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ROSATOM

in the war years of 2023 and 2024

*Main events, projects, decisions,
facts and problems*

2025

BELLONA

Rosatom in the war years of 2023 and 2024

Main events, projects, decisions, facts and problems

Authors: Alexander Nikitin, Dmitry Gorchakov

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About Bellona:

The Bellona Environmental Foundation is an international science-based non-profit organization headquartered in Norway. Founded in 1986 as an action and protest group, Bellona has evolved into a recognized technology- and solution-oriented organization with offices in Oslo, Brussels, Berlin, and Vilnius. Today, more than 70 engineers, ecologists, physicists, chemists, economists, political scientists, and journalists work at Bellona.

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Forward

If Russia's state nuclear corporation, Rosatom, is to be believed, 2024 was a banner year.

It is expanding its footprint in new markets in Africa, Asia and the Middle East, as well as in Central Asian post-Soviet states. It's running a wide-reaching development program along the Northern Sea Route, the 6,000-kilometer Arctic shipping corridor uniting Europe and Asia, and is responsible for everything from nuclear icebreaker construction to port infrastructure along its reach. It's powering the mining of rare earth minerals essential for renewable energy and electronics in operations from the Kola Peninsula to Siberia. It's acquiring domestic energy firms and making forays into transport, housing and utilities. And, of course, it's building nuclear power plants in foreign markets—including in some NATO countries—at a pace unmatched by any other country or corporation.

But the slick commercial rhetoric belies the fact that Rosatom is a company that is literally at war.

As one of the Kremlin's prize state industries, Rosatom, has since 2022 reoriented its practices to align with Moscow's war economy as the invasion of Ukraine drags on. For this, it receives lavish state support and is overseen by members of President Vladimir Putin's inner circle. Yet, unlike other energy producers in Russia's oil and gas sectors, Rosatom has more or less managed to sidestep any serious sanctions from the West, testifying to the dependence it has fostered on the international nuclear market.

Recently, Western markets have begun to challenge Rosatom's dominance as they attempt to shift their dependence away from Russian produced nuclear fuels and other technologies. But our new report suggests that Rosatom is preparing for such shortfalls by shifting who it sells to and expanding its operations into industries beyond the nuclear—moves that includes further enmeshing itself in Moscow's war as an active military participant. These are the corporate achievements that are less likely to appear in the company's glossy PR.

Rosatom at war

For instance, the putatively civilian corporation is helping Russia arms makers sidestep bans on western-produced components for weapons used on the Ukrainian front. It has also developed technology for the Oreshnik line of ballistic missiles—a warhead tip so durable that it can withstand temperatures as hot as the surface of the Sun, the company has bragged.

The corporation also seems to be smoothing the way for various weapons tests—including nuclear tests—on Novaya Zemlya, an Arctic archipelago used by the Soviets as an atomic bomb testing range. Most recently, it has been the site of trials for the Burevestnik nuclear-powered cruise missile.

Russia's recent withdrawal from its ratification of the Comprehensive Nuclear-Test-Ban Treaty and its abandonment of other arms agreements with the West coincides with a hive of activity on this frozen strip of land, suggesting Russia may be moving back toward testing nuclear weapons, with Rosatom—as the steward of Russia's nuclear arsenal—at the center of it.

Rosatom likewise continues to tighten its grip on the Zaporizhzhia nuclear power plant—Europe's largest atomic energy station—which the Russian military seized in the opening days of Moscow's invasion in 2022, and which Rosatom has been de facto running ever since. It is widely assumed from Russia's official statements that Rosatom intends to absorb the plant into its own structure, making it the 12th nuclear power plant in its purview—and marking one of the most breath-taking seizures of war booty in modern warfare.

What the corporation is ignoring

Alongside these endeavors, which the Rosatom is loath to mention in its brochures, stand the fact that Rosatom's domestic fleet of 36 reactors is ageing and will largely need to be replaced by 2065, the funds for which are severely lacking. The company's current plans to extend runtimes at several aged reactors suggest that this is a problem it won't be able to solve anytime soon.

Rosatom has also snuffed out its past efforts to clean up Russia's Soviet nuclear legacy, retooling many of the constituent enterprises that were responsible for that to handling non-nuclear hazardous waste. These moves turn away from more than two decades of effort with the international community and mark the corporation's increasing efforts to shut itself off both from the West and from scrutiny at home.

Encouraging that opacity is the fact that the war in Ukraine—and stifling anti-dissent legislation at home—has driven into exile most of the civil society organizations, including Bellona, that

once helped hold Rosatom to account. In fact, such organizations once formed Rosatom's Public Council, which kept the corporation in conversation with the environmentalists and the public it purported to serve. While the Public Council does still exist, it is staffed by Putin's cronies, including one from his intramural hockey team.

Nor is there anything left of the robust network of strident Russian-grown anti-nuclear non-government organizations that for years fought to keep Rosatom's activities in the public eye. Their disappearance has left Rosatom to its own secretive devices, the organizations themselves hounded out of existence by the bureaucracy.

