

How Russia's New Vision of Territorial Development in the Arctic Can Boost China-Russia Economic Collaboration

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In recent years, a growing number of investment projects in the Arctic zone of Russia have been contributed to by China's capital and technologies, but the industrial development of the Russian Arctic remains extremely fragmented. The focal location of productive forces and population hampers integration of the northern territories into global supply chains, limits international investment cooperation to few mineral resources basins, and thus poses a threat to the resilient development of the entire region. Russia's government has been paying increasing attention to mitigating social and economic imbalances in the Arctic. The new Strategy for the Development of the Arctic Zone of the Russian Federation and Provision of National Security through 2035 (approved in November 2020) for the first time focuses on the development priorities of individual regions and includes per-territory summaries of investment, infrastructure, and social projects. The Arctic Zone of Russia is expanding by the inclusion of new administrative entities. In 2020, Russia announced preferences for investors which have turned the Russian Arctic into the world's largest free economic zone of almost five million square kilometers. Such changes cannot but affect business links with foreign counterparts. In this study, the authors explore new possibilities of Russia-China economic and investment cooperation in the High North. The analysis includes Russia's national Arctic strategy and regional strategies of the nine administrative territories that constitute the Arctic Zone of Russia. The study concludes with the per-territory identification of the most promising investment and infrastructure projects for China to take part in.

Introduction

The Arctic zone is of crucial importance for Russia's economy. Over 80% of Russia's natural gas and 17% of its oil come from oil and gas fields in the High North (Southcott et al., 2018). The importance of the Northern Sea Route (NSR) as an international transport corridor is growing amid progressing climate change and new opportunities for the exploration and transportation of minerals and hydrocarbons. In the past decades, territorial development of the Russian (or rather Soviet) Arctic, motivated by resource factors, was aimed at the establishment of transport and industrial infrastructure and settling territories in places of resource localization. This approach has resulted in the focal distribution of productive forces throughout the vast and poorly connected territories of the Russian Arctic.

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Studies on the economic geography and territorial development of the Arctic (Nuttal & Callaghan, 2019; Howkins, 2015; Lipina et al., 2019; Galtseva et al., 2015; Gao et al., 2021; Wood-Donnelly, 2018; Heininen et al., 2020) distinguish three main models of the spatial economy which differ in the degree of administrative regulation of industrial, social, and economic development. While the North American and European models are both characterized by decentralization and sharing of governance functions between central and provincial governments, the Russian model assumes high centralization of resources management along with the formulation of territorial development priorities and principles by the federal government. The specifics of administration of territorial development processes in Russia manifests itself in various spheres. Many scholars, including Kudryashova et al. (2019), Plisetskii and Plisetskii (2019), Gubina and Provorova (2018), and Zaykov et al. (2017), among others, emphasize drawbacks peculiar to contemporary territorial development of the Russian Arctic, such as:

- spatial fragmentation and segmentation, the concentration of the population and economic activity around resource deposits;
- non-stationarity of productive forces due to the seasonal nature of a rotation system;
- uneven settlement, the polarization of the Arctic space due to the concentration of productive forces in cities and industrial centers, densification of settlement systems, labor outflow;
- high concentration of resources of better comparative characteristics and qualities (natural, human, financial, material, technical, etc.);
- pioneer nature of territorial development, due to the geographical remoteness of Arctic territories and vast undeveloped areas (particularly, in northern Yakutia and Chukotka).

These factors aggravate the instability of social and economic systems in the Russian Arctic, as well as the fragility of the spatial organization of the economy, which significantly increases the risks of economic and investment activities. In recent years, along with the factor of resource development, territorial development in the Arctic has been increasingly shaped by geopolitical interests of Russia and other Arctic states, as well as by the growing interests of China and other non-Arctic countries in various aspects of studying, exploration, and development of the Arctic. Approaches to territorial development in the High North are determined by the international status of land and water areas including the continental shelf, the importance of oil and gas resources in the global perspective including for non-Arctic stakeholders, and the formats of regional governance and their impact on economic, environmental, and military stability and security (Tamnes & Offerdal, 2014; Goldin, 2016). The models of resource-based territorial development of the Arctic are becoming less responsive to contemporary geopolitical and economic challenges. This requires their adaptation to the development of the Arctic space with the involvement of non-Arctic countries.

Among non-Arctic countries, one of the principal actors in the region now is China. Since 2014, when the first international sanctions were imposed against Russia, many Western companies have quit joint projects with Rosneft, Gazprom, and other Russian tycoons in the Arctic, restricting the access for the latter to a variety of technologies and innovations, not to mention investments (Gao & Erokhin, 2019). In an attempt to recoup the losses, Russia has reoriented its foreign policy to the East, primarily, China. This 'Pivot to Asia' has resulted in the Joint Statement of the Russian Federation and the People's Republic of China on Developing Comprehensive Partnership and

Strategic Interaction (President of the Russian Federation, 2019) and the number of Russia-China agreements. Although they have not been exclusively focused on the Arctic, the intentions of both countries to collaborate in the improvement of the NSR infrastructure, economic evaluation and exploration of mineral, biological, and other resources of Russia's northern territories have been articulated (Gao & Erokhin, 2020).

Despite the increased intensity of cooperation and the entry of Chinese investors into a number of resource and infrastructure projects in the Russian Arctic, the prospects for China's involvement in the territorial development of the Arctic Zone of Russia have received little attention in the literature. Most studies concentrate on geopolitical aspects of China's growing role in the Arctic, downplaying the impacts of China's activities in the region on territorial development. A comparative study of major international publications in recent years (Sun, 2013; Sinha & Bekkevold, 2015; Peng & Wegge, 2015; Su & Lanteigne, 2015; Sakhuja & Narula, 2016; Ivanov, 2016; Tonami, 2016; Keil & Knecht, 2017; Finger & Heininen, 2019; Nuttall & Callaghan, 2019; Erokhin et al., 2019; Conde & Sanchez, 2019; Hong, 2020; Coates & Holroyd, 2020; Koivurova & Kopra, 2020; Heininen et al., 2020) indicates two main gaps in research. Either China's participation is not considered when analyzing territorial development issues in the Arctic, or it is limited to reviewing the participation of Chinese companies in focal industrial projects in Russia and northern Europe and navigation along the NSR. Although most researchers agree that cooperation with China and other non-Arctic countries is inseparable from the social and economic development of circumpolar territories (Blunden, 2012; Heininen, 2014; Moe & Oystein, 2010; Melia et al., 2017), they mainly focus on institutional policy and governance in the Arctic, rather than on the regional aspects of development and allocation of productive forces. Participation of Chinese companies in the development of resources in the Arctic and their export to China (Bertelsen & Gallucci, 2016; Fairhall, 2011; Flake, 2013) explore marine navigation, rail, or pipeline transportation issues. Thus, China's involvement in the development of resources and transport routes does not add up to one picture with territorial development goals of Russia and individual Russian regions along the potential Polar Silk Road corridors.

Among Chinese sources, the adaptation of China-Russia cooperation mechanisms to the spatial, industrial, and economic development of the Russian Arctic has remained underinvestigated, in contrast to abundant research in the fields of political science, resource development and transport routes, and climatology (Lu, 2010; Xu, 2016; Zhao et al., 2016; Xu, 2017; Meng et al., 2017; Wang et al., 2017; Lim, 2018; Hong, 2018; Deng, 2018; Zhu et al., 2018; Li et al., 2018; Yang & Zhao, 2019). Practical studies of the mechanisms of China's participation in the territorial and industrial development of the Arctic Zone of Russia are very scarce. It is important to investigate the opportunities for China to contribute to the development of circumpolar territories in Russia in a complex way: not only within the Arctic Council format, where either China's or Russia's interests can be blocked by Arctic states but within the bilateral framework of individual interactions between China and Russia. This study attempts to contribute to the literature on China's role in the territorial development of the Arctic by exploring the possibilities of Russia-China economic and investment cooperation in the High North across nine administrative territories that constitute the Arctic Zone of Russia.

Arctic Zone of Russia

The Arctic Zone of the Russian Federation includes land territories, adjacent internal waters, territorial sea, exclusive economic zone, and continental shelf (President of the Russian Federation, 2020a). The list of Arctic land territories established in 2014 (President of the Russian Federation, 2014) has been revised and expanded three times since then. According to the latest revision of the Decree “On the Land Territories of the Arctic Zone of the Russian Federation”, four administrative entities of Russia are fully located in the Arctic (Nenets, Yamal-Nenets, and Chukotka autonomous districts and Murmansk Oblast). In the other five administrative entities (Republic of Karelia, Arkhangelsk Oblast, Komi Republic, Krasnoyarsk Krai, and Republic of Sakha), individual territories are recognized as belonging to the Arctic Zone (Figure 1).



