore. (Fernández Alvarez, 2022, pp. 395–396)

Coal has played a significant role in the global energy system since the Industrial Revolution. While its prominence waned in the latter half of the 20th century with the ascendancy of oil, coal experienced a resurgence by the century's end. This resurgence was driven by market dynamics in the 1970s, precipitated by a series of crises, including OPEC member states imposing an oil embargo during the Yom Kippur war and supply disruptions following the Iranian Revolution. These events led to a sharp increase in oil prices, prompting a renewed interest in alternative energy sources such as natural gas, nuclear, and coal. This era was characterized by expectations of a substantial increase in coal use and the widespread adoption of synthetic fuels. (Barnes, 1990, p. 32) Global coal consumption demonstrated strong growth throughout the two decades preceding the 1990s (Figure 1).

The international trade in coal has been growing faster than production. While in 1973 only 8% of produced coal was eventually traded internationally, by the beginning of 1990s, this figure increased to 11%. (IEA, 1995, p. 38) Overall volume of coal exports increased by 120% during this period, from 183 to 403 million tonnes.

In the 1990s, coal demand saw a historically low increase due primarily to supply-side factors. (Figure 1). The collapse of the USSR precipitated a crisis for the post-Soviet coal industry, worsened by the breakdown of ties between former Soviet republics. Furthermore, European coal policies, especially in France, Germany, Poland, and Spain, sought to diminish heavily subsidized coal production. Meanwhile, China, then a regional hydrocarbon exporter, rationalized its hard-coal production by shuttering small, uncompetitive mines and reducing coal consumption in specific markets. (OIES, 2003, p. 71) Additionally, low coal prices provided little incentive for major producing and exporting countries to boost production.

While the 1990s witnessed sluggish coal market development, the turn of the century heralded a new era. The first decade of the 21st century saw dramatic changes in coal markets, with the largest increase in demand surpassing that of the previous decades combined. Much of this demand originated from China, which needed energy to power its rapidly expanding industrial economy and infrastructure development efforts. (Fernández Alvarez & Arnold, 2020)

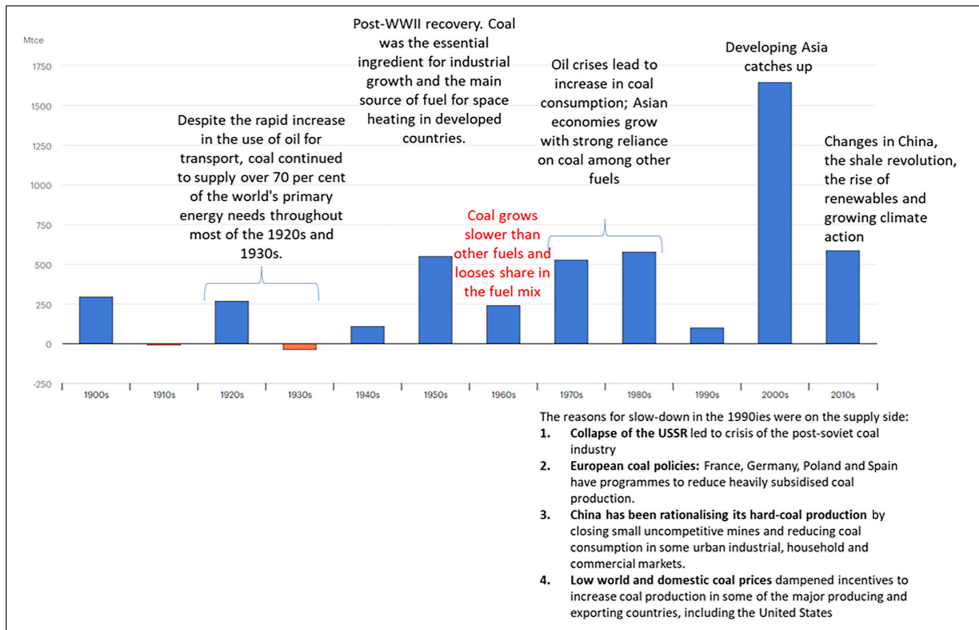


Figure 1. Change in global coal consumption by decade, 1900-2010s. Data from (Fernández Alvarez & Arnold, 2020)

After 2000, shifting demand patterns necessitated seeking coal sources beyond domestic means, leading to the internationalization of the market. In the early 1990s, the coal industry was predominantly local, lacking commodity exchange trading and well-developed futures markets, resulting in opaque transaction prices. (IEA, 1995, p. 37) This was not particularly exceptional in the context of other hydrocarbons markets, as it had only been several years since oil futures contracts began to be traded in 1986. It would still be many years before similar developments toward competitive markets would occur in natural gas trade.