Rosatom helps Moscow divide the world

All of this taken together—both what the corporation will and will not tell us—paints a picture of Rosatom as primarily a formidable political tool. This allows it to couple a broad mandate at home with a campaign of influence abroad. By offering its reactor customers enormous state-backed loans to build reactors that Rosatom will service, fuel, and, in many cases, even staff for decades to come, the corporation is vital to creating regimes that are friendly to—and dependent on—Moscow throughout the world.

And while the war in Ukraine has perhaps cost Rosatom some of its former markets in the West, the company has, as we show in our report, survived these geopolitical shifts and remained a powerful vector of Russian influence, adjusting agilely to changing circumstances along the way. As a result, the company will continue to help cleave away many of the world's nations and orient them toward Moscow's geopolitical causes.

Introduction

Russia's war in Ukraine has significantly transformed all areas of activity in Russia's atomic agency. Rosatom has fully aligned itself with the policies of Russia's current leadership and unconditionally supports it in all its actions, including criminal ones. The transformation of goals, directions, and operational parameters has affected nearly all of Rosatom's structures, enterprises, and organizations. Rosatom has significantly increased its activity in assisting the Kremlin in achieving geopolitical objectives. In 2023 and 2024, Rosatom actively promoted its projects in Asian, African, and Latin American countries, seeking to strengthen both its own and Russia's state presence and influence in these regions. Despite political tensions, Rosatom continues to play an active role in the construction of nuclear power plants in NATO countries such as Turkey and Hungary, thereby helping the Kremlin achieve its objectives by gaining leverage over energy security and influencing the political unity of the nations Russia has declared to be "unfriendly". Due to geopolitical tensions and the refusal of several countries to cooperate with Russia, Rosatom is losing ground in the global nuclear technology and fuel market. However, despite diversification efforts, some countries still remain dependent on nuclear fuel supplies from Russia. Rosatom is actively involved in military operations and supports Russia's defense industry. There is evidence that Rosatom has been involved in supplying components and raw materials to Russia's defense industry, circumventing international sanctions. In particular, in October 2022, Rosatom representatives met with weapons manufacturers, offering them essential materials such as aluminum oxide for rocket fuel and lithium-ion batteries for military equipment. Rosatom may have been importing raw materials and electronics for the Russian military.¹ The company's general director, summarizing the results of 2024, stated that in addition to maintaining Russia's nuclear shield, the atomic agency had significantly expanded its state defense order (GOZ) for non-nuclear weaponry and launched several independent military development initiatives². Thus, Rosatom has effectively become one of Russia's primary manufacturers and suppliers of non-nuclear weaponry, second only to Rostec, despite having had little involvement in such tasks before the war. In addition to its military activities, Rosatom maintains an ongoing

¹ Korrespondent.net, January 20, 2023. Rosatom could have imported raw materials and electronics for the Russian army to Russia – media [in Russian]. (Accessed: March 21, 2025.)
<https://korrespondent.net/ukraine/4554956>

² Smotrim, January 4, 2025. Rosatom CEO Likhachev: In 2024, we showed multiple growth in non-nuclear state defense order [in Russian]. (Accessed: March 21, 2025.)
<https://smotrim.ru/article/4295798>

presence at the Zaporizhzhia Nuclear Power Plant (ZNPP). The actions of Rosatom employees at ZNPP contribute to the militarization of the facility and pose a threat to nuclear safety. The situation at ZNPP has been repeatedly documented in Bellona's reports and digests³.

One gets the impression that unlike many other companies, Rosatom has benefited from the war, significantly increasing its commercial assets, financial resources, influence, and political weight. No other corporation in recent years has received such comprehensive state support as Rosatom. This applies not only to state defense contracts but also to areas such as the political and economic development of the Arctic, the socio-economic advancement of "nuclear territories," scientific and educational programs, and more.

In this report, Bellona analyzes the activities of the Rosatom State Corporation during the war in Ukraine in 2023 and 2024. Bellona has compiled and examined the work of the agency's main divisions and enterprises, striving to avoid the overtly promotional information that saturates all Russian and Rosatom-affiliated media resources during wartime. Some publications about the agency's successes are particularly striking—for instance, the list of Rosatom's "100 achievements" published at the end of 2024. Notably, in 2023, there were one and a half times more "achievements," which raises the question of whether its successes are declining or whether the agency has simply become more modest. In any case, in 2024, nearly everything possible was classified as a major achievement—from signing memoranda of cooperation with several African states and other international and Russian entities, to winning the nationwide "Ready for Labor and Defense" cup. Many seemingly ordinary results of Rosatom's activities have been declared record-breaking in this list. For example, most cargo shipments along the Northern Sea Route by the Delo and FESCO groups have been labeled as record-setting, with some even described as "historically record-breaking."⁴

In preparing this report, Bellona strives to maintain an objective analysis, avoiding promotional, unreliable and contentious claims, showing that since the start of the war in Ukraine, Rosatom has faced significant challenges, including international pressure, shifts in partnerships, and the need to adapt to new geopolitical realities. At the same time, however, the corporation has significantly expanded its domestic resources and capabilities. The authors of this report examine the reasons and conditions behind these changes while also providing forecasts on the corporation's future prospects.