Figure 1. Land territories of Russia's Arctic Zone

Source: Authors' development

The total land area of the Russian Arctic is about 5 million km². This territory is home to more than 2.5 million people, which is about 40% of the entire population of the Arctic. Most of the settlements are located along the coast of the Arctic Ocean or in the immediate vicinity of it, as well as in the lower reaches of rivers. The three world's largest cities above the Arctic Circle are all located in Russia: Murmansk (325,000 people), Norilsk (205,000 people), and Vorkuta (85,000 people).

Russia's vision of territorial development of the Arctic Zone

The vision of territorial development of the Arctic is shaped by not only the size of the Arctic Zone but its role in Russia's economy. The Arctic Zone contributes about 20% of the budget revenues, provides for the production of more than 80% of natural combustible gas and 17% of oil (including gas condensate) in Russia. The continental shelf contains more than 85.1 trillion m³ of natural combustible gas, 17.3 billion tons of oil (including gas condensate), and other mineral resources. It is a small surprise that the territorial development of the Arctic Zone strongly pursues

economic goals. The 2020 Strategy for the Development of the Arctic Zone (President of the Russian Federation, 2020b) envisages the introduction of a special economic regime in the Arctic Zone that promotes the transition to a circular economy and the development of new oil and gas provinces, deposits of solid commercial minerals and hard-to-extract hydrocarbon reserves, increasing deep oil refining, production of liquefied natural gas and gas chemical products.

The regions of the Russian Arctic are the area of transport and economic influence of the NSR, which advances inland for hundreds of kilometers, depending on the configuration of the river network and other communication routes associated with the existing and potential cargo base of the NSR. Therefore, economic goals of territorial development in the Russian Arctic are inextricably linked to the construction and modernization of various types of infrastructure: inland water and marine transportation, railroads and airports, pipelines and information communication, etc. Among the priorities of infrastructure construction in the Arctic, Russia declares the comprehensive development of a network of seaports and sea shipping routes along the NSR and in the Barents, White, and Pechora seas. The 2020 Strategy (President of the Russian Federation, 2020b) schedules the construction of hub ports and the creation of a container operator to provide international and coastal transportation in the NSR, as well as the improvement of shipping conditions (dredging and setting of inland river ports) along the White Sea-Baltic Canal and in the basins of Onega, Northern Dvina, Mezen, Pechora, Ob, Yenisei, Lena, and Kolyma rivers.

This territory-economy-infrastructure triangle has been particularly emphasized as the strategic vision of territorial development in Russia in recent years. It has been unified across the documents that now establish the governance system in the Arctic Zone: Foundations of the State Policy of the Russian Federation in the Arctic till 2035 (President of the Russian Federation, 2020a), Strategy for the Development of the Arctic Zone of the Russian Federation and Ensurance of National Security till 2035 (President of the Russian Federation, 2020b), and State Program for Social and Economic Development of the Arctic Zone of the Russian Federation (Government of the Russian Federation, 2021). Most of the administrative entities that compose the Arctic Zone of Russia have updated their regional Arctic strategies according to the federal-level framework.

Murmansk Oblast

The territory of Murmansk Oblast (144.9 thousand km², or 0.86% of the area of Russia) is fully assigned to the land territories of Russia's Arctic Zone (President of the Russian Federation, 2014). With 92.2% of its 731.4 thousand people living in the cities, Murmansk Oblast is the most urbanized region in the Russian Arctic (Federal State Statistics Service Directorate for Murmansk Oblast, 2021). The territory is rich in various kinds of ore minerals and aquatic biological resources. Over 60 large deposits of crude minerals have been discovered in the Kola Peninsula, including copper, nickel, iron, apatite-nepheline ores, and rare earth metals. There are significant deposits of mica, raw materials for construction and ceramic products, facing stones, and semi-precious and ornamental stones. Murmansk Oblast produces 100% of Russia's apatite, nepheline and baddeleyite concentrates and 45%, 11%, and 7% of nickel, iron ore concentrate, and refined copper, respectively. Significant oil and gas deposits are discovered on the continental shelf of the Barents Sea, including the largest Shtokman gas condensate field.

Among the territories of Russia's Arctic Zone, Murmansk Oblast enjoys the most developed transport infrastructure. Murmansk sea port is the only ice-free deep-water harbour in the European part of the Russian High North. It is a home port for Russia's nuclear-powered

icebreaker fleet, which serves the entire NSR. A total of three sea ports are located on the coast of the White and Barents seas. Further development of the transport infrastructure and deeper integration of Murmansk Oblast in the global supply chains and transcontinental cargo corridors between Europe and Asia are among the priorities of territorial development (Table 1). According to the Regional Program of Social and Economic Development “Murmansk Oblast – Strategic Center of the Arctic Zone of the Russian Federation” (Governor of Murmansk Oblast, 2014) and the Strategy of Social and Economic Development of Murmansk Oblast (Government of Murmansk Oblast, 2013), it is planned to establish a year-round deep-sea international center for processing of oil cargo, transshipment of coal and mineral fertilizers. The project provides for the development of infrastructure for marine, rail, and road transport, as well as logistics and warehouse infrastructure. The development of railway network includes the construction of the Vykhodnoy – Lavna line, Lavna and Promezhutochnaya railway stations, a railway bridge across the Kola Bay, as well as the development of existing facilities (Vykhodnoy and Murmashi-2 railway stations) with a total traffic capacity of 28 million tons and dredging of the water approaches to railway terminals. Investments will be directed to the construction of coal and oil transshipment terminals on the western bank of the Kola Bay.

Table 1. Priorities of territorial, economic, and infrastructure development in Murmansk Oblast

| Spheres | Measures |
|-------------------------|--|
| Territorial development | 1. Comprehensive development of restricted-access administrative entities and locations of military units, including the development of infrastructure and modernization of dual-use facilities |
| | 2. Development of tourist and recreational clusters, including in Kirovsk city, Teriberka settlement, and Kovdorsky, Pechengsky, and Tersky municipal districts |
| Economy | 3. Establishment and development of enterprises engaged in repair, supply, and bunkering of vessels and improvement of coastal bases for navigation along the NSR |
| | 4. Establishment and development of a center for the construction of large-capacity offshore structures intended for the production, storage, and shipment of liquefied natural gas. |
| | 5. Establishment and development of enterprises engaged in repair and maintenance of marine equipment and equipment for the development of offshore hydrocarbon deposits |
| | 6. Geological exploration of the mineral resource base of the Kola Peninsula, the establishment of new and development of existing mineral resource centers specializing in the extraction and processing of minerals |
| | 7. Development of the fishery complex, technical re-equipment of enterprises, including the construction of vessels, introduction of new capacities for deep processing of aquatic biological resources, and development of aquaculture. |
| Infrastructure | 8. Integrated development of the ice-free seaport of Murmansk, development of the multimodal transport hub, construction of new terminals and transshipment complexes |
| | 9. Development of power supply infrastructure, including replacement of fuel oil facilities with those consuming other types of energy for power and heat generation |
| | 10. Modernization of airport complexes, including the Murmansk International Airport |
| | 11. Development of congress, exhibition and business infrastructure |

Source: Authors' development based on President of the Russian Federation (2020b), Governor of Murmansk Oblast (2014), and Government of Murmansk Oblast (2013)

The problems of territorial development in Murmansk Oblast are rather common for most of the Arctic regions of Russia. Among them, we identify (1) significant inter-district inequality in the degree of economic activity, development of social infrastructure, and the standard of living of the population; (2) low density and continuing outflow of the population; (3) the local mono-industry nature of the economy and low-diversified production; (4) unfavorable natural and climatic

conditions that determine the increased costs of construction and maintenance of residential, industrial, and infrastructure facilities; (5) high depreciation of fixed assets, especially transport, industrial, energy, and municipal infrastructure; (6) deterioration of mining conditions, exploration of deeper layers and underground mining; (7) high accumulated environmental damage.

