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Russia's Low Carbon Development Policy: Opportunities and Constraints in the New Economic and Political Reality[1]

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Abstract

Russia's model of economic development, based on hydrocarbon exports, initially determined the country's scepticism to- ward low-carbon transformation. However, the growing negative effects of climate change, manifesting in increased natural disasters (floods, fires, extreme heat), as well as extraterritorial measures imposed by major trading partners, which could potentially limit market access, led to a transformation of the perceived climate change challenge and the adoption of a range of policy documents and regulations to articulate and implement a low-carbon development policy in Russia. The targets and measures have been criticized for lacking ambition and rigour, but still pushed the processes without which the economy would continue to face the negative effects of climate change and increasing constraints in global markets. The geopolitical crisis of 2022 and widening sanctions have significantly constrained Russia's ability to meet climate targets. Despite this, mechanisms to promote decarbonization in key sectors continue to be developed. In addition, opportunities for cooperation with some major non-western economies have not closed.

This article analyzes Russia's strategic documents and key low-carbon development policies, including the activities of major companies. It provides perspective on the role of forest climate projects as well as their drawbacks and risks, the Sakhalin experiment to achieve carbon neutrality in the region and how it is implemented through concrete initiatives, the prospects and limitations of the hydrogen industry, the challenges and tools for decarbonizing transport, state of play in the carbon capture, use and storage technologies, the criteria for green projects, and the situation on the green bond market. It also identifies two important areas which gain importance as the climate transition scales up: nuclear power and the ex- traction and production of critical raw materials. Based on the analysis, recommendations are given on promising areas of cooperation between Russia and its BRICS and EAEU partners.

Keywords: Strategy of long-term socio-economic development of the Russian Federation with low greenhouse gas emissions until 2050, decarbonization of the economy, carbon pricing, forest climate projects, voluntary carbon market, critical raw materials

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Introduction

The Russian Federation is the eighth largest economy in the world [World Bank, n. d.] and the fifth largest emitter of greenhouse gases after China, the U.S., India, and the European Union (EU) [Friedrich et al., 2023]. In 2020, Russia's emissions amounted to 2476.8 mt CO2, or 4.7% of total global emissions. The size of the economy, its relatively high contribution to overall emissions (although much smaller than that of the leaders—China, the United States, and India are responsible for 42.6% of global greenhouse gas emissions), the potential for their reduction and absorption, and its status as the largest supplier of energy resources makes Russia a significant actor, whose domestic policies and international cooperation are an important condition for achieving the Paris goals.

Russia's position on climate change and the necessary measures to slow it to an acceptable pace has always been criticized by experts [Climate Action Tracker, n. d.], activists, and some western partners [Lo, 2021] for lack of ambition, for periodically expressed official doubts about the anthropogenic nature of changes, and for the expansion of hydrocarbon production and exports without plans to reduce them. Russia's approach has always prioritized economic growth, and hydrocarbons constitute a significant source of budget revenues and ensure the energy security of the population. Transformation of such a vision cannot happen quickly. Climate goals have been largely absent from government planning for a long time. It took several years to join the Paris Agreement, and the required reporting under the United Nations Framework Convention on Climate Change (UNFCCC) was provided later than by most parties to the process; the base year for the agreement, 1990, provides wide scope for actual emissions increases until 2030. Some strategic documents adopted after the ratification of the Paris Agreement directly call the trend toward global decarbonization one of the main challenges for the socio-economic development of Russia [Government of the RF, 2020]. The Energy Strategy of the Russian Federation Until 2035 envisages further growth in hydrocarbon production as a guarantee of Russia's future as a global economic power. However, a combination of external and internal factors resulted in a gradual change in the country's attitude toward climate change issues and the beginning of the articulation of decarbonization policy tools that will gradually reduce the overall level of net emissions (including removals) without undermining the foundations of economic growth.

Climate change has serious impacts on socio-economic development. According to calculations by Roshydromet, in Russia over the past 40 years, climate warming has occurred faster than the global average, with a temperature increase rate of about 0.47℃ per 10 years against the world average of 0.18℃ per 10 years. In the Russian part of the Arctic, the rate of warming is even greater—0.8°C over 10 years and the air temperature in 2019 was above normal by an average of 2.5°C) [Mitrova et al., 2020]. Climate change, rising temperatures, increased frequency of adverse weather events, and shifts in climate zones affect human health and migration, food security, durability of buildings and structures, and pipeline and transport infrastructure and their reliability [Ibid.]. The increasing frequency of destructive natural phenomena, such as forest fires and floods, sometimes occurring simultaneously in different regions of the country, has led to an awareness of the seriousness of the challenge posed by climate change and prompted the beginning of the formation of a regulatory and strategic framework in the field of low-carbon development.

At the same time, in 2019–21, the efforts of Russia's economic partners to introduce new climate policy instruments intensified. Risks arising from extraterritorial regulation, stricter requirements for market access, and the active development of international climate regulation also contributed to the formation of this agenda in Russia.

It is important to note the role of the Russian scientific, academic and expert community, whose research helped highlight the real threats from climate change [Mitrova et al., 2020], opportunities arising from the introduction and development of new technologies [Kokorin, Potashnikov, 2018] and renewable energy sources [Lanshina, Barinova, 2017], the possible role of forests in absorbing emissions [Ptichnikov et al., 2022], issues of green financing [Bobylev, Kiryushin, Koshkina, 2021], prospects and limitations of legislative and institutional aspects of policy [Veselova, 2021], and

proposals for policy development in Russia, taking into account the national context and without compromising economic growth [Makarov, Stepanov, 2017]. The work of Russian researchers was also aimed at finding ways of low-carbon development that would not aggravate the problem of inequality [Grigoryev et al., 2020]. The involvement of Russian researchers in international projects helped strengthen the presence and role of the country in shaping the global agenda [Makarov et al., 2021]. Scientific justification for the need to introduce a combination of various instruments that will not negatively affect economic growth and expert and analytical support for the activities of government authorities contributed to the beginning of the active development of the decarbonization agenda in the country.

Decree of the President of the Russian Federation of 4 November 2020 No 666 "On Reducing Greenhouse Gas Emissions" set a goal of limiting greenhouse gas emissions to 70% of the 1990 level by 2030 (no more than 2162.4 million tons of CO2 equivalent) [President of Russia, 2020]. Also in 2020, Russia's nationally determined contribution (NDC) was submitted to the UNFCCC that sets an emissions reduction target of 70% [UNFCCC, 2022]. In 2021–23, Russia adopted a number of legal acts regulating aspects of climate policy in the country.

The geopolitical crisis, sanctions imposed on Russia, and partial economic isolation significantly influenced low-carbon development policies in the country. Calls to withdraw from the Paris Agreement and abandon the carbon neutrality goal by 2060 have become louder. However, President V. Putin reiterated the emissions targets and emphasized the country's commitment to decarbonization [President of Russia, 2023a]. The climate doctrine adopted in 2023 confirms the main objectives of Russia's climate policy: development of the information and scientific basis of climate policy, development and implementation of measures for adaptation and mitigation of anthropogenic impact on climate, development of a set of measures to reduce greenhouse gas emissions or increase their absorption (climate projects), and development of mutually beneficial cooperation on climate change issues on a bilateral and multilateral basis [President of Russia, 2023b]. The doctrine notes that "the choice of economic instruments that help reduce greenhouse gas emissions (including the possible use of market mechanisms, namely emissions trading) will be determined taking into account the effectiveness of these instruments using public and private financing mechanisms" [President of Russia, 2023b]. Business representatives called not for withdrawal from the Paris Agreement but for a reconsideration of some indicators, as well as time horizons, and voiced their desire to move away from western models of low-carbon transformation and develop new approaches in close cooperation with BRICS partners (Brazil, India, China, and South Africa) and the Eurasian Economic Union (EAEU) [RBC, 2023].