³ Bellona Environmental Transparency Center. (Accessed: March 21, 2025.)
<https://etc.bellona.org/>

⁴ Atom Media, December 30, 2024. 100 achievements of Rosatom in 2024 [in Russian]. (Accessed: March 21, 2025.)
<https://atommedia.online/2024/12/30/100-dostizhenij-rosatoma-v-2024-godu/>

Chapter 1.

Rosatom in Russia and the CIS during the military period of 2023-2024

1.1. Rosatom in the political structure of the Russian state

The war has significantly altered the political, economic, and social landscape of Russia. The population has become divided based on their views of Russian reality, their attitudes toward the ruling regime, as well as their levels of material well-being and prospects for the future. Active Putin supporters, “participants and heroes of the Special Military Operation,” their relatives and friends receive unprecedented advantages in their businesses, administrative and managerial positions, and other opportunities and privileges within the state. Small and medium-sized businesses, operating under new financial and budgetary conditions caused by sanctions, the militarization of the economy, a shortage of personnel, and other shifting economic and social processes, are trying to find ways to survive to the best of their abilities. State-owned and large businesses are trying not to provoke or irritate the current authorities, especially on issues such as the war in Ukraine and their views on the Western world.⁵

In the present situation, the Rosatom State Corporation has become one of the main political and economic structures of the Russian state and a favorite of President Putin. This is primarily because Rosatom is an important part of the country’s nuclear weapons complex, as well as an energy and scientific resource. Additionally, the top leaders of Rosatom and its fundamental

⁵ Kommersant, February 2, 2024. Putin: Business has allocated billions to support the SMO [in Russian]. (Accessed: March 21, 2025.)
<https://www.kommersant.ru/doc/6535664>

science, notably the chairman of Rosatom's board, Sergey Kiriyyenko, and the president of the Kurchatov Institute Mikhail Kovalchuk, are particularly close to Putin.

During the military period, Rosatom has undergone significant transformations and growth in many areas of its activity. Its close relationship with Putin allows Rosatom to enjoy unwavering support from nearly all major state structures, including the Russian government, legislators, law enforcement agencies, and regional authorities. This has enabled Rosatom not only to expand and strengthen its nuclear energy sector but also to increase its involvement in areas such as renewable energy, the development of the Northern Sea Route, logistics, quantum computing research, and medical technologies, as well as to expand rare earth mineral extraction and grow its scientific and educational base. Significant changes have also occurred in the corporation's work related to social issues, especially in Rosatom's nuclear and science towns, primarily through increased government and industry funding for projects supporting these towns.

1.2. Rosatom's nuclear energy sector

This section examines and analyzes events related to Russia's nuclear energy sector, from uranium mining and fuel fabrication to the construction and operation of nuclear power plant units on Russian territory, as well as renewable energy projects, which the State Corporation Rosatom has been actively involved in recently.

Russia's NPPs

As of the beginning of 2023, there were 34 power units operating in Russia, consisting of 10 land-based (NPPs) and one floating nuclear thermal power station with two reactor units (FNPP). A separate and special facility is the Zaporizhzhia NPP, under Russian occupation. Although it is not mentioned in Rosenergoatom's official documents, reports and plans, reports in the Russian media sometimes refer to it as a Rosatom enterprise.⁶

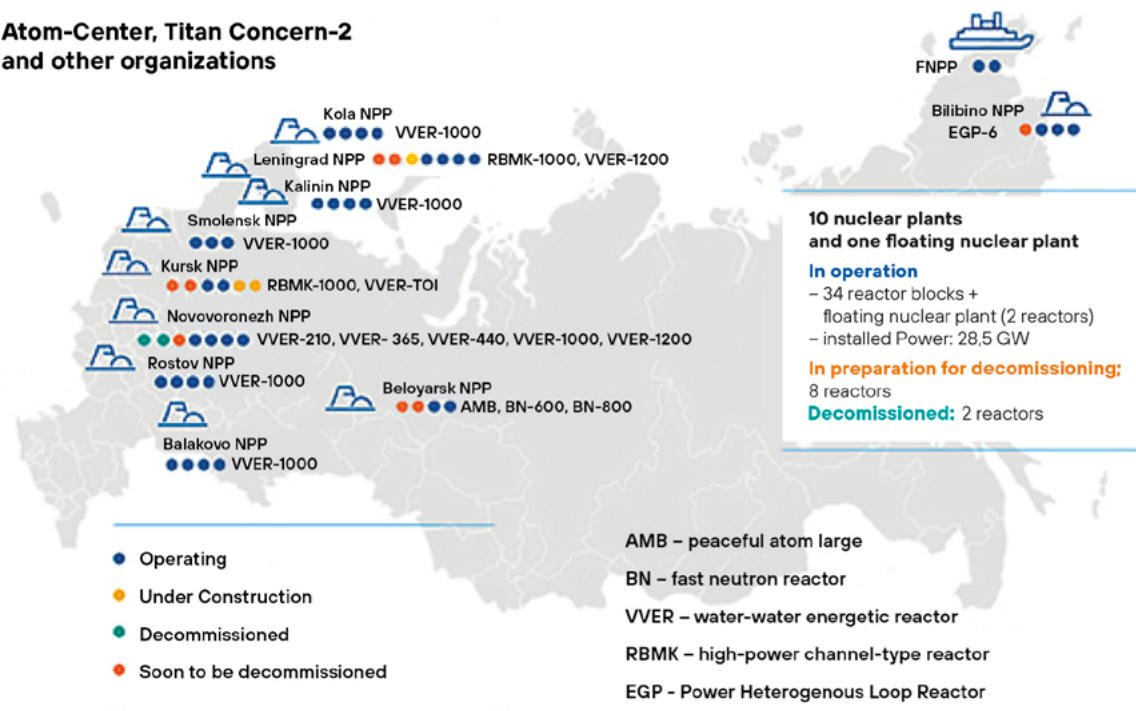
The 34 power units in operation are classified according to reactor type:

- 22 units with VVER type reactors (13 VVER-1000 units, 4 VVER-1200 units, 5 VVER-440 units)
- 10 units with channel reactors (7 RBMK-1000 units, 3 EGP-6 units)
- 2 units with fast neutron reactors (BN-600 and BN-800)

The total installed capacity of all currently operating power units is 28.5 GW

⁶ TASS, December 10, 2024. Likhachev: Zaporizhzhya NPP will become part of the general energy system of the Russian Federation after the end of the SMO [in Russian]. (Accessed: March 21, 2025.)
<https://tass.ru/obschestvo/22628209>

Atom-Center, Titan Concern-2 and other organizations



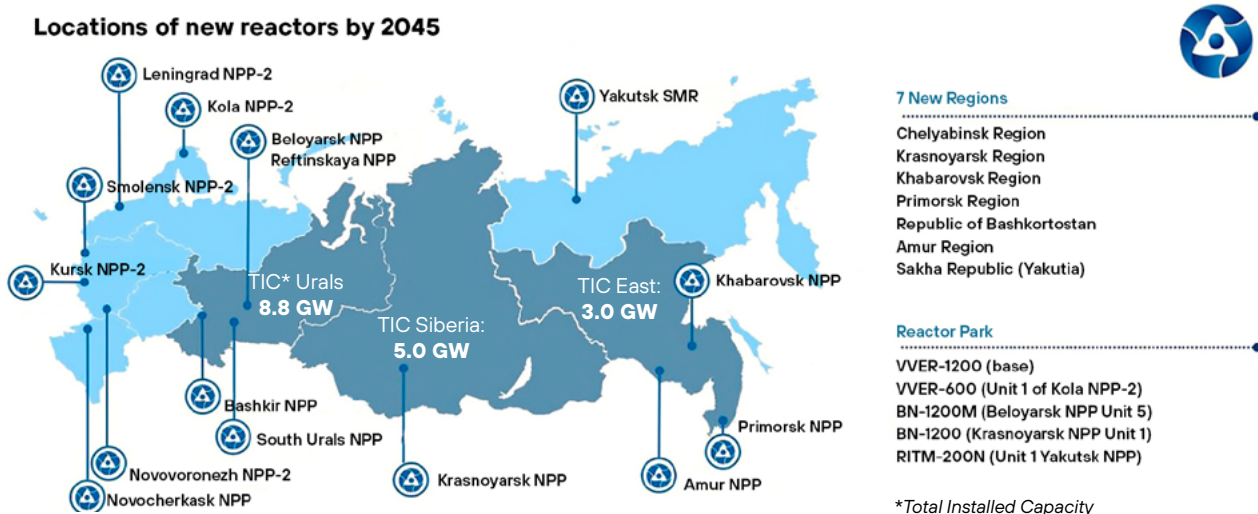
Source: Rosatom, modified by Bellona.
 NPP units in Russia
<https://www.rosenergoatom.ru/stations>

In late February 2023, discussions took place in Rosatom regarding the development plans for the nuclear industry and the construction of new NPPs up to 2035. According to the announced plans, it was expected that 12 new NPP units would be built by 2035, not counting small modular reactors. However, in mid-2024, the Russian government updated the general scheme for the placement of energy facilities up to 2042 and revised the previous plans regarding the number and timing of NPP constructions. The appendix to the document⁷ stated that new NPPs are planned for the Rostov, Sverdlovsk, Chelyabinsk, and Tomsk Oblasts, as well as for Yakutia, Primorsky, and Khabarovsk. Two nuclear plants are planned to be built in Chukotka and Krasnoyarsk Krai, according to the project. Furthermore, by 2042, the Kola NPP-2, Kursk NPP-2, and Smolensk NPP-2 should be operational. These stations are either under construction or in the design phase. By 2042, the total installed capacity of all nuclear power plants in Russia is expected to reach 45.8 GW. According to the plan, 29 new power units are to be built, and 18 units are to be decommissioned by that time.⁸

In April 2023, Rosenergoatom received a license from Rostekhnadzor for the construction of the Yakutsk Nuclear Power Plant in the Ust-Yansky District (Yakutia). The project is based on a small-capacity nuclear power plant that uses the water-water reactor RITM-200N, which is the result of adapting a marine version for land-based installation.