Nenets Autonomous District

Similar to Murmansk Oblast, the territory of the Nenets Autonomous District (176,800 km²) entirely belongs to the Arctic Zone of Russia. With a population of 44,400 people as of January 1, 2021, the district is the least populous region in the country (Federal State Statistics Service Directorate for Arkhangelsk Oblast and Nenets Autonomous District, 2021). The spatial structure of the settlement is characterized by a high concentration of the population in a small area. The entire urban population is concentrated in Naryan-Mar capital city and the adjacent Iskateley settlement and makes up 73% of the population of the Nenets Autonomous District. Such a high dispersion of settlement, small remote localities, extremely low level of transport accessibility, and predominance of air transportation contribute to exceptionally high costs for the territorial and economic development of the region.

The district possesses significant reserves of hydrocarbons: about 1 billion tons of oil and over 500 billion m³ of gas. Oil and gas-bearing areas are relatively well explored, and the degree of depletion is low (25% oil and only 1% for gas). Existing pipeline infrastructure allows increasing oil exports by 60-80% compared to the current production volumes (about 15 million tons per year). Oil production establishes about 75% of the gross regional product and generates 25% of the total number of jobs.

The northern shores of Nenets Autonomous District are washed by the Barents, White, and Kara seas. The length of the coastline exceeds 1,500 km, which is 10% of the NSR. Transport infrastructure, however, is extremely poorly developed. The district is the only administrative entity in the European part of Russia that has no permanent land transport connection with other territories. The absence of railways does not allow creating stable logistics. Due to the significant potential for the exploitation of well-explored natural resources and underdeveloped transport infrastructure, the priorities identified in the Strategy of Social and Economic Development of Nenets Autonomous District till 2030 (Assembly of Deputies of Nenets Autonomous District, 2019) include the development of oil and mineral resource centers and construction of railways and sea ports (Table 2).

Table 2. Priorities of territorial, economic, and infrastructure development in Nenets Autonomous District

| Spheres | Measures |
|-------------------------|--|
| Territorial development | 1. Development of Varandeyevsky, Kolguyevsky, Kharyago-Usinsky, and Khasyreysky oil and mineral resource centers |
| | 2. Creation of gas-condensate mineral resource centers, including the development of Korovinsky and Kumzhinsky gas-condensate fields, Vaneyvisky and Layavozhsky oil and gas-condensate fields |
| | 3. Development of the tourism cluster and infrastructure of cultural, religious, and ethnic tourism |
| Economy | 4. Geological exploration and development of solid commercial minerals |
| | 5. Construction of an agro-industrial park and implementation of export-oriented projects in the sphere of deep processing of venison |
| Infrastructure | 6. Development of the project for the construction of Indiga deep-water seaport and the Sosnogorsk – Indiga railway |

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| | 7. Development of transport infrastructure, including reconstruction of Naryan-Mar seaport, Naryan-Mar airport, and Amderma airport, dredging on the Pechora River, and construction of the Naryan-Mar – Usinsk highway |
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Source: Authors' development based on President of the Russian Federation (2020b) and Assembly of Deputies of Nenets Autonomous District (2019)

Along with the overall backwardness and even absence of transport infrastructure, it is worth mentioning the transport divergence of the district, when some territories (particularly, in the western part of the district) are better connected with neighboring entities than with Naryan-Mar capital city. As a result, such territories naturally gravitate to other regions (Arkhangelsk Oblast, Komi Republic, Yamal-Nenets Autonomous District), not to the administrative center of Nenets Autonomous District. The influence of these transportation and spatial factors blunts the effectiveness of territorial development measures. An important limitation of growth is the lack of pipeline capacity for the development of gas fields. The capacity of oil pipelines allows for a significant increase in oil production, but transport infrastructure for gas exports is missing. A number of megaprojects, in which Chinese investors were supposed to participate, are postponed or frozen, including Pechora LNG (postponed indefinitely), the Syktyvkar – Ukhta – Pechora – Usinsk – Naryan-Mar highway (postponed to 2022), Barentskomur railway, and Indiga sea port (both projects have not yet been approved).

Chukotka Autonomous District

Significant problems with the development of transport infrastructure also persist in Chukotka. The main cargo transport route that provides the region with goods, food, raw materials, machinery, equipment, and materials is the NSR (the Northern Supply program during the navigation window). Similar to Nenets Autonomous District, Chukotka lacks railway and motorway networks. The energy network is also poorly developed. Three power hubs (Anadyrsky, Egvekinotsky, and Chaun-Bilibinsky) operate separately from each other. There is also a decentralized power supply zone which includes 35 rural settlements and industrial enterprises that use their own generating facilities. High cost of energy and excessive transport costs are the main obstacles to sustainable territorial development outlined in the Strategy of Social and Economic Development of Chukotka Autonomous District till 2030 (Government of Chukotka Autonomous District, 2014) and Russia's Strategy for the Development of the Arctic Zone (President of the Russian Federation, 2020b) (Table 3).

Table 3. Priorities of territorial, economic, and infrastructure development in Chukotka Autonomous District

| Spheres | Measures |
|-------------------------|--|
| Territorial development | 1. Development of Baimsky and Pyrkakay-Maysky mineral resource centers of precious and non-ferrous metals |
| | 2. Development of Bering coal mineral resource center |
| | 3. Establishment of ethnic and environmental tourism clusters in Anadyr, Pevek, and Provideniya |
| Economy | 4. Development of Arctic cruise tourism |
| Infrastructure | 5. Development of sea port and terminals in Pevek |
| | 6. Establishment of a transport and logistics hub in Provideniya deep-water year-round port |
| | 7. Construction of a year-round coal terminal in Arinai deep-water lagoon |
| | 8. Modernization of Chaun-Bilibinsky power generation system |
| | 9. Development of transport infrastructure, including the construction of the Kolyma – Omsukchan – Omolon – Anadyr interregional highway |

| | |
|--|---|
| | 10. Joining the unified telecommunications network by the construction of the Petropavlovsk-Kamchatsky – Anadyr underwater fiber-optic communication line |
| | 11. Establishment of an emergency rescue unit and an Arctic crisis management center in Pevek |

Source: Authors' development based on President of the Russian Federation (2020b) and Government of Chukotka Autonomous District (2014)

The priorities of territorial development of Chukotka Autonomous District for the next decade are determined by the exploitation of mineral deposits concentrated in two industrial zones of advanced development.

Anadyrskaya industrial zone is focused on the development of coal deposits in the Bering coal basin and oil and gas in the Anadyrsky and Khatyrsky oil and gas basins. The Zapadno-Ozernoye gas field has been put into operation to meet the internal needs of the district. An investment project is being prepared for the development of the Amaamsky and Verkhne-Alkatwaamsky areas of the Bering coal basin to start exporting high-quality coal to China and other countries of Asia.

The Chaun-Bilibinskaya industrial zone possesses substantial deposits of gold, silver, tin, and copper. To date, Mayskoye, Kupol, Karalveem, and Dvoynoe gold deposits have been put into operation. Kekura and Klen gold deposits are being prepared for commissioning in the near future. Long-term strategic prospects include the development of tin deposits (Pyrkakai stockworks) and the development of Baimskaya ore zone, primarily Peschanka gold-bearing copper-porphyry deposit, the largest in Russia's Northeast.

Thus, non-ferrous metallurgy and the coal industry are seen as the main drivers of territorial and economic development in Chukotka. The most promising projects are the development of Baimskaya ore zone and the Bering coal basin. Their exploitation can substantially diversify extractive industries in the district. The production of high-quality coal in the Bering basin is promising due to the estimated volume of reserves (over one billion tons). The deposits are located close to the coastal zone, which could significantly cut transport costs when exporting coal to China and other countries. The estimated annual capacity of Amaamsky field, the largest in the basin, is 7 million tons of coking coal, while that of Alkatwaamsky field is 5 million tons of commercial coal. The development of Baimskaya ore zone (gold, silver, copper, and molybdenum) may become one of the largest mining projects in Russia. Geological exploration at Peschanka field estimated 27 million tons of copper and 1,600 tons of gold. The project provides that annual production of copper and gold will reach 200,000 tons and 9 tons, respectively, by 2027.