In the context of external restrictions, old challenges and threats to Russia's low-carbon development have intensified and new ones have emerged, but certain opportunities for both the implementation of domestic policy and international cooperation remain opened. The purpose of this article is to identify opportunities for the country's low-carbon development policy and cooperation with key partners. To do this, the main directions and instruments of low-carbon development policy, provided for by key strategic documents and regulations, as well as the activities of Russian business are analyzed.

Low-Carbon Development Strategy and Prospects for Its Implementation in New Reality

On 29 October 2021, the Strategy for the Socio-Economic Development of the Russian Federation With Low Greenhouse Gas Emissions Until 2050 was approved [Government of the RF, 2021a]. Its base scenario provides for additional measures to decarbonize economic sectors and increase the absorptive capacity of managed ecosystems. In the adopted strategy, the target scenario is intensive [Ibid.]. It assumes a reduction in net emissions from 1584 million tons of CO2 equivalent up to 630 million tons, with an increase in the absorption capacity of managed ecosystems from the current

535 million tons of carbon dioxide equivalent to 1200 million tons in forestry [Ibid.].

Cumulative investments in net emissions reduction average 1% of gross domestic product (GDP) in 2022–30 and 1.5–2% in 2031–50. It is expected that the additional growth of GCP until 2050 in response to investment will exceed the volume of invested funds by 25% [Government of the RF, 2021a].

The strategy involves the introduction of the following industry-wide measures:

– introduction of financial and tax policy measures;

– development of mechanisms provided for in Article 6 of the Paris Agreement;

– development of a system of public non-financial reporting of companies;

– increasing energy and environmental efficiency;

– implementation of best available technologies (BAT) to technological processes;

– providing government support measures for carbon-free technologies;

– increasing the use of secondary energy resources, involving waste in production cycles and in the production of goods;

– setting industry targets to reduce greenhouse gas emissions;

– changes in tax, customs, and budget policies taking into account the challenges of development with low greenhouse gas emissions;

– taking into account the balance of greenhouse gases when making budgetary expenditures and investments;

– development of sustainable green finance;

– adoption of adaptation plans; and

– support and dissemination of technologies for the capture, disposal, and further use of greenhouse gases.

The strategy was criticized by the international and Russian expert communities. Despite the fact that the final version was more ambitious than the original draft and adopted the intensive scenario with the introduction of additional regulation as the baseline, the emission reduction targets were assessed as not ambitious enough [Climate Action Tracker, n.d.]. The strategy gives Russia significant room to actually increase emissions. Emission targets assume growth until 2030. In addition, a significant role in achieving carbon neutrality is given to absorption by forests and other natural objects. Although Russia has considerable potential for absorbing emissions, the implementation of such a scenario requires the most effective policy in the field of forest management, including in the field of combating forest fires. The forecast of the carbon balance of Russian forests for the period up to 2050 shows that, while maintaining current levels of forest use and forest disturbances from fires, net absorption of CO2 by 2050 will not increase but rather will decrease to 367 million tons per year due to an increase in the average age of forest plantations. Another factor in reducing carbon sink is the planned increase in forest use and timber harvesting [Korotkov, 2022a]. It is also noted that at a certain point Russia included unmanaged forests in its absorption potential, which contradicts the methodology adopted by the UNFCCC [Climate Action Tracker, n.d.].

In 2022, the strategy was published by the UNFCCC with explicit reference to the intention to achieve carbon neutrality by 2060. By the time the strategy was officially presented on international platforms a plan for its implementation had to be approved, ensuring that it was filled with specific measures, as well as indicating the timing of their implementation. At the beginning of February 2022, the Ministry of Economic Development prepared a draft implementation plan for the strategy [RBC, 2022]. The plan proposed tax measures, including "the application of a zero rate of income tax and VAT on the trading of carbon units." The authorities also planned to “reimburse Russian organizations for part of the costs of paying interest on bonds or loans when introducing green technologies.” The Ministry of Finance and the Ministry of Economic Development were supposed to determine measures for financial (including fiscal) incentives for businesses to reduce greenhouse

gas emissions in 2022. The same departments should have worked on introducing emission quotas and tax benefits in certain sectors of the economy. Moreover, according to the draft plan, a slight reduction in emissions by 2030 was anticipated; this meant increasing the ambition of the strategy, which had initially envisaged an increase. However, changing geopolitical and economic conditions led to a delay in agreeing on the plan. The Russian Union of Industrialists and Entrepreneurs (RUIE) asked to postpone the plans's approval to the first quarter of 2023, but at the time of writing, it had not taken place.

Restrictions on access to technology, the associated increase in costs, and the reduction in budget revenues due to imposed sanctions have significantly worsened the prospects for the implementation of the strategy. In November 2022, experts from the Institute of National Economic Forecasting (INP) of the Russian Academy of Sciences conducted a study and concluded that sanctions have limited Russia's ability to reduce emissions. CO2 emissions will decrease to 1.119 billion tons by 2050 instead of 630 million tons as had been planned in strategic documents. Thus, Russia's potential to reduce greenhouse gas emissions will be approximately halved [Vedomosti, 2023]. Also, according to their calculations, to achieve carbon neutrality by 2050, total investments in decarbonization in the amount of 458 trillion roubles will be required. Over 28 years, this, in turn, will lead to rising prices and a fall in GDP. To reduce CO2 emissions to 441 million tons by this time, comparable smaller investments will be required - 182 trillion roubles, to reach the emissions of 532 million tons - 149 trillion roubles. The option closest to the approved strategy—reducing emissions to 671 million tons by 2050—will require investments in the amount of 108 trillion roubles (approximately 4 trillion roubles per year) [Vedomosti, 2023]. The Center for Energy Efficiency (CENEf) estimates that the carbon neutrality target for 2060 is still achievable but expected energy-related emissions in 2060 will be 80 MtCO2 higher than the 4D (Development Driven by Decarbonization and Democratization) scenario (2022 year). This is how many additional sinks in the land use, land-use change, and forestry (LULUCF) sector will be needed to achieve carbon neutrality in 2060. However, a decrease in carbon absorption in the LULUCF sector in 2021 by 73 Mt CO2 makes hopes for this sector as a "magic pill" increasingly illusory [Bashmakov, 2023].

The imposed restrictions and sanctions have not only significantly limited Russia's ability to decarbonize but have also led to an increase in emissions at the global level. The forced change in supply chains after the introduction of anti-Russian sanctions in 2022 led to an increase in greenhouse gas emissions from shipment, according to the study "Decarbonization of Long-Distance Logistics" conducted by Skolkovo experts [Perdero et al., 2022]. The airspace closure has increased the length of routes between Europe and the northern Asia-Pacific region and between the United States and India. An average increase in flight time of 3.5 hours orresponds to approximately 40 tons of CO2 for each flight [Perdero et al., 2022]. In addition, research shows that greenhouse gas emissions from LNG production, transportation, liquefaction, and regasification can be almost equal to those generated by gas combustion, effectively doubling the climate impact of every unit of energy produced from gas transported overseas. By some estimates, in 2022 the carbon footprint of European gas supplies as a whole, including pipeline and liquified natural gas (LNG), increased from approximately 30 kg CO2 per barrel of oil equivalent to 37 kg CO2 per barrel of oil equivalent as a result of the increased share of LNG [Ghilotti, 2022].