⁷ Russian Power System Operator. List of nuclear power plants planned for construction and commissioning [in Russian]. (Accessed: March 21, 2025.) https://www.so-ups.ru/fileadmin/files/company/future_plan/genshema/public_discussion/2024/genschem_2042_public_disc_an_04.pdf

⁸ Strana Rosatom, March 1, 2023. Russia may build 29 nuclear power units by 2045 [in Russian]. (Accessed: March 21, 2025.) <https://strana-rosatom.ru/2023/03/01/bezhat-kak-minimum-vdvoe-bystrye-v/>



Source: Rosatom, modified by Bellona.
 Regions in which new units will be built by 2045

However, judging by the fact that plans are changing very quickly, there is still the question of what will actually be built and when. At the same time, electricity generation at Russia’s nuclear power plants declined in 2023 and 2024. This decrease is an expected consequence of the aging of the country’s nuclear fleet and the delay in putting new facilities into operation to replace decommissioned plants.⁹ It is reported that nuclear power plants generated¹⁰ 217 billion kWh of electricity in 2023, which is 2.8% less than in 2022, and 216 billion kWh¹¹ in 2024. Meanwhile, Rosatom claims that it has exceeded¹² its targets for these years. The share of nuclear power in Russia’s total electricity generation was 18.5% in 2023 and 17.9% in 2024. This share has been declining¹³ for the fourth consecutive year from its peak of 20.3% in 2020 during the pandemic. At the same time, the target¹⁴ set by Vladimir Putin for Rosatom envisions nuclear power accounting for 25% of the country’s total energy balance by 2045. “Preliminary estimates indicate that achieving this will require the commissioning of 24 units, including at new sites and in new regions,” said Rosatom CEO Alexey Likhachev in March 2021. However, as seen in the government’s general energy plan, far fewer will actually be built by 2042. To compensate for the lag in constructing replacement capacities, the most

⁹ Rosenergoatom, April 19, 2022. Proposal on the prices (tariffs), long-term regulatory parameters for 2023 [in Russian]. (Accessed: March 21, 2025.) <https://www.rosenergoatom.ru/upload/iblock/2ce/2ce49a72adf19cd439845c20b33525de.pdf>

¹⁰ Rosstat, January 31, 2024. On industrial production in 2023 [in Russian]. (Accessed: March 21, 2025.) https://rosstat.gov.ru/storage/mediabank/10_31-01-2024.html#:~:text=%D0%B0%D1%82%D0%BE%D0%BC%D0%BD%D1%8B%D0%BC%D0%B8,-217,-106%2C3

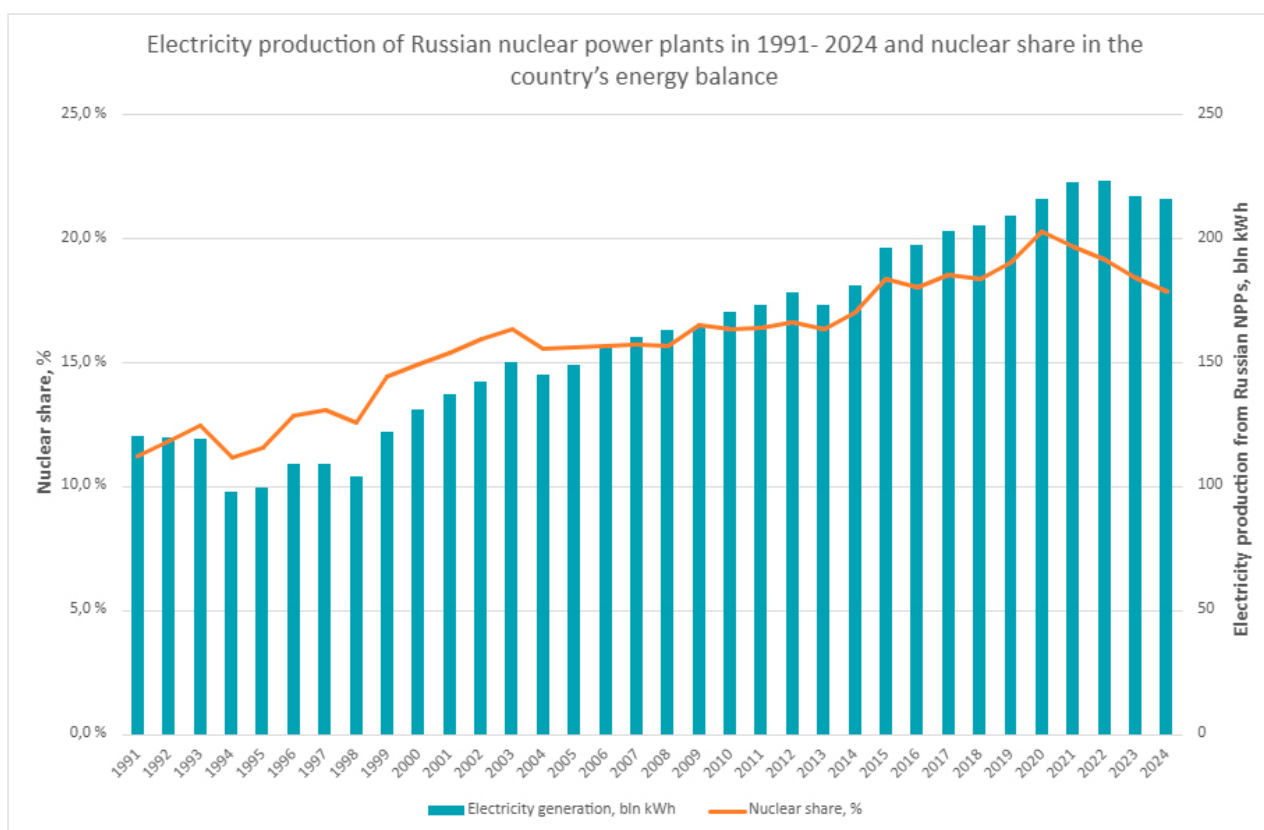
¹¹ TASS, February 5, 2025. Electricity generation in Russia increased by 2.4% in 2024 [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/23063431>