Yamal-Nenets Autonomous District

Yamal-Nenets Autonomous District is one of the largest administrative entities in Russia (769,300 km², or 4.5% of the total territory of the country). The main part of the district is the sparsely populated territories of inhabitation and economic activity of Indigenous people. Similar to other Arctic regions, the population is densely distributed (0.7 people per km²), highly urbanized, and focally settled near major resource bases and along rivers and transport routes. About 85% of the population lives in urban areas, of which 41% in the two largest cities (Novy Urengoy and Noyabrsk). Year-round transport accessibility of all localities across the district is possible only by air. The land transport system (railways and highways) is fragmented and serves local needs. Six districts out of seven are not permanently connected with the capital city of Salekhard, while three districts (Krasnoselkupsky, Yamalsky, and Shuryshkarsky) have no year-round automobile roads. The two main transport areas (Western and Eastern) that were established during the exploration

of oil fields in the 1970-1990s are not connected to each other. The Western area is built around the transport link between Salekhard and Labytnangsky industrial and transport hub and the Obskaya – Bovanenkovovo – Karskaya railway, the northernmost operating railways in the world. The Eastern area includes the Novy Urengoy – Tyumen railway section and the Nadym, Pur, and Taz rivers. Here, the road infrastructure is more developed with access to highways. The problem of poor transport connectivity is exacerbated by the condition of existing transport infrastructure. Most airports, railway lines, and highways require reconstruction and capacity addition. Measures for the development of the transport infrastructure have been particularly emphasized since the adoption of the Strategy of Social and Economic Development of Yamal-Nenets Autonomous District in 2011 (Legislative Assembly of Yamal-Nenets Autonomous District, 2011). Along with the expansion of resource extraction projects, infrastructure-related issues stand out among the priorities of strategic territorial development of the district till 2030 (Governor of Yamal-Nenets Autonomous District, 2018) (Table 4).

Table 4. Priorities of territorial, economic, and infrastructure development in Yamal-Nenets Autonomous District

| Spheres | Measures |
|-------------------------|---|
| Territorial development | 1. Development of Novoportovskoye oil and gas condensate mineral resource center and Bovanenkovskoye gas-condensate mineral resource center, development of Tambey group of fields, and preparation for the development of offshore fields |
| | 2. Establishment of industrial zones of oil and gas service in largest settlements |
| | 3. Establishment of a tourism cluster in the Salekhard – Labytnangi – Harp agglomeration |
| Economy | 4. Expansion of liquefied natural gas production in the Yamal and Gydan peninsulas |
| | 5. Exploration of gas fields in the Ob Bay and development of the pipeline gas transportation system |
| | 6. Development of oil and gas chemical industries in Sabetta, Yamburg, and Novy Urengoy and establishment of the multi-faceted industrial and technological center for gas processing and petrochemistry |
| | 7. Production of construction materials to meet the needs of the fuel and energy sector and residential construction |
| Infrastructure | 8. Development of sea port and shipment terminals in Sabetta and the navigable shipway in the Gulf of Ob |
| | 9. Construction and development of the Obskaya – Salekhard – Nadym – Pangody – Novy Urengoy – Korotchayevovo and the Obskaya – Bovanenkovovo – Sabetta railway lines |
| | 10. Maintenance and development of gas and oil pipeline networks, development of gas and oil mineral resource centers connected to pipelines in Nadym-Pur and Pur-Taz oil and gas regions, including the use of new technologies for the extraction and development of underlying layers and hard-to-extract oil reserves |
| | 11. Expansion of the centralized power supply zone by connecting settlements to the unified power grid |
| | 12. Establishment of an emergency rescue unit and an Arctic crisis management center in Sabetta |

Source: Authors' development based on President of the Russian Federation (2020b), Legislative Assembly of Yamal-Nenets Autonomous District (2011), and Governor of Yamal-Nenets Autonomous District (2018)

The economy of Yamal-Nenets Autonomous District is based on the substantial deposits of hydrocarbons. The shares of the district in the global proven gas and oil reserves are 18% and 2%, respectively (65% and 18% of all gas and oil in Russia). The extraction of hydrocarbons is mainly carried out in the Nadym-Pur-Tazovskaya oil and gas province in Medvezhye, Urengoyskoye, and Yamburgskoye mega-fields. This area is best equipped with transport, energy, and industrial facilities. Development prospects of the province are associated with the exploration of hard-to-recover hydrocarbon reserves of the Bazhenov and Achimov formations. In the future, substantial

investments will be required to continue the exploitation of existing oil fields and involve deeper-lying horizons into production to increase oil recovery.

There are obvious prospects for increasing investment in the development of new gas fields, increasing capacity, and building new LNG plants, which are being implemented with the participation of Chinese investors. Industrial development of the Yamal Peninsula began in 2012 with the putting of the Bovanenkovskoye oil and gas condensate field into operation. Currently, new gas production facilities are being launched such as the Yamal LNG and Arctic LNG 2 projects. Yamal LNG in the South Tambey field is an integrated project encompassing the production of 16.5 million tons of natural gas per year. The field's proven and probable reserves are estimated at 926 billion m³. (Yamal LNG, 2021). Arctic LNG 2 provides for the construction of three LNG lines of 6.6 million tons each. It is expected that the total annual capacity of the three lines will reach 19.8 million tons of LNG (Novatek, 2021). The resource base of the Arctic LNG 2 project is the Utrennee field on the Gydan Peninsula. In the long run, the establishment of industrial production centers on the Yamal and Gydan peninsulas and offshore fields in the Kara Sea, as well as the complex transport development of these territories, will contribute to the growth of production and export of LNG to China and the global market.

However, the development of hydrocarbon projects requires radical improvement of transport accessibility of Yamal-Nenets Autonomous District. Some of the measures include construction of the Northern Latitudinal Railway along with the associated Bovanenkovo – Sabetta non-public railway track, as well as the construction of the Nadym – Salekhard road section as a part of the Surgut – Salekhard highway. The implementation of these projects will reduce transport costs, create opportunities for the development of other than fuel sectors, and help diversify the single-industry economy of Yamal-Nenets Autonomous District.

Republic of Karelia

The area of the Arctic zone of the Republic of Karelia was significantly expanded in 2020 by the inclusion of three districts located along the Arctic Circle in the permafrost zone. Currently, the Arctic zone of the republic includes Belomorsky, Loukhsky, Kemsky, Segezhsky, and Kalevsky districts and Kostomuksha settlement, which makes up almost 40% of Karelia's territory. Among other Russia's entities, Karelia is an Arctic newcomer, so no individual strategic vision for the development of the six Arctic districts has yet been developed. However, general approaches to territorial development are outlined in the Strategy of Social and Economic Development of the Republic of Karelia till 2030 (Government of the Republic of Karelia, 2018) and the Individual Program of Social and Economic Development of the Republic of Karelia for 2020-2014 (Government of the Russian Federation, 2020) (Table 5).

The population of Karelia is about 609,000 people, of which 80.4% live in the cities. Petrozavodsk capital city is home to more than 45% of the region's population. The Arctic zone of the republic is sparsely populated, and most people (73%) live in the southern part of the region. The demographic situation is generally unfavorable, and there is a significant outflow of the population (Federal State Statistics Service Directorate for the Republic of Karelia, 2021).

Mineral resources are diverse. There are significant deposits of chromium (more than 50% of Russia's reserves), molybdenum (10%), iron ores (1.2%), uranium-vanadium ores, and other

minerals. Timber volume amounts to more than 1.03 billion m³, and over 53% of the territory is covered with woodland.

Table 5. Priorities of territorial, economic, and infrastructure development in the Republic of Karelia

| Spheres | Measures |
|-------------------------|--|
| Territorial development | 1. Establishment and development of mineral resource centers in the East Karelia copper-gold-molybdenum zone |
| Economy | 2. Development of the construction materials industry based on building stone deposits |
| | 3. Establishment and development of the deep wood processing cluster |
| | 4. Development of the fisheries and aquaculture cluster |
| | 5. Development of cultural, historical, and environmental tourism |
| Infrastructure | 6. Modernization of the White Sea – Baltic Canal |
| | 7. Establishment of cascades of small hydropower plants |
| | 8. Establishment of a network of data processing and storage centers |

Source: Authors' development based on President of the Russian Federation (2020b), Government of the Republic of Karelia (2018), and Government of the Russian Federation (2020)

One of the main advantages of Karelia is its geographical location. The region geographically connects Saint Petersburg, Murmansk, and Arkhangelsk sea hubs with other territories of Russia. Karelia has access to the White Sea in the east and borders with Finland in the west, which ensures the potential for transit transportation between the NSR sea ports and Northern Europe. The throughout cargo capacity of Saint Petersburg and major European Arctic ports in Murmansk and Arkhangelsk as transit transport hubs is limited. Therefore, the increasing cargo traffic between Europe and China (primarily container shipments) could be directed through alternative routes in Karelia. The construction of Kem deep-sea cargo and passenger port along with the reconstruction of Belomorsk berth are scheduled among measures of development of territories, historically associated with the Solovetsky Archipelago. Documents are being prepared for the establishment of a federal enterprise on the basis of the Petrozavodsk airport and the development of landing sites in Kostomuksha and Kalevala. These measures are included in the Individual Program of Social and Economic Development of the Republic of Karelia for 2020-2014 (Government of the Russian Federation, 2020). The Karelian White Sea region has substantial logistical potential, but interregional cooperation is critical for its development. Karelia should establish links with other Arctic territories of Russia (Murmansk and Archangelsk oblasts) in order to implement major infrastructure projects and be able to grow into a prominent transport hub within the Asia-Europe transport corridor.