Since 1990, international coal trade has undergone significant transformation. Initially, at 390 million tonnes, with thermal coal accounting for slightly over half, the market has grown to 1.4 billion tonnes, with thermal coal deliveries comprising over three-quarters. Thermal coal expanded over five times, while coking coal grew 1.8 times. (Fernández Alvarez, 2022, p. 396)

Seaborne transport is the most common method for international coal trade.

Coal prices exhibit less volatility compared to oil and gas, primarily due to higher fixed costs in mining and transportation. This limits price drops in oversupply scenarios, with prices stabilizing around 90% of production costs. (Fernández Alvarez, 2022, p. 400)

While a few countries dominate coal exports, imports are more evenly distributed globally. China stands out as the largest coal importer and user, transitioning from a major exporter to a net importer by 2009, securing the third position in global coal trade by 2010. (Figure 2). In 2011, China became the world's largest importer of coal and surpassed Japan. "This shift, together with the perspective that Chinese imports could continue such strong growth for some years, was paramount to explaining the dynamics of coal over the last decade, including the oversupply and lower prices of the 2012-2016 period". (Fernández Alvarez, 2022, p. 398)

Other significant coal importers include India, Japan, South Korea, and Europe. The figure below (Figure 2) highlights the importance of smaller Asian countries in overall coal

demand, grouped under ‘Other Asia.’ Large coal importers can be broadly divided into two groups: the ‘stable’ group, which includes Europe, Japan, and South Korea, and the ‘growing’ group, comprising China, India, and the rest of the Asia Pacific Region (APR). While the first group represents a stable energy system, the second group, in addition to the challenge of decarbonization, also has to address growing economic needs, making coal-related emissions management more complex for them.

Traditionally, international coal trade has primarily occurred in two main geographical markets: the Atlantic basin and the Pacific basin. (Fernández Alvarez, 2022, pp. 397–398) The market dynamics in the two basins were markedly different.

As of 2021, there is a clear disparity between the size of these two basins (Figure 3). 77% of internationally traded coal is delivered to countries within the Pacific basin, while only 18% is delivered to destinations in the Atlantic basin. Additionally, it is worth mentioning that the growing markets are predominantly located in the Pacific. This leads to the conclusion that an orientation toward the Pacific basin for coal trade would be a wiser solution for coal suppliers who have access to both destinations. The focus should be on the eastern direction, where there is room for market growth.

China’s role in the global coal market is unique. Not only is it the largest importer, but its domestic market is three times larger than the entire global coal trade. This significantly impacts trade dynamics and pricing worldwide. (Fernández Alvarez, 2022, pp. 395–396).

The IEA World Energy Outlook 2023 (IEA, 2023) discusses the future of coal demand, highlighting several key points. In 2022, global coal demand and prices reached record highs. However, growth in coal demand was limited or short-lived in many regions, indicating a split between developing economies, where coal is growing, and Europe and North America, where it is contracting. The future of coal demand is largely driven by trends in emerging economies, with China playing a crucial role. Although the peak of coal demand has not yet been reached, it is expected soon, with a fundamental global demand reduction anticipated within a year or two. India is projected to become the largest coal importer by the late 2020s, surpassing China.