¹² Peretok.ru, December 27, 2023. 3 NPPs were unable to fulfill their annual production plan due to equipment failures [in Russian]. (Accessed: March 21, 2025.) <https://peretok.ru/news/generation/27206/>

¹³ Gorchakov’s Atomic Channel [Telegram], February 1, 2024 [in Russian]. (Accessed: March 21, 2025.) <https://t.me/AtomGor/247>

¹⁴ Strana Rosatom, March 9, 2021. By 2045, the share of nuclear energy in Russia’s energy balance should reach 25% [in Russian]. (Accessed: March 21, 2025.) <https://strana-rosatom.ru/2021/03/09/k-2045-godu-dolya-atomnoj-energetiki-v-ener/>

likely solutions in the coming years will be extending the operational lifespan of older RBMK units from 45 to 50 years or shifting Rosatom’s focus from foreign projects to domestic nuclear power plant construction.



Power generation by Russian NPPs in 1991-2024 and their share in the country's energy balance. Graph by Bellona

In 2023, Rosenergoatom recorded a net profit of 115.43 billion rubles, which was 6.9% lower than in 2022. The increase in production costs led to a decline in Rosenergoatom’s profit and reduced its ability to finance new construction. This was due to rising production costs and decreased electricity generation, as a result of deferred maintenance, modernization efforts, and prolonged downtime at some NPP units.¹⁵ It is expected that Russia’s nuclear power generation will continue to decline over the next three years and will remain at the level of 220–222 billion kWh¹⁶ for the next 5–6 years.¹⁷

¹⁵ Peretok.ru, March 19, 2024. Rosenergoatom’s net profit under RAS in 2023 decreased by 6.9% to ₹115.43 billion [in Russian]. (Accessed: March 21, 2025.) <https://peretok.ru/news/generation/27444/>

¹⁶ Prime, January 18, 2022. Rosatom spoke about its immediate plans in Russia and abroad [in Russian]. (Accessed: March 21, 2025.) <https://prime.ru/energy/20220118/835798560.html>

¹⁷ Peretok.ru, January 30, 2023. Nuclear power generation in Russia in 2023–2025 will be lower than in recent years [in Russian]. (Accessed: March 21, 2025.) <https://peretok.ru/news/generation/25833/>

During the wartime period under review, Rosatom placed significant emphasis on the floating nuclear power plant Akademik Lomonosov, considering it a major achievement and, to some extent, a source of pride. The plant has been operating in the harsh conditions of Russia's Arctic coast in the city of Pevek since May 2020 and remains the world's only floating nuclear power station.

Since the approval of the technical design for the floating power unit with nuclear reactors¹⁸ on October 28, 2002, Bellona has closely monitored and reported on all developments related to the construction and commissioning of the Akademik Lomonosov floating nuclear power plant, as well as on the policies and prospects for using such floating NPPs in the future.¹⁹ At events held in 2023–2024 discussing proposals and prospects for international cooperation in nuclear energy, Rosatom consistently presented information about Akademik Lomonosov and offered collaboration opportunities for the construction of similar facilities. Particular efforts were made to attract interest from African and Asia-Pacific countries. On December 19, 2019, the world's only floating nuclear heat and power plant, Akademik Lomonosov, was first connected to the isolated Chaun-Bilibino grid in western Chukotka. To date, it has generated approximately 1 billion kWh of electricity. During this period, nuclear fuel was reloaded in both of the plant's reactors²⁰, and scheduled maintenance was carried out²¹ on reactor unit 1 and 2. This included replacing the steam generator tube system using parts salvaged from decommissioned steam generators of the retired nuclear-powered communications ship Ural. The fact that Rosenergoatom is resorting to repurposing old equipment for Akademik Lomonosov, a project it continues to take pride in, is troubling news. Bellona had previously drawn attention²² to potential issues with the operation of the floating NPP, stemming from the extremely prolonged construction period as well as the physical and technological aging of its equipment. While the Ural was not heavily used, meaning its steam generators may have relatively low operating hours, steam generators belong to the highest safety category of nuclear plant components. Their reliability directly impacts the nuclear safety of the installation. Evidently, the situation must have been dire if the decision was made to use a steam generator manufactured 45 years ago, stored for 15 years after being removed from the Ural's nuclear installation under unknown conditions. Moreover, it is important to note that steam generators from first- and second-generation transport reactors were not particularly reliable. Their operational integrity largely depended on proper maintenance—such as strict adherence to water chemistry protocols in the primary and secondary loops. Today, no one can say for certain whether the *Ural's* reactors were properly maintained by the