Arkhangelsk Oblast

Along with Karelia and Murmansk, Arkhangelsk Oblast has significant potential for integration into international transport corridors on the basis of both the NSR and multimodal shipments between Northern Europe, Russia, and Asian countries. As is the case with Karelia, the Arctic zone of Arkhangelsk Oblast was expanded in 2020 by the inclusion of two districts. Currently, nine administrative entities belong to the Arctic: Arkhangelsk, Severodvinsk, and Novodvinsk cities, Mezensky, Onezhsky, Primorsky, Leshukonsky, and Pinezhsky districts, and Novaya Zemlya island.

The territory is rich in timber and water resources. The forest cover of Arkhangelsk Oblast without Novaya Zemlya and smaller islands in the White Sea and the Arctic Ocean is 72.4%. The total land area covered by forests exceeds 29 million ha, of which about 20 million ha are under industrial

exploitation. There are significant deposits of 25 kinds of minerals and raw materials, including bauxites, limestone and clay for cement production, limestone for the pulp and paper industry, dolomites for metallurgy, zinc, lead, silver, gypsum, anhydrite, building stones (granites and basalts), peat, sand, and carbonate rocks. Arkhangelsk Oblast ranks second after Yakutia in Russia in terms of discovered diamond reserves – 248.3 million carats, or about 21% of all national deposits.

The vision of strategic priorities for the territorial development of Arkhangelsk Oblast is based on the combination and joint use of resource and geographical advantages: development of mineral resource centers for the production of lead, zinc, diamond, timber industries, fisheries, shipbuilding, and development of transport infrastructure to integrate domestic producers to global supply chains and transport corridors (Table 6).

Table 6. Priorities of territorial, economic, and infrastructure development in Arkhangelsk Oblast

| Spheres | Measures |
|-------------------------|--|
| Territorial development | 1. Development of the lead-zinc mineral resource center in the Novaya Zemlya archipelago |
| | 2. Development of diamond mineral resource centers |
| | 3. Development of cultural, educational, ethnographic, and environmental tourism cluster and sea cruise tourism on the Solovetsky Islands |
| Economy | 4. Development of the woodworking and pulp and paper industries, establishment of the full-cycle wood processing complex, and introduction of technologies for the production of biofuels from wood processing waste |
| | 5. Development of the shipbuilding and ship repair industries and production of equipment for oil and gas extraction on the continental shelf |
| | 6. Development of the fishing cluster, construction, modernization, and repair of the fishing fleet, establishment of enterprises for the production of fish and other products from aquatic biological resources, and development of biotechnologies and aquaculture |
| Infrastructure | 7. Modernization of the existing terminals at Arkhangelsk sea port, dredging, the establishment of a new deep-water area, production and logistics complexes and access infrastructure, implementation of coordination systems and digital management of the transport hub |
| | 8. Development of transport infrastructure (railways, waterways, and highways) to link Arkhangelsk sea port with Northwest Russia, the Urals, and Siberia, including the justification for the construction of the Karpogory – Vendinga and the Mikun – Solikamsk railway sections |
| | 9. Development of the Arkhangelsk international airport |

Source: Authors' development based on President of the Russian Federation (2020b) and Assembly of Deputies of Arkhangelsk Oblast (2019)

Although to a lesser degree compared to other regions of the Russian Arctic, both transport and industrial infrastructure in Arkhangelsk Oblast still requires significant modernization and radical improvement. Among critical threats to sustainable territorial development of the region, the Strategy of Social and Economic Development of Arkhangelsk Oblast till 2035 (Assembly of Deputies of Arkhangelsk Oblast, 2019) underscores the low level of exploration of territories and the low spatial density of industrial facilities, which both reduce the efficiency of infrastructure use. Arkhangelsk sea port is connected by rail lines with Moscow and Saint Petersburg, as well as neighboring regions. Internal railway communication is provided by trains that link Arkhangelsk with Kotlassky, Pinezhsky, Velsky, Plesetsky, Onezhsky, Ustyansky, Nyandomsky, and Konoshsky districts. The total length of the railway network exceeds 1700 km.

Waterways also play a significant role in cargo transportation. The water transport network integrates the basins of the White Sea and three rivers: Northern Dvina (including Vychegda, Vaga, and Pinega rivers), Mezen (including Kuloy river), and Onega. The Northern Dvina, Onega,

Vycheгда, and Kuloy rivers are fully navigable for the entire summer period, while the other rivers are used for cargo transportation during the spring flood window.

The largest investment project in the sphere of water transport infrastructure is the construction of a deep-water port and port infrastructure near Arkhangelsk. The project provides for the construction of six marine terminals for mineral fertilizers, petroleum products and gas condensate, bulk cargo, timber, metals, and containers, as well as automobile road and railway between Arkhangelsk city and the port area and external engineering infrastructure (communication, water supply, and power supply networks) (Arkhangelsk Transport Hub, 2021). Since 2016, Chinese investors (Poly International Holding Co) have been demonstrating interest in the project (Region 29 Information Agency, 2016), while in 2018, it was included in the list of investment initiatives to be implemented in the framework of convergence between the Eurasian Economic Union and the Silk Road Economic Belt (Zubkov, 2018). The economic feasibility of the construction is directly linked to the radical expansion of the railway network (in particular, the Belkomur railway) to link the port with cargo base localities and major markets. However, due to the uncertain cargo base, Russia's Ministry of Transport doubts the potential economic efficiency of the Belkomur railway, that is why the construction of the deepwater port in Arkhangelsk has been put on hold indefinitely along with that of the railway (Gao & Erokhin, 2020).

Komi Republic

In 2020, Vorkuta municipal district of the Komi Republic was supplemented by Usinsk and Inta cities and Ust-Tsilemsky district to establish the Arctic zone of the region. For Komi, the expansion of the Arctic zone is of crucial importance, as northern areas of the republic possess substantial natural resources (minerals, land, water), as well as they are promising for the development of cargo logistics and international transit.

The resource potential of the Komi Republic is represented by oil and gas in the Timan-Pechora oil and gas province (one of the largest in Russia), coking and energy coals in the Pechora coal basin (the second-largest in the country), and oil shale in the Vycheгодsky and Timan-Pechora shale basins. Ore minerals (ferrous, non-ferrous, and precious metals, manganese, chromium, and titanium ores) are concentrated in the Polar Urals and Middle and Southern Timan. Timan area also contains about one-third of Russia's deposits of bauxites. The Pizhemskeye and Yaregskoye titanium ore deposits are the largest in Russia with more than half of the country's reserves of titanium. In total, the explored deposits of the Komi Republic contain about 3% of all Russia's oil, 4.5% of coal, 13% of barite, 30% of bauxite, about 50% of titanium, and about 80% of quartz. Geological exploration is being conducted at Verkhnepizhemyy subsurface area, a part of the Pizhemskeye field, where large deposits of titanium and quartz have been identified. Forests cover about 80% of the Komi's territory, or 36.3 million ha (3.2% of all woodlands in Russia and 50% of woodlands in Russia's European North). More than 75% of the forest land fund (3.1 billion m³) is under industrial exploitation.

Taking into account the unity of nature management complexes and the interregional transport and logistics connectivity of Vorkuta, Usinsk, and Inta cities and Ust-Tsilemsky district with other territories of the Russian Arctic, the territorial development of the Arctic zone of the Komi Republic is considered in the context of integration of economic development measures, modernization and construction of transport infrastructure, development of the tourism sector, and maintenance of traditional economic activities of indigenous peoples (Table 7).