Thus, sanctions pressure and the partial economic isolation of Russia negatively affect not only the country's decarbonization prospects but also global emissions and, therefore, the ability to achieve the Paris goals. Despite this, a number of promising areas of low-carbon development policy remain, the implementation of which will contribute to reducing the negative effects of climate change on the Russian economy, will strengthen cooperation with key partners, and will prevent Russia from being completely isolated and excluded from global climate regulation.

Implementation of Climate Projects and Voluntary Carbon Market

The main instrument of Russia's climate policy, which represents a compromise between the authorities, society, and business, is climate projects, especially in the forestry sector, and the development of a voluntary carbon market as a pricing tool. The voluntary nature of the instrument, the significant role assigned to the absorption of emissions by forests in the NDC, the project-based approach traditionally preferred for Russian socio-economic policy, and the often-misleading perception of forest projects as easy to implement determine the choice in their favour. The central role was assigned to forestry projects from the very start; they are mentioned in the law On Limiting Greenhouse Gas Emissions in contrast to, for example, direct pricing or other instruments. Agreeing on the terms of implementation, verification, and accounting was one of the main tasks of the Russian delegation at COP 26 in Glasgow, and everyone was pleased to note the progress in this direction following the meeting in 2021. In addition, Russia joined the global forest initiative but did not become a party to other similar agreements to reduce methane and phase out coal.

In September 2022, regulations covering the implementation of climate projects in Russia and the release of corresponding carbon units came into force. According to the law, all such projects must be validated by one of the greenhouse gas validation and verification bodies accredited by Rosaccreditation and then registered in the prescribed manner in the carbon units register [Government of the RF, 2021f]. In November 2022, Rosakcreditation reported on the registration of 12 such bodies [2022]. In 2023, several more applications for the status were satisfied, accreditation rules were updated,[1] and a plan for the transition of participants in the national accreditation system to the use of national standards identical to international ones was approved [RusAccreditation, 2023]. There are currently 13 climate projects registered on the carbon credits registry, with 87 508 carbon credits issued and 63 926 635credits to be released [Registry of Carbon Units, n.d.].

At this stage, the main focus in Russia is on forest climate projects, although they represent only one type of this instrument. A climate project is a set of measures that reduce (prevent) greenhouse gas emissions or increase the absorption of greenhouse gases. To be considered climate-friendly, a project must also meet the following criteria:

- it must not contradict the law and must be carried out in accordance with the requirements of the national standardization system;
- it must not lead to an increase in greenhouse gas emissions or a decrease in the level of their absorption outside the project;
- it must be additional to activities aimed at fulfilling the provided mandatory requirements;
- it must not be a consequence of a reduction in production; and
- reduction of greenhouse gas emissions or increase in their absorption during the project implementation period is not the result of the influence of factors not related to project activities.

Climate projects include projects in the field of low-carbon energy, resource conservation, efficient waste management, sustainable agriculture, and reforestation projects [Registry of Carbon Units, n.d.]. Russia has great potential in the implementation of both natural and technological climate projects. According to various estimates, in the next few years their volume could reach 1.5–10 million carbon units [Soldatova, 2023].

It is estimated that, to meet national targets, it is necessary to neutralize up to 20–30% of emissions from large companies through climate projects by 2050, which amounts to about 150–

[1] The updated procedure includes the submission of an application and documents, their acceptance and verification by RosAccreditation for compliance with established requirements, formation of an expert group, assessment of the applicant's compliance with accreditation criteria, and making a decision based on the results of the accreditation procedure.

200 million tons of CO2 equivalent [Aptekar, 2023]. In September 2023, it was announced that the first forest climate project had been launched in Russia. The operator of the Register of Carbon Units, JSC Kontur, introduced information about Roslesinforg's forest climate project on Sakhalin Island into its system. This is the first such project to be validated [Zadera, 2023]. The Sakhalin project aims to increase the absorption of greenhouse gases on the island. As part of its implementation, a larch forest will be created on swampy non-forest lands with subsequent protection from fires. In total, 21 million trees will be planted on 6,100 hectares by 2028. Over the entire period, they will neutralize 1.5 million tons of harmful emissions and the same number of carbon units will be released into circulation [Roslesinforg, 2023].

Large Russian companies also report that they are carrying out forest climate projects. In 2019, the Rusal company began implementing its pilot project in the Irkutsk region and Krasnoyarsk Territory. With its funds, more than 1.1 million pine seedlings were planted on an area of 520 hectares; over the next five years, all necessary measures to care for these forests (supplement, agrotechnical, and silvicultural care) will be financed [Ecosphere, 2023]. In November 2022, the first pilot stage of the Uralchem forest climate project started in the Labinsky district of the Krasnodar Territory. More than 15,000 oak, walnut, and ash seedlings were planted on three sites with a total area of 7 hectares [Uralchem, 2023]. These projects have not been validated and are intended to help assess the potential impact of implementation and, if positive results are obtained, to lay the foundation for further formalization. Other companies are also voicing their interest in the initiative, launching pilot projects, and agreeing on cooperation with research centres [Parfenenkova, 2022].

Given Russia's great potential for absorbing emissions, forest climate projects can make a significant contribution to achieving carbon neutrality. However, their implementation is associated with a number of risks and limitations. Forest climate projects are prolonged and often require additional investments in irrigation and forest protection. Reducing the level of CO2 in the atmosphere through forests requires constant effort, which should become more and more ambitious every year. In addition, such projects are not economically feasible in areas smaller than 10,000 hectares, and the yield of carbon units can vary significantly depending on the structure of the forest [Aptekar, 2023]. The main risks to forest climate projects are carbon leakage, death of forest stands as a result of fires, diseases, and other causes, and termination of project funding [Korotkov, 2022b].

Despite their apparent simplicity, forestry projects are perhaps the most complex type of climate solution. Not only do these projects require the special knowledge and skills of highly qualified forestry specialists, but they are also exposed to natural and other risks that are difficult to control and manage. According to experts in the field of forest management, in any case, when choosing measures to achieve established climate goals, it is necessary to start with measures to reduce greenhouse gas emissions and resort to carbon sequestration measures to neutralize unavoidable emissions from sources for which there are no adequate low-carbon technologies [Korotkov, 2022b]. Even if forestry projects are effectively implemented, according to some estimates, two thirds of emission reductions will have to be achieved through industrial technologies [Ecosphere, 2023].

The implementation of other types of climate projects can make a significant contribution to the decarbonization of the country. They will still be voluntary and push the development of a carbon market, but they will help reduce emissions. There are currently 13 climate projects registered in the carbon registry, six of which are not related to forests and emission absorption [Registry of Carbon Units, n.d.]. The projects are aimed at reducing greenhouse gas emissions by modernizing equipment, introducing renewable energy sources, and connecting new less carbon-intensive installations—these projects are technological in nature.[2] The introduction of such

[2]For example, the construction of a plant for the production of liquefied carbon dioxide with a capacity of 4 t/h in order to reduce greenhouse gas emissions of NAC AZOT JSC; the reduction of greenhouse gas emissions by changing the production technology of dioctyl terephthalate (DOTP) of SIBUR-Khimprom JSC; the construction of

initiatives by a larger number of economic entities and their scaling can reduce emissions and reduce overreliance on absorption.