¹⁸ Bellona. Publications [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/news/>

¹⁹ Bellona, 2011. Floating NPPs [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/publication/floating-npps-ru/>

²⁰ Floating NPPs [Telegram], October 15, 2024. Replaced and improved! How the unique repair campaign went on the world's only floating nuclear power plant [in Russian]. (Accessed: March 21, 2025.)
https://t.me/floating_npp1/2010

²¹ Rosenergoatom, December 19, 2023. The world's only floating nuclear power plant generated over 722 million kWh of electricity in four years [in Russian]. (Accessed: March 21, 2025.)
https://www.rosenergoatom.ru/stations_projects/sayt-pates/press-tsentr/novosti/45343/

²² Bellona, 2011. Floating NPPs [in Russian]. (Accessed: March 21, 2025.)
https://bellona.ru/assets/sites/4/2015/07/fil_Floating-npps-ru1.pdf

navy. Decisions like using old equipment—especially components critical to nuclear safety—are either a last resort or a temporary measure to buy time. Either way, they increase the risk of compromised safety in the operation of the floating NPP. Nevertheless, Rosatom continues to develop plans for new floating and small-scale nuclear power plants in the Arctic and actively promotes this technology to the Global South and East. Nuclear construction in the Arctic will inevitably lead to increased transportation of fresh and spent nuclear fuel, as well as radioactive materials, along the Northern Sea Route.

The war has affected and begun to alter the operations of several Russian nuclear power plants, primarily the Kursk and Rostov NPPs, not to mention the Russian-occupied Zaporizhzhia NPP.

The Rostov NPP is located in the south, near the Donetsk-Luhansk theater of military operations, so the technical issues that have arisen and continue to arise at the plant during 2023–24 have been perceived by the public as possibly influenced by the ongoing military events. During this period, the Rostov NPP experienced a series of emergency incidents, breakdowns, and repair works that attracted media and public attention:

- In late December of 2022 (31.12) a fire broke out in the unit transformers of unit 3²³.
- In the spring of 2023, the turbine generator of Unit 2, which had been put into operation in 2014, was placed under major and medium repairs. The reasons for major repairs on relatively new equipment were not disclosed²⁴.
- In July 2024 Unit 1 was repeatedly disconnected due to a malfunction in electrical equipment²⁵.
- In August 2024, Unit 1 was disconnected from the grid due to a turbine failure, and in October it was taken out of operation, officially for scheduled maintenance²⁶.

The events of August 2024 alarmed the people living near the plant. However, it should be noted that despite the proximity of the war, the Rostov NPP was not subjected to airstrikes, shelling, or other military actions by Ukraine throughout the entire wartime period.

The Kursk NPP found itself just 30 kilometers from the combat zone after Ukrainian forces took control of part of the Kursk region on August 6. Two RBMK-1000 reactor units at the plant were in shutdown mode, operating without power generation, while the other two RBMK-1000 reactors remained operational. Additionally, construction continues at the Kursk NPP on two