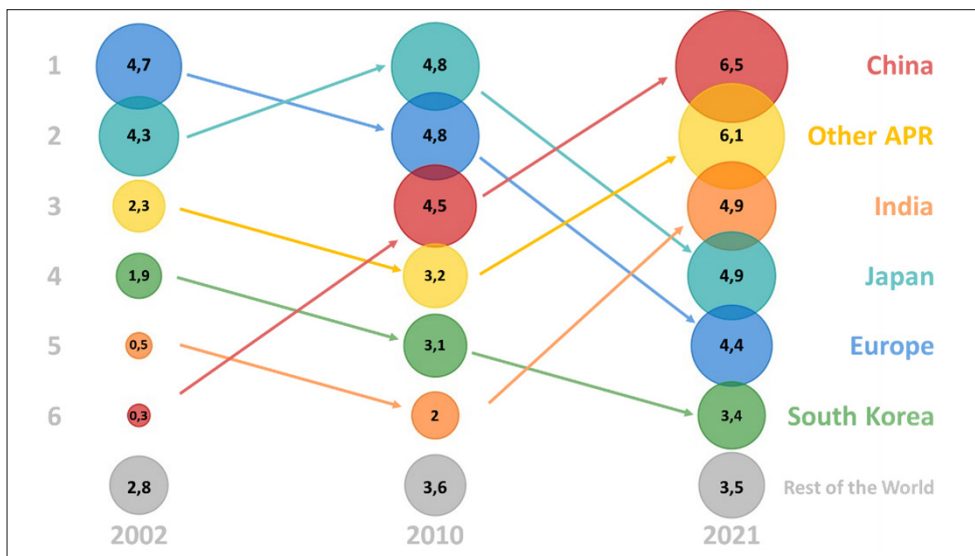


Figure 2. Largest coal importers in 2002, 2010 and 2021, Exajoules (BP, 2022)

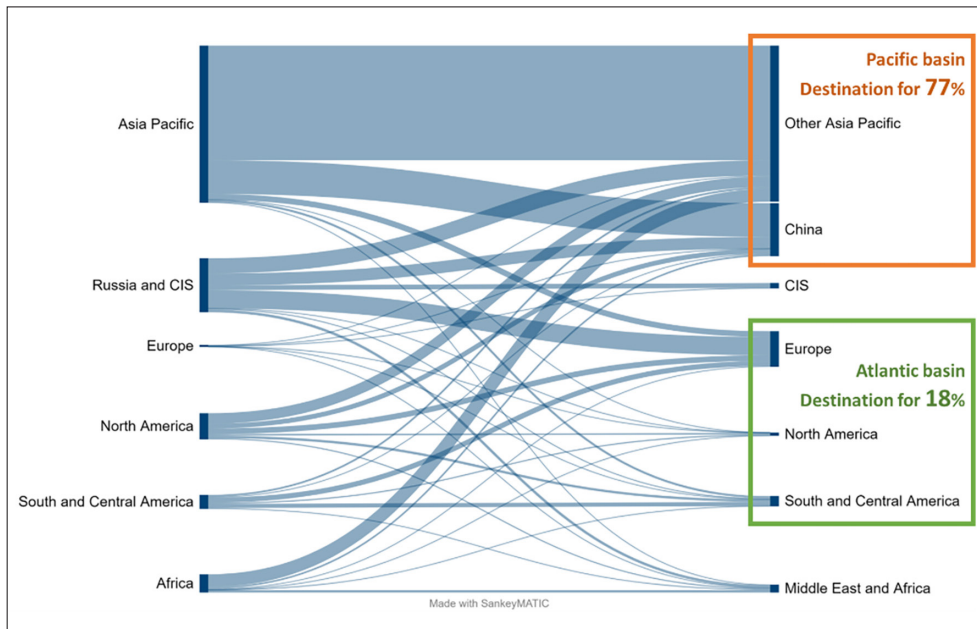


Figure 3. International coal trade flows in 2021, Exajoules (BP, 2022)

International coal trade volumes are declining, but the share of international trade in total coal consumption is expected to increase. Export growth is anticipated for countries producing coking coal, such as Australia, while countries relying on thermal coal exports, like Indonesia, may face a decline. In 2022, there was a surge in investments in the coal sector, particularly in coal generation, driven by high prices. However, overall investment in the coal industry is expected to decrease significantly, potentially approaching zero, in scenarios aiming for “Net-Zero Emissions by 2050” (NZE). Achieving the desired future vision of reduced coal consumption poses challenges, especially given current investment trends. Nonetheless, coal-producing states can expect profitability in the medium term.

Russia’s coal sector produced record output in 2022. (Energy Institute, 2023; Petrenko, 2023) Available data for the first half of 2023 show persistent growth with higher domestic demand and export recovery. (Meshkov et al., 2023; Petrenko, 2023).