An efficient carbon market is necessary to stimulate the implementation of climate projects, especially technological ones. In Russia it is in its infancy. The carbon market is a mechanism for financing projects and technologies that contribute to climate change mitigation, but are unprofitable without monetizing their climate impact. Since this product is intangible, the main difficulties are the provision of specific, understandable, fairly strict, but at the same time feasible rules, and the introduction of integrity guarantees, as well as a convenient infrastructure for buyers [Soldatova, 2023].

The lack of officially approved and systematized methodologies for climate projects impedes the development of the carbon market. The state union standard (GOST) allows the climate project implementer to use the methodology of any international standard or develop it independently, guided by the requirements of the Ministry of Economic Development of the Russian Federation. In an attempt to solve this problem, Gazprombank Bank and the Institute of Global Climate and Ecology, named after academician Yu. A. Israel, concluded an agreement in February 2022. As part of this agreement, the institute's specialists will develop methodologies for implementing climate projects that will help improve the quality of Russian carbon units and increase their competitiveness. The list of 18 methodologies included in the agreement is based on the needs of potential climate project implementers who applied to the Russian register of carbon units [Soldatova, 2023] and on the characteristics of each specific area of project implementation. Using an internationally recognized methodology is the preferred option, as it makes verification easier for those who want to offset units in foreign markets and reduces barriers to Russia's access to global markets. Internationally approved methodologies for projects of various scales and industries were developed for the implementation of clean development mechanism projects of the Kyoto Protocol and are still used today [Clean Development Mechanism, 2023].

On 26 September 2022, the National Commodity Exchange held the first exchange transactions with carbon units. These transactions took place in the mode of commodity auctions. At the end of the first day, two transactions for the purchase and sale of carbon units with a total volume of 20 units were concluded. The weighted average selling price was 1,000 roubles per piece [MOEX, 2022]. In September 2023, RusHydro and Udokan Copper signed an agreement for the purchase and sale of carbon units. RusHydro sold part of the carbon units received from the implementation of the climate project at the Vladivostok CHPP-2, converting it from coal to gas [RusHydro, 2023].

Russian companies have successfully participated in the international carbon market. For example, JSC Lesozavod-25 and OJSC Arkhangelsk Pulp and Paper Mill, based on the results of projects involving the combustion of wood waste to generate energy for their own needs, verified and sold over 800,000 voluntary emission reduction units worth about 1.5 million euros [Uledova, Yulkin, 2023]. Two more Russian projects are registered in the verified carbon standard (VCS) registry of the Verra company—the project for the conservation of intact forests of the Terneyles company (at the validation stage) and the Core Carbon Group project to reduce methane leaks in low-pressure gas distribution networks in the Tomsk region [VERRA, n.d.].

It is important to note that the possibility of transferring carbon units to foreign registers was not provided [Uledova, Yulkin, 2023]. All carbon units issued in the registry can only be circulated within the registry and cannot be transferred to the owner's account in a foreign registry. This creates another barrier for companies that would like to enter international carbon markets.

The implementation of climate projects and the development of a voluntary carbon market could become the main, but not the only, tool for achieving Russia's climate goals and increasing their

a plant-wide flare system Minnibaevsky gas processing plant of the Tatneftegazopererabotka Department; and the reduction of specific greenhouse gas emissions at the Vladivostok CHPP-2 through modernization via the replacement of coal-fired boilers No 12–14 with gas ones.

ambition in the future. To do this, it is necessary to continue to develop methodologies for assessing efficiency and standards for verification and validation, stimulate the implementation of technological projects, more seriously study and understand all the limitations and potential costs of forestry, and lay down the conditions for the participation of Russian companies in international carbon markets.

Sakhalin Project

An experiment to limit greenhouse gas emissions began on Sakhalin from 1 September 2022 and will end on 31 December 2028. Its goal is to achieve carbon neutrality in the Sakhalin region by 31 December 2025. It is expected that it will become a testing ground for the implementation of various climate policy instruments, and its results and outcomes will be able to lay the foundation for conducting similar experiments in other regions and further scale up regulation throughout the country.

Sakhalin is a prototype of an internal carbon market. The Sakhalin experiment will test various carbon regulation measures and evaluate their effectiveness for subsequent scaling up at the country level. So far, only a voluntary market is actively developing in the country, but without the introduction of mandatory restrictions and either trading in emissions quotas or a carbon tax in the long term, subject to the easing of external restrictions, it will be difficult to ensure a real reduction in emissions.

Starting from 2023, large Sakhalin emitters that emit more than 50,000 tons of CO2 equivalent will fall under the quota system, and in 2025, the experiment will also affect companies whose emissions exceed 20,000 tons. The government of the Sakhalin region has approved a list of regional organizations regulated as part of the experiment. It listed 50 companies, including Sakhalin Energy (operator of the Sakhalin-2 PSA project), NNK-Sakhalinmorneftegaz, Sakhalin Shipping Company, Russian Railways, Gazprom Dobycha Shelf Yuzhno-Sakhalinsk, RN-Shelf-Far East, and Aurora Airlines. At the end of September 2023, the regional authorities of the Sakhalin region approved greenhouse gas emission quotas for 35 organizations regulated within the framework of the experiment, which, based on the results of verification, submitted reports for 2022 exceeding the threshold of 20,000 tons of CO2. By 2025, these companies will have to collectively reduce about 160,000 tons of CO2 equivalent, which is less than 2% of the 2022 emissions level, taking into account plans for production growth [Interfax, 2023].

The main measures to reduce greenhouse gas emissions are gasification and the development of renewable energy sources. The goals for 2025 are 100% technical gasification of the Sakhalin region, conversion of 145 coal boiler houses to gas, gasification of 37,237 households and 157 enterprises, and to have 66 municipal enterprises connected to natural gas. Compensation payments to citizens and subsidies to legal entities—producers of gasification works for residential buildings who have concluded agreements with citizens in the prescribed manner—are expected. Less than 1% of energy is generated from renewable energy sources in the Sakhalin region, as in Russia as a whole; it is planned to increase the share of renewable energy sources to 15% by 2026 [Skokov, Guzenko, 2023].

Also, the goal of the experiment is to reduce methane emissions in the waste sector through separate waste collection and the launch of waste recycling infrastructure. The government of the Sakhalin region set the goal of increasing the share of gas-powered and electric vehicles in the total share of transport to 50% in 2025. To achieve the goal, a whole package of incentive measures is provided, including various subsidies, zeroing out the transport tax, compensation, and procurement. Among the measures to implement the experiment are the development of hydrogen energy and the introduction of carbon capture and storage technologies.

Thus, the most ambitious project in the history of Russia for a truly comprehensive decarbonization policy is underway on Sakhalin. Initially, a larger role was given to mandatory pricing instruments and regulation. Changes in external and internal economic conditions have

already delayed the start of the project, increased the time frame for achieving set goals, and shifted attention to forestry and other climate projects. But conducting this experiment is necessary as a starting point for the practical implementation of the tools that are provided for in the Low-Carbon Development Strategy Until 2050 in order to identify their limitations and potential. At the national level, many policies were also launched but eventually faced severe restrictions due to sanctions.