Table 7. Priorities of territorial, economic, and infrastructure development in the Komi Republic

| Spheres | Measures |
|-------------------------|---|
| Territorial development | 1. Integrated social and economic development of single-industry urban districts of Vorkuta and Inta |
| | 2. Development of coal mineral resource centers in the Pechora coal basin |
| | 3. Establishment and development of oil and gas mineral resource centers in the Timan-Pechora oil and gas province |
| | 4. Establishment and development of the Parnoksky ferromanganese mineral resource center |
| | 5. Development of the cultural, ethnographic, and historical tourism cluster and the active natural tourism cluster |
| Economy | 6. Establishment of complexes for deep processing of coal raw materials and coal chemistry |
| | 7. Development of oil and gas processing facilities |
| | 8. Geological exploration of territories and development of solid commercial minerals fields |
| | 9. Establishment and development of the vertically integrated mining and metallurgical complex for processing of titanium ores and quartz (glass) sands in Pizhemskeye field |
| Infrastructure | 10. Construction of the Sosnogorsk – Indiga railway, reconstruction of the Konosha – Kotlas – Chum – Labytnangi railway section, justification of the feasibility of reconstruction of the Mikun – Vendinga railway section, and construction of the Vendinga – Karpogory railway section |
| | 11. Construction and reconstruction of the Syktyvkar – Ukhta – Pechora – Usinsk – Naryan-Mar highway |
| | 12. Dredging on the Pechora River |
| | 13. Reconstruction and modernization of the airport network, including the joint deployment of Vorkuta airport |

Source: Authors' development based on President of the Russian Federation (2020b) and Government of the Komi Republic (2019)

Among the main challenges of territorial development in the coming years, the Strategy of Social and Economic Development of the Komi Republic till 2035 (Government of the Komi Republic, 2019) emphasizes significant territorial disparities, low population density, uneven allocation of the population across the region, and a high concentration of industrial facilities (in particular, in Vorkuta). Other problems that are typical for many regions of the Russian Arctic are the low density of automobile roads, poor transport accessibility of remote settlements, inequality between districts in the development of transport infrastructure, the lack of access to the NSR ports, and insufficient capacity of and coverage by railway lines. Nevertheless, the relative remoteness of the Arctic territories of the Komi Republic from the water and land borders of Russia provides conditions for the development of a secured and stable transport connections and a transport and logistics hub by the construction of the new Vorkuta – Ust-Kara and Sosnogorsk – Indiga railways. It is assumed that the implementation of these infrastructure projects will be supplemented by the construction of the Northern Latitudinal Railway to connect the Komi Republic with the Yamal Peninsula and the NSR through Sabetta sea port. The connection of the cargo base in Komi (minerals, timber, etc.) with the NSR will significantly increase traffic in the route, including potential exports to China. Also, as part of the implementation of the “North-East – Polar Urals” project, the regional Strategy (Government of the Komi Republic, 2019) plans for the construction of the Syktyvkar – Vorkuta – Salekhard highway with access to Naryan-Mar.

Krasnoyarsk Krai

A similar vision of the need to develop economic and transport corridors with the inclusion of Arctic territories is also highlighted in the Strategy of Social and Economic Development of Northern and Arctic Territories and Support of Indigenous People in Krasnoyarsk Krai till 2030 (Government of Krasnoyarsk Krai, 2020). The Arctic zone of Krasnoyarsk Krai is one of the economic and industrial centers of the Russian Arctic due to a long history of the resource extraction industries in Taimyr Dolgan-Nenets and Evenki municipal districts. However, amid the depletion of long-exploited deposits and the discovery of new ones, there have been emerging disproportions in the development of the northern territories. According to the parameters of transport accessibility and implementation of resource projects, Arctic territories in Krasnoyarsk Krai are divided into six main types:

- Relatively developed areas with year-round land transportation. This type includes the most populated areas of the southernmost districts in the Arctic zone – Yeniseysky, Motyginский, Boguchansky, Kezhemsky, and Severo-Yeniseysky districts, where major cities of Yeniseysk and Lesosibirsk are located.
- Coastal river zones and the NSR zone accessible for large-capacity water transport. Even though water transport is fundamentally important for the entire Arctic zone of Krasnoyarsk Krai, these areas cannot be undoubtedly recognized as economic development locomotives. The advantage of their position is attained only if large-scale resource projects are implemented or large-scale cargo transshipment is carried out nearby.
- Off-road zone, where communication is carried out by seasonal winter roads, small rivers, or by air. These are the most problematic areas in terms of territorial development. There are required the introduction of life-support technologies, reduction of fuel and product supply costs, and new solutions in transportation and marketing of reindeer and other local products.
- Territories of large industrial projects at the stage of development (new resource projects). They include oil production areas (Vankor oil production cluster – Vankorskoe, Suzunskoe, and adjacent fields in Turukhansky district, fields in Yuryubcheno-Takhomskaya zone, oil production areas in East Taimyr); gold mining area in Severo-Yeniseysky district (Olympiadninsky and adjacent fields); timber production in Boguchansky and Kezhemsky districts; coal mining area around Dikson; development of new oil and gas fields in the Angara region.
- Territories of large industrial projects at the stage of production decline or after the termination of exploitation. These are the “northern old industrial territories” of Igarka, Dikson, and Motyginский and neighboring districts. For them, it is necessary to develop measures for controlled depopulation with an increase in the quality of life of the remaining dwellers and the development of alternative employment opportunities.
- The mature industrial area is represented by the Norilsk cluster. It covers a vast area that supports the Norilsk industrial complex and the city of Norilsk, including Pelyatkinskoye gas field and Kureyskaya and Ust-Khantayskaya hydro power plants.

The points of economic growth for the Arctic territories in Krasnoyarsk Krai are new large resource projects. Infrastructure growth zones correspond to the sites of newly explored oil, gas, and gold deposits. In coastal zones, off-road zones, and old industrial territories, specific growth points will include strengthening energy and food security (Table 8).

Table 8. Priorities of territorial, economic, and infrastructure development in Krasnoyarsk Krai

| Spheres | Measures |
|-------------------------|--|
| Territorial development | 1. Integrated social and economic development of the single-industry Norilsk municipal district |
| | 2. Development of the Norilsk industrial district specializing in the extraction and enrichment (processing) of non-ferrous metals and platinum group metals |
| | 3. Establishment and development of the oil and mineral resource center in Western Taimyr oil fields to export extracted resources via the NSR |
| | 4. Establishment of the West-Taimyr coal industry cluster to export coal via the NSR |
| | 5. Development of the tourism and recreational cluster in Taimyr Dolgan-Nenets municipal district, Norilsk, and Dudinka |
| Economy | 6. Construction of new production facilities and modernization of Zapolyarnaya mine |
| | 7. Development of Popigaysky field of technical diamonds and establishment of the mineral resource center |
| | 8. Development of the resources of the Taimyr-Severozemelsky gold-bearing province |
| Infrastructure | 9. Development of sea ports in Dikson (including the construction of new coal terminals and oil terminal) and Dudinka |
| | 10. Reconstruction and modernization of the airport network, including Khatanga airport |
| | 11. Establishment of an emergency rescue unit and an Arctic crisis management center in Dikson |

Source: Authors' development based on President of the Russian Federation (2020b) and Government of Krasnoyarsk Krai (2020)

Taking into account the geological conditions of the Arctic territories of Krasnoyarsk Krai, the priority in economic development is given to hydrocarbons. The 2030 Strategy (Government of Krasnoyarsk Krai, 2020) declares oil and gas projects to become anchor measures of economic and territorial development for the next decade. A new center of oil and gas production is being formed near the eastern coast of the Yenisei Bay based on the Payakhscoe and Baikalscoe deposits. Their total recoverable reserves amount to more than 200 million tons of oil and about 90 billion m³ of natural gas. Oil transportation will be carried out through the NSR, for which purpose Sever marine oil terminal and the 413 km long oil supply pipeline will be constructed. The launch of an oil and gas production center near the coast of the Khatanga Bay is also promising, from where hydrocarbons will be directed to the NSR. In addition to the onshore deposits, the 2030 Strategy envisages the exploration of the continental shelf. Currently, the geological structure and prospects of oil and gas extraction are being studied in the eastern part of the Kara Sea and the Yenisei Bay.

Republic of Sakha (Yakutia)

The area of the Arctic zone on the Republic of Sakha (Yakutia) is 1.609 million km² or over half of the entire territory of the republic. The Arctic zone includes thirteen districts divided into five groups according to their location in one of the basins of major navigable rivers: Anabarskaya, Prilenskaya, Yanskaya, Indigirskaya, and Kolymenskaya groups. The population of Arctic territories accounts for 67,000 people, which is 7.0% of the total population of the republic. Apart from Zhigansky district, where all settlements are located linearly along the Lena River, other territories are characterized by high dispersion of small rural and hard-to-reach settlements (particularly in Verkhoyansky and Srednekolymsky districts).