The distribution of Russia’s coal exports has undergone significant changes since 2021 (Figure 4). While exports to China and India have seen substantial growth, decreased exports to Japan and South Korea have balanced Asia’s overall share, keeping it comparable to 2021 levels. Russia’s coal exports to Europe have nearly halted, with most of the former European export volume now going to “other” destinations. Notably, Turkish and United Arab Emirates markets have seen a considerable increase in Russian coal exports.

Russia’s Energy Strategy (Government of the Russian Federation, 2020) foresees a decrease in OECD coal demand, countered by rising demand in South and Southeast Asia. The strategy delineates two potential trajectories for Russia’s coal exports: a lower scenario with diminishing global coal trade and a higher scenario with stable trade. The lower scenario aligns with IEA projections assuming governments implement existing policies¹, while the higher scenario substantially exceeds international forecasts. To achieve the higher scenario’s projected increase to 392 million tons per year by 2035 from the current level of around 210 million tons in 2023

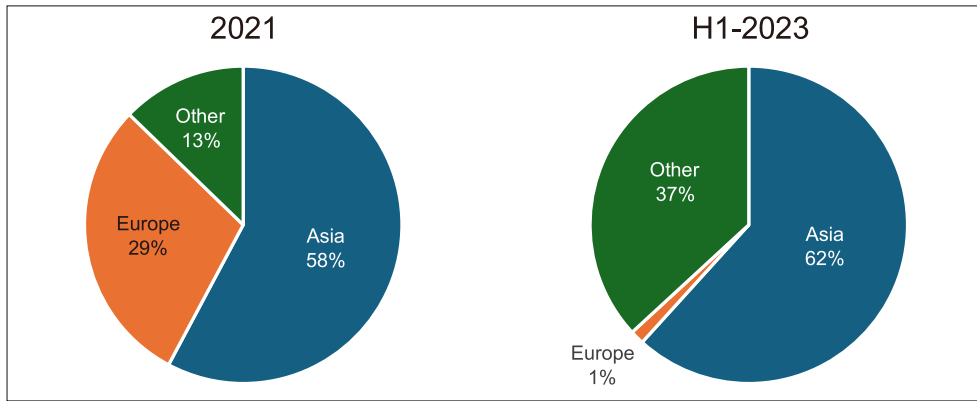


Figure 4. Structure of Russia's coal exports in 2021 and H1-2023 (BP, 2022; Meshkov et al., 2023)

(Novak, 2024) would be challenging due to the global market size and domestic transportation constraints. This makes the lower scenario more realistic under current conditions. The increase in exports in the lower scenario to 257 million tons is thus plausible and achievable if Russia successfully completes existing plans to overcome the transportation constraints. (Mironova, 2024)

2. Domestic economic factors

Energy security in Eastern Russian regions

The energy security of Eastern Russian regions depends significantly on the coal industry, particularly in Eastern Siberia and the Far East. While natural gas dominates Russia's overall primary energy consumption (54% in 2021 and 51% in 2022 according to the Energy Institute), this is not the case for regions lacking substantial pipeline connections. East of the Urals, a stable energy supply is ensured by a combination of large-scale hydro and coal.

Russia relies primarily on domestic production for its energy needs and exports, although it imports around 5% of its coal from Kazakhstan, primarily for power generation. (Meshkov et al., 2023) Hard coal accounts for over 80% of Russia's coal production, with the remainder being lower-quality brown coal and lignite. (Rosstat, 2021a) Overall, Russia used about two-fifths of its coal production domestically in 2020 and exported the remaining three-fifths. (Rosstat, 2022).

In Russia, the electricity sector is the largest consumer of coal, with coal-fired plants and combined heat and power facilities driving the demand. Around one-sixth of Russia's installed power generation capacity is coal-fired, while nearly half relies on natural gas. (System Operator of the Unified Energy System of Russia, 2022) In contrast to the European part of Russia, where natural gas and nuclear energy are prevalent, smaller and more remote cities and towns east of the Urals rely significantly on coal and hydroelectric power. The option to switch to natural gas for power generation is viable along natural gas export pipeline routes in Russia's Eastern Siberia and the Far East. (Milkin, 2023) The collapse of Russia's gas exports to Europe has left substantial natural gas volumes stranded within the country, potentially making fuel-switching more attractive in the future. (Mitrova, 2023)

The current situation remains largely coal-centric, with coal serving as the foundation for energy supply and security, especially in regions east of the Urals.