Development of the Hydrogen Industry

In August 2021, the Concept for the Development of Hydrogen Energy in the Russian Federation was released. The concept emphasized that the development of hydrogen energy will reduce the risks associated with the global trend toward decarbonization and have a positive effect on the economy by diversifying the export structure, reducing the carbon footprint of exported industrial products, and attracting investment in projects for the production and use of hydrogen [Government of the RF, 2021b]. It is also noted that "the Russian Federation can provide a competitive price for hydrogen in both the European and Asia-Pacific markets." At the same time, one of the main tasks is to overcome systemic development limitations, including ensuring cost-effective transportation of hydrogen, which requires the development of infrastructure and technology. In 2021, the potential volumes of hydrogen exports from the Russian Federation to the world market were estimated as follows: up to 0.2 million tons in 2024, 2–12 million tons in 2035, and 15–50 million tons in 2050, depending on the pace of the development of a global low-carbon economy and growing demand for hydrogen in the global market. Russia planned to occupy a fifth of the global hydrogen production market, including by increasing the export of hydrogen extracted from natural gas to the EU countries [Solovyova, 2023].

The Concept for the Development of Hydrogen Energy initially envisaged the development of an export-oriented industry in Russia; the main buyers were the EU, Japan, Korea, and China. It is obvious that in the new conditions all goals will be revised. The Ministry of Energy of the Russian Federation later adjusted its export forecasts: the target for export potential was reduced from 9.5 million to 4.5 million tons and the forecast for actual exports was reduced from 2.2 million to 1.4 million tons per year by 2030. Now the priority has become the development of Russia's technological competencies and meeting the needs of the domestic market. Currently, several dozen companies are engaged in hydrogen technologies in Russia, including Gazprom, Rosatom, RUSNANO, NOVATEK, and H2 Clean Energy. These companies are developing and investing in technologies for the production, storage, and transportation of hydrogen and CO2 recycling, as well as the use of hydrogen in various fields of industry, energy, and transport.

In Russia, based on considerations of profitability, only technologies for the production of blue and brown carbon, from gas and coal, were considered. Such hydrogen is more economically profitable and less energy intensive. In Europe, which was supposed to become the main export destination, and in other countries, for example, Japan, preference is given to green hydrogen, which is produced using renewable energy sources. At the time of writing the strategy, there was no such unambiguous attitude toward methods of producing hydrogen in the EU; however, after the adoption of the REPowerEU plan in early 2022, a preference for green hydrogen was established. China may still be a promising partner, but it has plans to widely develop its own production technologies. This must be taken into account when developing long-term plans for the development of the industry.

Using nuclear energy for the development of the hydrogen industry may be a promising direction for Russia. Nuclear power reactors can be coupled with a hydrogen production plant to form a single cogeneration system that can cost-effectively produce both electricity and hydrogen [Fisher, 2020]. In 2019, Russia launched its first initiative to produce hydrogen using nuclear energy. The programme implemented by the State Atomic Energy Corporation Rosatom provides for the use of electrolysis based on electricity generated by nuclear power plants, as well as thermochemical production using high-temperature gas-cooled reactors. Russia's first nuclear power

plant for hydrogen production is planned to be launched by 2033, and put into commercial operation by 2036 [RIA, 2021].

Decarbonization of Transport

In 2019, fuel combustion in transport accounted for about 15% of all greenhouse gas emissions in Russia. In 2019, 61% of emissions came from road transport, 5% from aviation (domestic), 3% from railway transport, 1% from sea and inland waterway transport, and 27% from pipelines (oil and gas pipelines) [Russian Socio-Ecological Union, 2022]. Reducing transport emissions is essential to achieving overall climate goals. Russia's transport strategy, adopted in 2021, emphasizes that the state's mission in ensuring the functioning and development of the transport system is, among other things, expanding access to safe and high-quality transport services with minimal impact on the environment and climate [Government of the RF, 2021c]. Climate change is named in the strategy as one of the threats to the development of the transport system in the country. According to the text of the strategy, "to reduce greenhouse gas emissions in the Russian transport sector, road transport is a priority." Air travel, rail transport, inland waterways, and maritime transport are also important sectors for subsequent decarbonization, although they make a relatively small contribution to greenhouse gas emissions.

Creation of incentive and regulatory conditions for large-scale changes in the structure of freight and passenger turnover in favour of less carbon-intensive modes of transport will be an important tool for reducing greenhouse gas emissions from transport. The strategy proposes several main directions to reduce emissions in road transport: the use of energy-efficient vehicles, the use of hybrid energy storage systems, electrification and gasification of public transport, stimulating the transition to the use of less carbon-intensive models, transfer of automobile transport to hybrid analogues, and development of charging infrastructure for electric vehicles. At the same time, the implementation of a more aggressive forecast for reducing emissions involves the introduction of new transport and information technologies, automatic driving systems, a large-scale change in the structure of freight and passenger turnover in favour of less carbon-intensive modes of transport, large-scale promotion of vehicle sharing, and the development of cycling and other non-motorized transport.

In 2021, the government presented the Concept for the Development of Production and Use of Electric Road Transport in the Russian Federation for the Period Until 2030 [Government of the RF, 2021d]. The key directions of state policy in the development of production and use of electric vehicles on the territory of the Russian Federation include: improving legislation; removing regulatory barriers; stimulating the development of charging infrastructure; stimulating demand for domestic electric vehicles; production of traction batteries and components for them, as well as hydrogen fuel cells and related systems; production and localization of electric vehicles, including hydrogen fuel ones; creation of a testing base for certification and development work when designing cars with a low carbon footprint; and creation of hydrogen infrastructure. According to the Concept for the Development of Electric Transport in the Russian Federation, by 2030 every 10th car produced in Russia will be electric. According to plans, in eight years the country will produce about 220,000 electric cars per year, and the total number of electric vehicles will exceed 1.4 million; at least 15 thousand charging stations will be put into operation, more than a third of which will be for fast charging electric cars. There is also a state support programme for the electric vehicle market in Russia. From 1 January 2023, the state will compensate 25% (up to 625,000 roubles) for the purchase of an electric car. The main thing is that the car is assembled in the country. Currently, Evolute cars are eligible for the programme [Expobank, 2023].

The reduction in the cost of electric transport, the ability to supply it from friendly countries, primarily China, the developing battery production in the country, the large potential for lithium mining, and the expanding charging infrastructure create favourable conditions for the

decarbonization of Russian road transport, even under restrictions.

Carbon Capture, Storage and Use

Another promising area of low-carbon development policy for Russia could be the development of carbon capture, utilization, and storage (CCUS) technologies. Such technologies include technical processes that allow capturing up to 90% of CO2 emissions. These include separating CO2 from industrial and energy sources or the atmosphere, transporting it to storage and long-term isolation from the atmosphere, or using it to create new products. At the same time, leading international organizations note the key role of CCUS technologies in achieving global carbon neutrality, and according to Intergovernmental Panel on Climate Change (IPCC) estimates, achieving global climate goals will be 138% more expensive without the deployment of CCUS technologies [Osiptsov et al., 2022]. Bloomberg New Energy Finance calculated that more than 174 billion tons of CO2 must be captured by the 2050, otherwise achieving net zero will be almost impossible [Hostert et al., 2022].