In the Arctic zone of Yakutia, there are large deposits of diamonds, gold, non-ferrous and rare earth metals, coal, hydrocarbons, and mammoth ivory. The mining industry is localized in Anabarsky, Oleneksky, Bulunsky, Verkhoyansky, Ust-Yansky, and Verkhnekolymsky districts. The geological knowledge of the region is low due to the underdevelopment and inaccessibility of many territories, so a complex geological exploration is required. However, even at the current point of geologic certainty, it is evident that the Arctic zone of Yakutia is promising for the identification of deposits of diamonds, rare metals, oil and gas, and coal, primarily in Anabarsky, Oleneksky, and Bulunsky districts. The development of this territory is based on the exploration of the Tomtorskoy deposit of rare-earth metals, Pronchishchevsky and Zapadno-Anabarsky areas that are promising for the detection of oil and gas, Taimylyr coal and boghead deposits, and the Laptev Sea shelf. The development of the Ust-Yansky mining and industrial cluster is considered promising due to the exploration of Kuchus gold deposits, tin in Deputatskoye, Churpunya, Odinoky, Kester, and Tirekhtyakh fields, and gold placers in Kularsky ore placer field. The territory is promising for identifying deposits of platinum, copper, uranium, and rare metals (Table 9).

Table 9. Priorities of territorial, economic, and infrastructure development in the Republic of Sakha (Yakutia)

| Spheres | Measures |
|-------------------------|---|
| Territorial development | 1. Integrated development of the Anabar and Lena basins, development of mineral resource centers |
| | 2. Integrated development of Tiksi settlement, including dual-use infrastructure |
| | 3. Integrated development of territories in the Yana river basin |
| | 4. Integrated development of territories in the Indigirka river basin, ensuring their energy security |
| | 5. Integrated development of territories in the Kolyma river basin |
| | 6. Development of the scientific, cultural, ethnographic, and expedition tourism cluster |
| Economy | 7. Development of the Tomtorskoy deposit of rare earth metals |
| | 8. Development of alluvial diamond deposits in Anabarsky, Bulunsky, and Oleneksky districts and Verkhne-Munsky diamond deposit |
| | 9. Development of the Taimylyr coal deposit |
| | 10. Development of the West Anabar oil and mineral resource center |
| | 11. Development of solid minerals fields in the Yansk basin, including Kuchus gold deposit, Prognoz silver deposit, and Deputatsky and Tirekhtyakh tin deposits |
| | 12. Development of Krasnorechensk coal deposit |
| | 13. Production of construction materials based on basalt and building stone deposits in the Indigirka river basin |
| Infrastructure | 14. Dredging on the Anabar, Lena, Yana, Indigirka, and Kolyma rivers |
| | 15. Reconstruction of the sea port and terminals in Tiksi |
| | 16. Construction of power supply and transport infrastructure facilities in the Yana river basin |
| | 17. Modernization of Zeleny Mys river port and development of the Zyryansk coal mineral resource center in the Kolyma river basin |
| | 18. Establishment of a network of trade and logistics centers to ensure the delivery of fuel, food, and other goods to remote settlements |
| | 19. Establishment of an emergency rescue unit and an Arctic crisis management center in Tiksi |

Source: Authors' development based on President of the Russian Federation (2020b) and Head of the Republic of Sakha (Yakutia) (2020)

One of the main problems of the balanced spatial development of Yakutia is the almost complete absence of a year-round land transport system to connect settlements within the Arctic zone, as well as the Arctic zone with other territories of the republic. Transport framework is made up of the Anabar, Lena, Yana, Indigirka, and Kolyma rivers, the NSR section from the mouth of the Lena River to the mouths of other Arctic rivers, Tiksi sea port, three river ports (Zelenomyssky

and Nizhneyansky river ports and Belogorsky shipping section), and river berths in Ust-Kuiga, Batagai, Zyryanka, and Yuryung-Khaya. Tiksi is recognized as the base point of infrastructure management in the eastern part of the NSR. The reconstruction of the sea port in Tiksi will ensure safe entry of vessels with a draft of up to ten meters and allow to increase cargo turnover up to 300 thousand tons per year, including coal, lumber, equipment, and supply cargo for Arctic territories. Potentially, Tiksi port can turn into a central transport hub in the Arctic Yakutia for servicing export-import traffic on the Lena River and the NSR. The Strategy of Social and Economic Development of the Arctic Zone of the Republic of Sakha (Yakutia) till 2035 (Head of the Republic of Sakha (Yakutia), 2020) schedules dredging operations on the Anabar, Lena, Yana, Indigirka, and Kolyma rivers. The goal is to bring the parameters of inland waterways to the level that provides sufficient capacity for river navigation.

China's interests in the Arctic: Possible matches with Russia's approaches to territorial development

The fact that China is a non-Arctic country determines the range of national interests in the region, which is somewhat different from that of Russia and other Arctic countries. Having released the White Paper on the Arctic Policy in 2018, China emphasized “climate change, environment, scientific research, utilization of shipping routes, resource exploration and exploitation, security, and global governance” (State Council of the People's Republic of China, 2018: article II) as priority areas trans-regional and international collaboration in the Arctic. Obviously, the territorial development agenda is not directly addressed in China's Arctic Strategy, but indirectly it is expressed through such priorities as “deepening the exploration and understanding of the Arctic” (State Council of the People's Republic of China, 2018: article IV.1) and “utilizing Arctic resources in a lawful and rational manner” (State Council of the People's Republic of China, 2018: article IV.3).

In the sphere of exploration of the Arctic, China specifically encourages the studies on the development of polar equipment in the fields of deep-sea exploration, ice zone prospecting, exploitation of natural resources, renewable energy development, navigation and monitoring in ice zones, and construction of new-type icebreakers (State Council of the People's Republic of China, 2018: article IV.1). Investigations in such areas as geology and geophysics of mineral resources and geography of Arctic territories are underscored among core multi-disciplinary studies for Chinese enterprises and research institutions to get involved in.

Utilization of Arctic resources includes the development of shipping routes in the Arctic Ocean to build the Polar Silk Route, participation in the exploration for and exploitation of oil, gas, mineral and other non-living resources, and cooperation with Arctic countries in developing tourism in the region. China “calls for stronger international cooperation on infrastructure construction and operation of the Arctic routes” (State Council of the People's Republic of China, 2018: article IV.3.1) and prioritizes infrastructure construction for the Polar Silk Road, navigation security, and hydrographic surveys to improve logistical capacities of the NSR and the Northeast, Northwest, and Central passages. In the sphere of tourism, China “supports and encourages its enterprises to cooperate with Arctic States ... and calls for continuous efforts to enhance security, insurance, and rescue systems to ensure the safety of tourists in the Arctic” (State Council of the People's Republic of China, 2018: article IV.3.4). The White Paper particularly declares every respect to the traditions and cultures of the Arctic residents including the Indigenous peoples, preserving their lifestyles and

values, and respecting the efforts made by the Arctic countries to foster social and economic progress in circumpolar territories.

Chinese enterprises are also encouraged to participate in the exploitation of oil, gas, and mineral resources in the Arctic through cooperation in various forms with residents in the region. As Chinese businesses have been entering many investment projects in the Arctic in recent years, there exist various estimations of and attitudes to China's role in the territorial development of the region. Russia is so far the biggest recipient of Chinese investment in the Arctic projects. The \$27 billion Yamal LNG project (China National Petroleum Corporation (CNPC) – 20% equity stake, Silk Road Fund – 9.9%) was followed by the \$25.5-billion Arctic LNG 2, where CNPC and China National Offshore Oil Corporation (CNOOC) took 10% shares each (Daiss, 2019). The two projects are estimated to have an aggregated capacity of over 37 million tons of LNG per year (Humpert, 2019), moving both Russia and China to the top positions in the global LNG market. In 2020, Novatek, Russian operator of both Yamal LNG and Arctic LNG 2, announced the search for investors for its Arctic LNG 3 project, where China is expected to take part.