Coal industry organization around single-industry towns (mono towns)

The structuring of the coal industry around single-industry towns (monotowns) illustrates a dirigiste approach, highlighting government influence over resource allocation. This policy, observed in the post-soviet transformation of the coal sector (Kozhukhovskiy, 2003), especially in Vorkuta, includes indicative planning, state-directed investment, and the utilization of market instruments like taxes and subsidies to meet state economic goals. Vorkuta's incorporation into federal programs, including those for Arctic development and monotown revitalization, emphasizes its increased prominence on federal agendas.

Mono town status, as defined by Russian law, grants privileges to these towns, including federal support and a favorable investment climate. (Government of the Russian Federation, 2015) These towns, numbering around 900 countrywide, are economically dominated by a single industry or company, with most employment tied to the main enterprise. (Sapozhkov, 2021) Established as residential extensions of these enterprises, monotowns face challenges, particularly highlighted during the late-1990s recession, which resulted in widespread unemployment and subsequent protests. According to Russian law, monotowns with high unemployment rates are eligible for state support to address socio-economic challenges, a status Vorkuta achieved in 2009. (Solovieva, 2022)

The Russian government aids infrastructure development in monotowns through initiatives like the special endowment for monotown development, offering subsidized credits and a favorable tax regime for investors. (VEB.RF, 2023) Nevertheless, federal support for monotowns has declined in recent years, presenting challenges for their sustainable development. (Government of the Russian Federation, 2022) The government had planned to halve the list of monotowns in 2022 for those situated within 50 km of republic capitals. However, Vorkuta, which is over 1,000 km away from Syktyvkar, remains on the list. (Petrova, 2022)

Coal monotowns are also present in other coal-producing regions, such as the Kuzbass region, and they all encounter similar challenges linked to the risks of energy transition and decarbonization. The government might consider lowering the threshold for obtaining monotown status for coal towns in Kuzbass if workforce reductions exceed 10% of the total labor force, which is lower than the general rule of 20%. (Sapozhkov, 2021) While Vorkuta has a low unemployment rate, Kuzbass faces greater risks, making the government's support crucial.

Kuzbass continues to be a robust industrial region, with coal mining serving as its primary economic driver. However, the region's economy is significantly affected by volatile coal prices, leading to fluctuations in coal's contribution to the gross regional product. Coal and metals represent a significant portion of Kuzbass' exports, underscoring the region's reliance on these industries. (Korppoo et al., 2023; Kuzbass Ministry of Coal Industry, 2023)

The coal industry remains central to Kuzbass, sustaining the livelihoods of many residents despite the challenges it faces. When considering the industry's future, the social implications must be carefully weighed. Looking back, in the late 1980s, the Soviet Union's coal sector was concentrated in mining towns, fostering strong bonds among miners. These communities often saw work issues blending with local concerns, leading to protests that included blocking rail traffic and halting underground work. These actions even escalated to 'marches' on Moscow. The miners' demands varied from altering ownership structures and increasing prices to selling coal internationally and restructuring the government. Their interests aligned with the "new industrial bourgeoisie," supporting Boris Yeltsin in his power struggle with Mikhail Gorbachev and ultimately contributing to the independence of Russia and other former Soviet republics from the USSR. (Gavrilov & Lavrov, 1989; Levchik, 2020, pp. 29, 46–47, 197; Lomagin et al., 2023, pp. 50–52, 63)

Earnings of the federal and regional budgets from the coal sector

The coal sector holds strategic importance in Russia's energy landscape, contributing over 10% to its energy mix and generating substantial export revenue, estimated at \$15-17 billion USD annually. Although coal's fiscal contribution is lower compared to oil and natural gas, it plays a pivotal economic role. The sector's competitive position enables it to potentially lobby for support, including licenses, tax breaks, and transportation subsidies.