In Russia, businesses like Novatek, Gazprom, Gazprom Neft, NMLK, Rosneft, and Tatneft are announcing plans to use CCUS technologies. Rosneft plans to prevent emissions of 20 million tons of CO2 equivalent greenhouse gases by 2035, and the launch of a pilot CCUS project is expected in 2028. Tatneft has planned to achieve carbon neutrality by 2050 thanks to the implementation of CCUS projects. Gazprom Neft is investing about 30 billion roubles into a project in the Orenburg region for carbon capture and storage and has entered into an agreement with the government of the Sakhalin region on cooperation in the field of sustainable development and the implementation of climate projects and programmes in the island region. Novatek and Severstal are planning to jointly implement a pilot project to produce blue hydrogen from natural gas using carbon dioxide capture and storage technologies. Novatek is also collaborating with NLMK to study the prospects of hydrogen and technologies for capturing and storing CO2. CCUS projects may be of interest to petrochemical companies.

The CCUS industry is not currently listed as a foreign sanctioned industry sector. However, the sanctions lists may include technologies that are simultaneously used in both oil refining and CCUS. Such conditions call into question international partnerships in Russian CCUS projects.

Russia has significant carbon storage potential. Capture and injection technologies are at an early stage of development in all countries, which means there is no significant lag yet, and there is an opportunity to occupy a niche in the emerging market. Large Russian companies are interested in reducing the carbon intensity of their production; they have the resources to implement pilot projects and finance scientific research and are ready to implement joint projects. The development and scaling of such technologies could help significantly reduce the carbon intensity of the Russian mining industry, which would contribute to reducing emissions from the sector, as well as making Russian raw materials more competitive in international markets in the face of rising emissions requirements.

Green Taxonomy and Financing

Low carbon transformation is impossible without sufficient funding. To create incentives for decarbonization and direct resources to truly climate- and environmentally neutral projects, countries and integration groupings are developing criteria for identifying projects as sustainable. In 2021, Russia adopted criteria for sustainable (including green) development projects and requirements for verification of financing instruments [Government of the RF, 2021e]. A project will be considered green or sustainable if it meets several basic requirements. The project must contribute to the achievement of the Paris or sustainable development goals; do no significant harm

to the environment; comply with the technological indicators of the best available technologies (BAT); reduce greenhouse gas emissions; preserve, protect, or improve the environment; reduce emissions and discharge of pollutants substances and/or prevent their impact on the environment; be energy saving; and increase the efficiency of resource use. Its implementation should lead to the achievement of an environmental effect that is material, meets the requirements of the legislation of the Russian Federation in the field of environmental protection, and is described in detail and verified [VEB RF, 2021].

The taxonomy also identifies eight main areas for implementing green projects and six for adaptation ones. Green projects can be developed in the areas of waste management, energy, construction, landscape management, drainage and water supply, industry, transport, and agriculture. In the energy sector, examples include generating facilities using renewable energy sources, construction of hydroelectric power plants, development of nuclear and hydrogen energy, development of urban and municipal heat supply systems using low-carbon energy sources, modernization or replacement of existing generation facilities with a significant increase in energy efficiency and/or reduction of emissions, and installation of co-generation. In industry, projects can be implemented to develop green steel, aluminum, and cement. Six main areas were identified for adaptation projects: waste management, energy (modernization of mining facilities aimed at significantly reducing emissions, modernization of oil refineries or gas processing plants, production and transportation of LNG, electricity and heat generation facilities, gas purification equipment, and dam hydroelectric power plants), sustainable infrastructure (creation and modernization of green infrastructure facilities), industry (production of metals, chemicals, polymers in accordance with requirements), transport, and agriculture [VEB RF, 2021]. In general, the taxonomy adopted in Russia clearly defines the criteria for project sustainability and was developed taking into account international requirements and experience.

After the adoption of the taxonomy, financial incentives for its implementation began to be actively discussed. As incentive measures, the easing of regulation by the central bank, zeroing the tax rate on green bond income for three years, and actual compensation for verification of green projects of up to 1 million roubles were discussed [Boyko, Grinkevich, 2021].

The Concessional Financing Programme for Green Projects and Sustainable Development Initiatives was officially launched in 2021. In 2023, despite the deteriorating economic situation, the list of green initiatives areas was expanded, and their implementation provides access to preferential financing through special bonds or loans. For example, the list of projects that may receive financial incentives includes the creation and modernization of infrastructure for the direct capture of greenhouse gases from the environment, as well as the capture and utilization of landfill gas with subsequent energy production, initiatives to modernize and repair infrastructure for hydrogen transportation, production of batteries, and their recycling and reuse [Government of the RF, 2023a].

The development of the green bond market in the country is not progressing at a very fast pace. The overall volume of sustainable development securities is 250 billion roubles, most of which were placed in 2020 and 2021, although the first issues date back to 2016. The market is concentrated: the three largest issues are worth 70 billion, 50 billion, and 25 billion roubles placed by the Moscow government, VEB.RF, and Sberbank, respectively. These issuers have become the driving force behind the development of the sustainable development segment. Issues from the real sector or securitization usually do not exceed 10 billion roubles [Avtukhov, 2022]. It is noted that one of the constraining factors for growth is the lack of a discount in the coupon rate.

Further development of the green bond market will depend on the general financial and economic situation in the country. In 2022, the market, expectedly, dropped significantly, but it is noted that a gradual revival was expected in 2023 [Gorchakov, Panicheva, 2022]. The revival of the financial market will likely lead to an increase in the issuance of green bonds.

Important aspects of low-carbon development: energy efficiency, waste management, and methane emissions reduction.

Russia also has the potential to reduce emissions through the implementation of policies to increase energy efficiency and improve waste management. In September 2023, the comprehensive strategy Energy Saving and Increasing Energy Efficiency was approved. The document notes that in 2015–21, the average annual rate of decline in the energy intensity of the gross domestic product of the Russian Federation was 0.6%, lagging behind the European average by 5.4 times and the world average by 3.1 times [Government of the RF, 2023b]. In 2021, the most energy-intensive industries were electric and heat power (27%), manufacturing (20%), construction and housing and communal services (10%), transport (15%), mining (10%), and population (17%).

The strategy provides for measures to stimulate cogeneration (when electricity generation makes it possible to rationally use associated heat), the development of alternative and renewable energy sources, the conversion of boiler houses to economical types of fuel, and the reduction of losses of electricity and heat. In industry, energy efficiency should be improved by introducing the best available technologies and energy management principles. In construction and housing and communal services, it is planned to stimulate the use of environmentally friendly and highly energy efficient building materials.

Russia is also improving its waste management policies. In June 2022, a federal law was adopted aimed at improving legal regulation in the field of industrial and consumer waste management. It introduced the concepts of "secondary resources" and "secondary raw materials" and established requirements for the handling of secondary resources, including a ban on their disposal. The law provides for the establishment of lists of types of goods, works, and services, the production, execution, and provision of which is allowed only using a certain share of secondary raw materials and for which incentives are provided, as well as types of goods, the production and use of which are not allowed due to the impossibility of processing and disposal. The federal law on environmental protection was supplemented with Article 511 Requirements for Handling Production By-Products. It stipulates that by-products accompanying the main manufacturing process should not pollute the environment and its components, including soils, water bodies, and forests. In addition, the federal law clarifies certain provisions regarding the management of production and consumption waste, fees for negative impacts on the environment, licensing of certain types of activities, and other provisions of legislative acts of the Russian Federation [President of Russia, 2022].

Measures to improve energy efficiency and waste management help reduce the carbon intensity of the economy, increase its efficiency, and have important effects not only in reducing emissions, but also in eliminating other negative impacts on the environment.