Despite these numbers, Chinese investments in the Russian Arctic still represent a negligible percentage of Russia's GDP, while those in some Nordic countries are rather substantial (for instance, 11.6% in Greenland and 5.7% in Iceland in 2012-2017) (Auerswald, 2019). Apart from a skyrocketing development of the LNG industry, other projects where Chinese enterprises were expected to participate, have not been that successful. There were plans to attract Chinese investment in the exploration of the continental shelf in the Barents and Pechora seas, as well as to exploit Shtokman gas field and Prirazlomnoe offshore oilfield, but as global oil prices went down in 2015-2016, Rosneft, Russian oil tycoon, suspended those projects. As mentioned earlier, the mega infrastructure projects such as Belkomur railroad and Arkhangelsk deepwater port in which China initially declared its interest (Erokhin & Gao, 2018; Erokhin et al., 2018) have not been launched due to the delays and concerns from the Russian side.

The new strategic vision of the territorial development provided by Russian authorities on the federal (the State Policy of the Russian Federation in the Arctic till 2035 and the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensurance of National Security till 2035) and regional levels (the nine regional development strategies) focus the development efforts on the networks of interrelated investment projects (economic clusters). Russia aims to establish favorable conditions for the implementation of large-scale infrastructure projects in its Arctic zone, modernize the existing infrastructure, and create the centers of attraction for foreign investments. Across the nine territories, development priorities include mining and processing of mineral resources, transport, extraction and processing of diamonds, geological survey and exploration, power generation, fishing and agriculture, environmental protection, and tourism. For China, many of Russia's priorities could be matched with strategic interests in the Arctic as they fit the Polar Silk Road concept (Table 10). New development zones allocated across Russia's Arctic territories will allow to increase potential cargo base for the NSR and improve the infrastructure connectivity of the Polar Silk Road.

Table 10. Matches between Russia's territorial development priorities and China's interests in the Arctic

| Russia's Arctic territories / priorities | China's priority areas | | | | | |
|--|---------------------------|--------------------------------|-----------------------------|---------------------|---|---------|
| | Exploration of the Arctic | Development of shipping routes | Infrastructure construction | Navigation security | Exploitation of resources | Tourism |
| Murmansk Oblast | | | | | | |
| Territory | | | | | | 1.2 |
| Economy | 1.6 | 1.3; 1.4; 1.5 | | | | |
| Infrastructure | | | 1.8; 1.9; 1.10 | | | 1.11 |
| Nenets Autonomous District | | | | | | |
| Territory | | | | | 2.1; 2.2 | 2.3 |
| Economy | 2.4 | | | | | |
| Infrastructure | | 2.6 | 2.6; 2.7 | | | |
| Chukotka Autonomous District | | | | | | |
| Territory | | | | | 3.1; 3.2 | 3.3 |
| Economy | | | | | | 3.4 |
| Infrastructure | | 3.5; 3.6; 3.7 | 3.8; 3.9; 3.10 | 3.11 | | |
| Yamal-Nenets Autonomous District | | | | | | |
| Territory | | | | | 4.1 | 4.3 |
| Economy | 4.5 | | | | 4.4; 4.6 | |
| Infrastructure | | 4.8 | 4.9; 4.11 | 4.12 | 4.10 | |
| Republic of Karelia | | | | | | |
| Territory | | | | | 5.1 | |
| Economy | | | | | 5.2; 5.3; 5.4 | 5.5 |
| Infrastructure | | 5.6 | 5.7; 5.8 | | | |
| Arkhangelsk Oblast | | | | | | |
| Territory | | | | | 6.1; 6.2 | 6.3 |
| Economy | | 6.5 | | | 6.4; 6.6 | |
| Infrastructure | | 6.7 | 6.8; 6.9 | | | |
| Komi Republic | | | | | | |
| Territory | | | | | 7.2; 7.3; 7.4 | 7.5 |
| Economy | 7.8 | | | | 7.6; 7.7; 7.9 | |
| Infrastructure | | 7.12 | 7.10; 7.11; 7.13 | | | |
| Krasnoyarsk Krai | | | | | | |
| Territory | | | | | 8.2; 8.3; 8.4 | 8.5 |
| Economy | | | | | 8.6; 8.7; 8.8 | |
| Infrastructure | | 8.9 | 8.10 | 8.11 | | |
| Republic of Sakha (Yakutia) | | | | | | |
| Territory | | | | | 9.1 | 9.6 |
| Economy | | | | | 9.7; 9.8; 9.9; 9.10; 9.11; 9.12; 9.13 | |
| Infrastructure | | 9.14; 9.15 | 9.16 | 9.19 | 9.17 | |

Note: Matches are presented in X.YY format, where X – number of table in the text (tables 1-9), YY – number of measure in the respective table.

Source: Authors' development based on President of the Russian Federation (2020a, 2020b), Governor of Murmansk Oblast (2014), Government of Murmansk Oblast (2013), Assembly of Deputies of Nenets Autonomous District (2019), Government of Chukotka Autonomous District (2014), Legislative Assembly of Yamal-Nenets Autonomous District (2011), Governor of Yamal-Nenets Autonomous District (2018), Government of the Republic of Karelia (2018), Government of the Russian Federation (2020), Assembly of Deputies of Arkhangelsk Oblast (2019), Government of the Komi Republic (2019), Government of Krasnoyarsk Krai (2020), Head of the Republic of Sakha (Yakutia) (2020)

To encourage investment in the Arctic projects, Russia announced a raft of support measures (Petlevoy et al., 2019). New investment projects above RUB 10 million each (nearly \$160,000) will be granted tax reductions and other preferences. For offshore oil production projects, the mineral extraction tax (MET) rate will be reduced down to 5% within fifteen years depending on the level of oil field depletion. For selected oil fields explored by Rosneft and Neftegazholding, a 0% MET rate will be applied until the depletion reaches 1%. After that, the MET rate will be increased gradually. In addition to lower tax rates, investment projects in the Arctic will be granted other preferences, including non-regression of tax environment and protection in the court, as well as the possibility to attract foreign labor above quotas, conclude concessional agreements without tendering, and receive federal subsidies for the construction of external infrastructure. LNG projects, in which China has been particularly interested so far, will also receive preferences, including the MET exemption for twelve years after the start of production. The governments of the nine Arctic territories will be able to implement additional support measures to incentivize the attraction of investment according to their regional priorities (for instance, zero rates of profit tax, property tax, and land tax). Specifically, the regime will be applied to Novatek's projects, including Arctic LNG 3, in which China (the Silk Road Fund, CNPC, CNOOC, China Development Bank, or China's Export-Import Bank) will most definitely get involved.

Conclusion

In recent years, Russia's policy in the Arctic has been undergoing changes, refocusing from an exclusively territorial principle of defining priorities to the implementation of complex multi-territorial projects, the establishment of the advanced development zones, and support of inter-territorial industrial clusters. In 2020, along with the expansion of the list of administrative entities that make up the Arctic zone of the country, there started the unification of Arctic strategies of the nine territories among themselves, as well as with an updated body of the Arctic-related documents adopted at the federal level (Foundations of the State Policy of the Russian Federation in the Arctic till 2035, Strategy for the Development of the Arctic Zone of the Russian Federation and Ensurance of National Security till 2035, Plan for the Development of the Northern Sea Route Infrastructure until 2035, and State Program of Social and Economic Development of the Arctic Zone of the Russian Federation till 2024). However, despite all the changes, the main lines of Russia's vision of the territorial development of the Arctic remain the exploitation of natural resources and the improvement of infrastructure (since recently, external transport infrastructure to increase exports and international transits in the NSR). Such a vision fairly builds into China's set of priorities for the development of the Arctic as a promising Polar Silk Road corridor between Asia, Russia, and Northern Europe. Although China does not directly outline territorial development among its strategic interests in the Arctic, the similarity of attitudes to economic and infrastructure issues substantially strengthens the basis for Russia-China cooperation in the region. To better align the Polar Silk Road initiative with the NSR and Russia's priorities for the sustainable development of resources and the transport-trade-economic corridor in the High North, it is necessary to advance from spotty resource projects (Yamal LNG, Arctic 2 LNG, etc.) to comprehensive cooperation to improve the resource base and infrastructure capabilities of the future corridor. As this study shows, in all nine Arctic territories of Russia, it is possible to match Russia's and China's interests in such areas as the exploration and exploitation of the Arctic resources, development of marine and river shipping routes, construction of shipping, transport, power supply, and communication infrastructure, improvement of navigation security, and other

sectors, such as tourism, fishery, timber industry, and traditional economic activities of indigenous people.

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