Russia's federal budget heavily relies on revenue from the fuel and energy complex, primarily through the mineral extraction tax (MET) and export duties. In response to Western sanctions, Russia raised taxes on fuel and other exports to bolster federal revenue. The MET rate for coal was previously fixed at 57 rubles per ton (Zainullin, 2023), but since early 2022, it has been linked to 1.5% of the average Australian coal price. (Milkin, 2022) Preliminary calculations based on current market conditions suggest that the new tax scheme could have increased MET revenue in 2022 by more than six-fold, from 25 billion rubles to 160 billion rubles.²

Overall tax revenues from the coal industry in Russia doubled between 2021 and 2022, reaching 360 billion rubles. (Zainullin, 2023) While this accounts for less than 1.5% of the federal budget, it is a significant contributor to local budgets in coal-producing regions like Kemerovo.

The Russian government's absence of direct ownership in the coal sector contrasts with its stakes in major oil and gas enterprises. This divergence can be attributed in part to coal's historically lower profitability. (Fridman et al., 2019) The government's tax hikes in 2022 and early 2023 were intended to capture windfall profits from the surge in coal prices. However, market challenges such as discounts on Russian coal, higher railway tariffs, and a stronger ruble have constrained export profits.

Conclusions

The coal industry, while contentious due to environmental and climate concerns, continues to be a crucial and cost-effective energy source for many worldwide. International trade dynamics are shifting, with countries producing coking coal, like Australia, poised for growth, while those reliant on thermal coal, such as Indonesia, may see a decline. Despite challenges, coal-producing states can anticipate profitability in the medium term.

When it comes to Russia's coal sector, there are three dimensions of domestic economic effectiveness: energy security, social factors, and budget revenues.

The coal sector is a key component of Russia's energy system, providing notable share of its energy mix and generating significant export revenue. While coal contributes less to the federal budget than oil or natural gas, it plays a crucial economic role. In 2022 and early 2023, the government's tax hikes aimed to capture excess profits from rising coal prices. However, market complexities, including discounts on Russian coal, increased railway tariffs, and a stronger ruble, have restrained export profits. The current landscape remains predominantly coal-centric, underpinning energy supply and security, particularly in regions east of the Urals.

The energy transition and decarbonization challenges for Russia's coal industry have significant socio-economic dimensions. History shows that social factors must not be overlooked, and the government appears to consider these risks in its approach to energy transition.

Russia's coal sector is pivotal for regional economic growth, development, and energy security. Despite its controversial nature, coal remains a vital and affordable energy source globally. The industry's potential is immense, allowing for long-term planning and development, especially in expanding coal exports to the Asia-Pacific region. The reorganisation of the sector

led to competitive standing in international markets. The Sakhalin coal industry stands out as a prime example of how corporatization can lead to the emergence of genuine ownership. By 2000, all coal mining enterprises in Sakhalin had transitioned to private ownership. Not only did production increase, but the industry also became profitable. With notable competitive advantages like high-quality coal, proximity to the sea, and shallow coal deposits, Sakhalin's coal industry gradually emerged to become an appealing investment opportunity for private investors. In the future, the Sakhalin coal mining center may not only become an example of the industry's success, but also a window of opportunity for other Russian coal mining companies that are losing their attractiveness due to their significant remoteness from promising markets in the Asia-Pacific region.

However, realizing this potential requires substantial investment in railway and port infrastructure, particularly in eastern Russia, posing a key challenge for the coal sector's economic model and future development.

The Dirigiste approach could once again drive the development of the coal sector in Russia. Without state investment in infrastructure, the substantial costs are likely to deter private enterprises, even in dynamic coal production regions like Sakhalin. Another crucial area is state support for monotowns, driven by the risks associated with energy transition. These challenges, with their significant socio-economic implications for the coal industry, underscore the importance of not overlooking social factors, as evidenced by historical miner strikes. The government takes these risks into consideration in its approach to managing the energy transition.

Our research bridges a significant gap between climate change mitigation, energy transition, and a country's existing coal industry. The transformation of the coal sector in Russia stands out as a crucial case study in social, economic, and political terms, highlighting the challenges of transitioning to a market economy. Since 2014, this transformation, occurring without external support, offers valuable insights into its practical implementation and provides important lessons for countries facing a similar transition without the aid of a "Just Transition" framework..

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Notes

1. STEPS, or Stated Policies Scenario.
2. Authors' calculations based on data from (Petrenko, 2023) and the Central Bank of Russia.

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