Measures to adapt to climate change will play an increasingly important role in Russian policy. The first national adaptation plan was adopted in 2019, and its implementation was completed in 2022. In March 2023, the implementation plan for the second stage of adaptation activities was presented. Measures to adapt to climate change are a separate, significant area of climate policy that deserves detailed in-depth analysis. This article focuses on emission reduction tools and therefore does not analyze adaptation measures in depth.

Important Industries in New Realities: Nuclear Energy and Critical Raw Materials

Widespread decarbonization and the development and scaling of new climate-neutral technologies are significantly increasing demand for the materials needed to produce them. The extraction, processing, and supply of critical raw materials (CRMs) is becoming a central topic of discussion in the world's leading economies. The EU and Japan are actively developing both their domestic policy in the field of global CRMs supply and promoting their interests at major international

platforms, such as the Group of 7 (G7), the Group of 20 (G20), and the United Nations (UN) General Assembly. Achieving climate neutrality by the largest economies will require enormous amounts of raw materials, the supply of which is still limited. China is the leader in proven reserves and production of such materials, but they are mainly used to meet the needs of domestic industry; China periodically imposes export restrictions. Economies whose reserves are limited, primarily the EU, are looking for niches in the still very poorly developed international market in order to ensure the necessary supply volumes, without which it will be impossible to develop local production of technologies on the desired scale. Countries with significant reserves of CRMs essentially own one of the most valuable resources of a future climate-neutral economy.

Russia has one of the largest proven reserves of CRMs and rare earth elements. Russia has the fourth largest reserves of rare earth metals in the world (12 million tonnes) after China (44 million tonnes), Vietnam (22 million tonnes), and Brazil (21 million tonnes).

Despite the impressive reserves, after the collapse of the Soviet Union, Russia has failed to realize this potential and kick start production. With the fourth largest reserves, the share of global production is only 1.3%. Russia's main reserves are concentrated in hard-to-reach and poorly studied deposits. Only Lovozerskoye is being developed, where complex loparite ores are mined, containing, in addition to rare earth metals, tantalum, niobium, and titanium. The enriched ore is sent to the only Solikamsk magnesium plant in the country, where an intermediate product is obtained—a collective carbonate concentrate of rare earth metals. To extract metals needed by industry, it must be separated into oxides. There are no enterprises in Russia capable of doing this on an industrial scale. After the collapse of the Soviet Union, Russia lost its links with the factories in Kazakhstan and Estonia. The collective concentrate was sent there for processing [RIA, 2022]. As a result, Russia, possessing one of the world's largest mineral raw materials bases, was nevertheless entirely dependent on the import of CRMs.

In 2020, a set of measures was announced, including an investment plan that should help Russia to "significantly increase the production of rare earth metals critical for electronics and defence, in order to reduce dependence on imports in five years, and by 2030 become second only to China" [Reuters, 2020]. To stimulate the development of the industry, the Russian Federation reduced the tax on the extraction of rare metals from January 2020 to 4.8% from 8%, introduced a reduction factor of 0.1 for new projects for 10 years from launch, and provided preferential loans and the possibility of subsidizing the rate. Also, the government, together with the state corporation Rosatom, approved a road map for the development of the industry, including 11 projects with the participation of private investors with investments of 100–110 billion roubles. They should allow Russia to become better supplied with rare earth products in five years, begin exporting in 2026, and become a major global player with a 10% share of production by 2030 [Ibid.].

The development of production and, most importantly, technologies and enterprises for the extraction and processing of CRMs can lay the foundation for the growth of Russia's export profits in the context of widespread decarbonization and compensate for the decrease in part of the income from the sale of hydrocarbons after a reduction in global demand in the long term. Therefore, this industry should become a priority and receive the necessary incentives and funding even from a limited budget.

Another strategically important area of low-carbon development and decarbonization is the development of nuclear energy both domestically and through international partnerships. The share of electricity generated by nuclear power plants in Russia is about 20% of all electricity produced. [Rosatom, 2023]. Thanks to their work, over 100 million tons of carbon dioxide are prevented from being released into the atmosphere each year. Russia plans to increase the share of nuclear energy in the country's electricity production balance to 25% by 2040, and the country's share in the global market for low-power nuclear power plants will reach 20% by 2030 [Novak, 2022].

Many countries and regional groupings consider nuclear energy to be environmentally friendly. Russia and China have included nuclear energy in their national taxonomies of green projects, and nuclear generation is also classified in the green category under the international climate bonds

verification standards. In the summer of 2022, the European Parliament supported labelling nuclear energy in the EU taxonomy as a "transitional" energy source [Novak, 2022]. The role of nuclear energy as an industry that ensures the achievement of climate neutrality goals is also confirmed by its classification as a low-carbon technology by the Rome Energy Initiative of the G7 in 2014 and subsequent G7 documents. Today, 58 reactors are under construction in 18 countries.

The Russian nuclear industry ranks first in the world in terms of its foreign projects portfolio size: 34 power units in 11 countries are at various stages of implementation. This portfolio constitutesover 70% of global nuclear power plant exports. In addition, the Russian state corporation Rosatom is the only company in the world that has competencies in the entire technological chain of the nuclear fuel cycle. Rosatom fully ensures the production of key equipment for all nuclear power plant construction projects in Russia and abroad [Novak, 2022]. Russian specialists are constructing nuclear power plants in China, India, Bangladesh, Turkey, Hungary, the Republic of Belarus, and Egypt.

Further development of Russia's enormous scientific and technical potential in nuclear energy, including in the field of pink hydrogen, to strengthen international leadership positions and partnerships may be the basis for overcoming isolation and increasing the country's feasible contribution to global decarbonization.

Opportunities for International Cooperation

The dynamic development of Asian and Latin American economies and constantly deteriorating relations with developed countries have led to the realization of the need to diversify the country's export flows and partnerships. However, the so-called "turn to the East" was carried out extremely slowly. The geopolitical crisis of 2022, the imposed and expanding sanctions, and the partial isolation of the Russian economy have accelerated the process of reorientation of the foreign policy and foreign economic course. BRICS countries and other developing economies, as well as partners in the EAEU are considered as the main partners for climate cooperation. Inside Russia there are increasing calls to develop non-western approaches to climate policy jointly with these states.

When business or government representatives talk about "non-western" approaches, they do not specify what they mean. Among the instruments acceptable to Russia are forestry and other climate projects, the development of gas engine fuel, hydro, and nuclear energy. All of these decarbonization policies are being implemented in developed western countries. Climate projects and carbon trading are among the important mechanisms for implementing the Kyoto Protocol, so they can hardly be considered a traditionally non-western mechanism. Probably, when speaking about western approaches, they mean direct carbon pricing, widespread deployment of renewable energy sources, and the introduction of standards for certain industries, as well as carbon border adjustments. Direct pricing in the form of cap-and-trade or carbon taxes is indeed implemented in most developed countries. But, for example, in the United States there is no nationwide regulation, in Japan, at the moment, quota trading is carried out only in two municipalities, in Australia they opted for alternative voluntary incentive instruments, and cross-border adjustment is introduced only by the EU and faces criticism even from partners in G7. At the same time, several developing countries have either already introduced direct carbon pricing, as China did with the launch of a nationwide cap-and-trade system and as South Africa did with the introduction of a carbon tax, or are considering such a possibility. Developing countries and BRICS partners, including new members, are employing the full range of decarbonization policies and generally do not exclude restrictive instruments. They, of course, always emphasize the principle of common but differentiated responsibilities, the priority of socio-economic development and growth, and the obligations of developed countries to finance the climate transition, but do not deny the need to decarbonize economies with the help of international financing and within the framework, for example, of partnerships for just energy transition.

Almost all BRICS and EAEU partners see climate projects (especially forestry projects) and a voluntary carbon market as important tools for decarbonization. At the same time, all partners, including Russia, face difficulties with recognition of standards for verification and validation of carbon credits at the international level. Development of common approaches and standards within the framework of the enlarged BRICS and the EAEU could ensure recognition of partner countries' units, creating a potentially very wide market. A single standard for a significant number of jurisdictions would increase its credibility and the likelihood of international recognition. A common position of countries would also help them to work together to further develop the provisions of Article 6 of the Paris Agreement regarding the trade of carbon units between states and to achieve wider consideration of offsets in reporting.

The adoption of a common BRICS taxonomy of sustainable activities could stimulate the development of green finance markets in developing countries and strengthen the potential for mutual financing. Russia, China, and South Africa have already adopted their own versions of taxonomies; Brazil and India have not yet presented their criteria for project sustainability. It is advisable to begin work on harmonizing taxonomies and adopting a common version that would reflect the necessities and interests of all BRICS members.

In the energy sector, cooperation on issues of nuclear energy and the extraction of critical raw materials is promising. All BRICS partners, including new members, are considering expansion of nuclear energy use because it can help significantly reduce emissions. CRMs are the industry of the future, so cooperation and exchange of experience will be mutually beneficial. Cooperation on the production of electric mobility and batteries can also be developed.

Russia may also be interested in the best practices of its BRICS partners, for example, the concept of a circular carbon economy proposed by Saudi Arabia for the G20. Both countries are the largest exporters of hydrocarbons, the income from which plays a huge role in the budget. A complete phase out of this source of growth would undermine the foundations of socio-economic development and the social contract. Therefore, an alternative option is proposed that involves a gradual reduction in dependence on hydrocarbons with active decarbonization of the production industry and the development of alternative energy sources.

Solidarity on decarbonization issues across all international platforms is necessary to strengthen the position of developing countries. Defending the right to economic growth, resolving the debt problem of developing countries, and demanding compliance with the financing and technology transfer commitments by developed countries should be at the centre of the climate agenda of the BRICS and the G20, especially after BRICS' enlargement and the chance to increase the influence of the BRICS core group in the G20. It is important to use the expansion of BRICS and the upcoming presidencies of Brazil and South Africa in the G20 to promote and consolidate the interests of developing countries.

The request to remove climate-neutral technologies from sanctions also remains an important part of Russia's agenda in the international arena. The restrictions have not only hit Russia's ability to meet climate goals but have also led to a global increase in emissions.

The climate agenda and low-carbon development are becoming increasingly important priorities for Russia's partners in the EAEU. They all express interest in international cooperation and underline the threats they face due to climate change. The adoption of criteria for green projects (model taxonomy) at the EAEU level creates the basis for harmonizing approaches to the use of green financial instruments based on international recognition standards. Putting forward a common position on key issues of international climate regulation, primarily on Article 6 of the Paris Agreement and financing instruments for developing countries, would help represent the interests of EAEU members in a more consolidated manner at international platforms, primarily the UNFCCC.

Active participation in all formats of cooperation on climate issues may prevent further isolation and allow Russia to remain involved in decision-making and discussion on the most important areas of the development agenda. Global management in climate issues creates

mechanisms that will operate for decades, and some aspects of global cooperation are just being laid out now and will become effective closer to the middle of the century. Participation in these processes will allow a quicker return to cooperation with all actors when conditions change.

Conclusions

The Russian economic model, based on hydrocarbons export and cheap energy for citizens and businesses, will have to significantly transform if the global trend toward decarbonization strengthens. Initially the attitude toward low-carbon initiatives was sceptical; they were perceived as a direct threat to Russia's economic growth and international influence. The growing negative effects of climate change, which have resulted in significant economic losses, as well as the adoption of tough extraterritorial measures by Russia's partners, have forced the authorities to reconsider the attitude toward the climate agenda and see beyond its limitations and negative consequences. Since 2021, active development of national climate policy has begun, a number of strategies have been adopted for key sectors, the NDCs have been formulated, and a long-term low-carbon strategy has been adopted. The geopolitical crisis has significantly worsened the conditions for implementing policies and the ability to achieve goals that were already not ambitious enough. Despite this, many initiatives have been implemented and a number of regulations were adopted in 2023 to push decarbonization and adaptation of the economy.

Lower profits from hydrocarbons, which could have been used to ensure transition in the medium term, the de facto closure of the European market for both traditional hydrocarbons and promising hydrogen projects, and the ban on Russian exports in a number of industries covered by the carbon border adjustment mechanism (CBAM), affected the readiness of Russian business for new restrictions within the country.

However, the long-term nature of all climate challenges and the risks they pose, primarily for socio-economic development and growth, prevent Russia from simply forgetting about low-carbon development and cancelling already adopted initiatives. External conditions can change very quickly and, without the fundamentals of climate policy in place, a return to world markets and platforms will be extremely difficult. Reducing the level of greenhouse gas and harmful substances emissions and reforestation measures will benefit the health of citizens and, therefore, ensure the future efficiency of the economy. Thus, even under total isolation, for Russia it would be beneficial to take measures to reduce emissions and increase their absorption.

It is necessary to further improve and systematize the validation and verification of climate projects, bringing them into full compliance with international standards. Currently, entities actively apply to the body for verification and validation of greenhouse gas emissions status; control over their activities should be put in place to ensure synchronization of their work and its results. It is important to communicate and explain to companies of all sizes the advantages and limitations of forest climate projects and their real costs. Technological projects can be just as cost-effective with a greater impact on reducing emissions. The taxonomy of sustainable activities adopted in Russia pays great attention to various technological projects, including the deployment of renewable energy sources. Despite the cool attitude toward renewable energy in the country, it has significant potential for the development of certain types of alternative energy, depending on the region and natural and climatic conditions. Therefore, climate technology projects also have the potential to receive incentives from the state or attract external funding.

Full implementation, albeit with modified time frame and priorities, of the Sakhalin experiment will enable data accumulation and ensure informed decision-making in the future, testing emission control mechanisms, including pricing. The launch of similar projects in other less remote and geographically specific regions should be the next step in the nearest future—there is no need to wait for the completion of the Sakhalin project.

Russia has significant strategic, technological, and research potential and advantage in nuclear

energy and can play a significant role in decarbonizing the global economy. Its use can be expanded within the country, increasing its share in electricity generation, and through developing international partnerships. Income from exports in this area is not as significant compared to hydrocarbons, but cooperation maintains the strategic relations with the partner, since both the construction and further operation of the nuclear power plants are carried out by Rosatom. Harnessing the potential of nuclear energy to produce pink hydrogen is also an important priority and opportunity for the country's low-carbon development.

Despite the growing sanctions pressure, the country has not been isolated from world markets and international platforms; many actors are still ready to develop cooperation in promising areas. BRICS, especially after the enlargement, is considered by the authorities to be the main platform for international cooperation on climate issues. It is important for Russia to strengthen ties with partners and realize its national interests through cooperation on nuclear energy and critical raw materials, coordination of carbon accounting standards, and green taxonomies. A joint response to restrictive measures, such as CBAM, introduced by some developed countries, deforestation prevention requirements to access to the European market, and protectionism in climate-neutral technologies and critical raw materials, will more effectively protect the interests of developing countries in the face of growing contradictions, ensuring real compliance with the principle of common but differentiated responsibilities

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