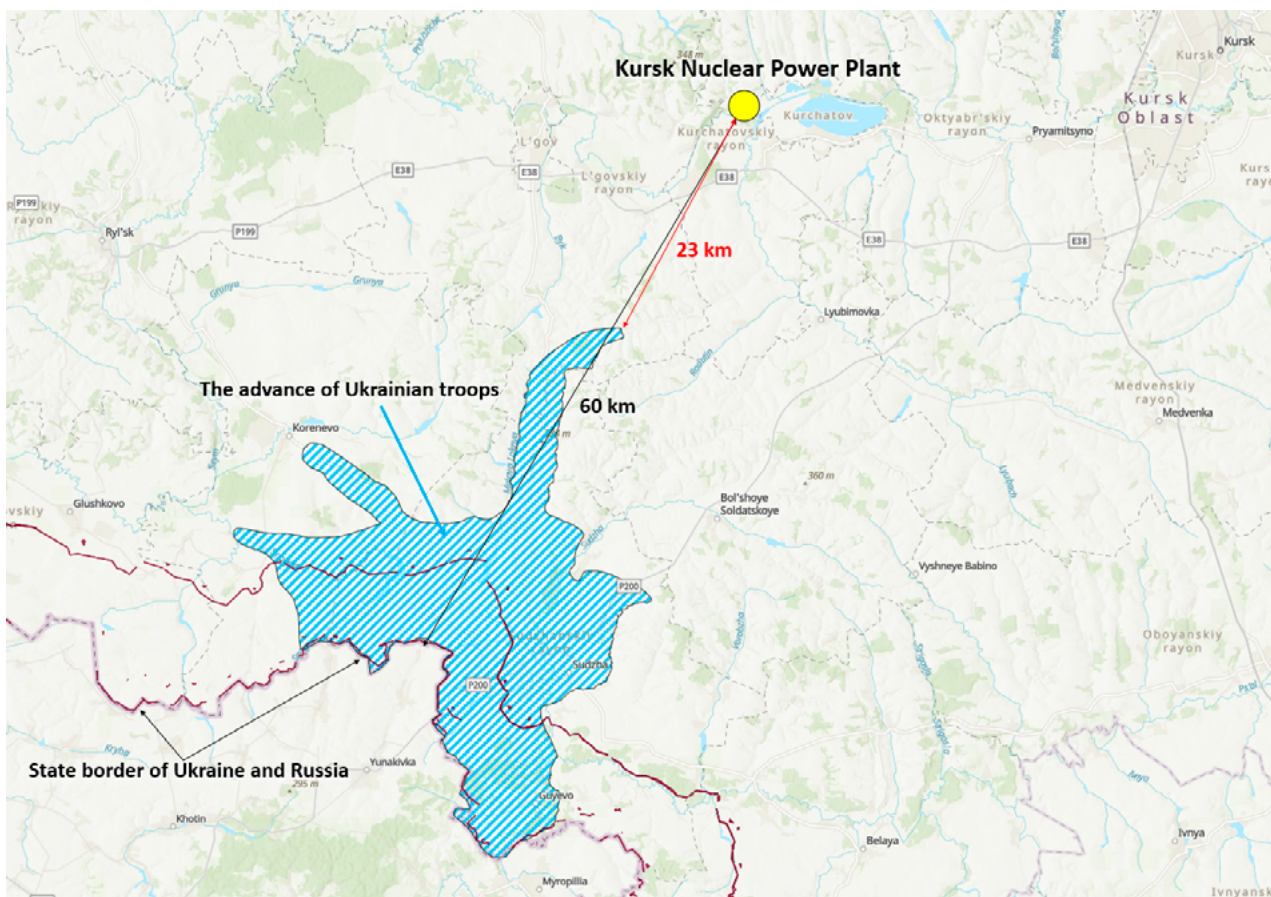
²³ Atomic Energy 2.0, January 9, 2023. Rostov NPP resumed normal operation after pre-New Year fire at transformer [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2023/01/09/131788>

²⁴ Atomic Energy 2.0, February 13, 2023. Scheduled repairs of the second WWER-1000 power unit have started at the Rostov NPP [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2023/02/13/132711>

²⁵ Atomic Energy 2.0, July 16, 2024. The first power unit of the Rostov NPP was disconnected from the grid due to a malfunction in electrical equipment [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2024/07/16/147690>

²⁶ Atomic Energy 2.0, August 23, 2024. The first WWER-1000 power unit of the Rostov NPP was disconnected from the grid due to a defect detected in the turbine [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2024/08/23/148725>

VVER-TOI units (Project V-510). Bellona previously wrote about the risks of military action near nuclear facilities with RBMK reactors in the article “Will Ukraine’s attack on Russian territory lead to the seizure of the Kursk Nuclear Plant?”²⁷



Map of the Ukrainian offensive in the Kursk Oblast as of 8 August 2024. An infographic by Bellona based on data from the Institute for the Study of War. The area of the Kursk region where the presence of Ukrainian forces was recorded up until 8 August is marked in blue. The red arrow indicates the shortest distance from this area to the Kursk NPP. The black arrow marks the shortest distance to the internationally recognized Russia-Ukraine border.

In response to numerous statements from the Russian side claiming that Ukraine intended to seize the Kursk NPP, Ukrainian President Zelensky stated that they would not repeat Russia’s crimes and would not take control of civilian nuclear facilities.²⁸

²⁷ Bellona, August 12, 2024. Will Ukraine’s attack on Russian territory lead to the seizure of the Kursk Nuclear Plant? (Accessed: March 21, 2025.) <https://etc.bellona.org/2024/08/12/will-ukraine-s-attack-on-russian-territory-lead-to-the-seizure-of-the-kursk-nuclear-plant/>

²⁸ Meduza, October 30, 2024. “Otherwise, we will be like Russia.” Zelensky said that the Ukrainian Armed Forces could have seized the Kursk Nuclear Power Plant, but “never wanted to” [in Russian]. (Accessed: March 21, 2025.) <https://meduza.io/news/2024/10/30/inache-my-budem-kak-rossiya-zelenskiy-zayavil-cto-vsu-mogli-zahvatit-kurskuyu-aes-no-nikogda-ne-hoteli-etogo>

On 9 and 17 August, Rosatom Director General Alexey Likhachev held phone conversations²⁹ with Rafael Grossi to discuss the situation around the Kursk NPP. Russian media reported that during the talks, Likhachev emphasized that “the actions of the Ukrainian armed forces pose a direct threat not only to the Kursk NPP but also to the development of the entire global nuclear energy sector.” However, as usual, they did not report how he views Russia’s armed seizure of the Zaporizhzhia NPP or whether he considers it to have any impact on the “development of the entire global nuclear energy sector.” Additionally, it was reported that Likhachev invited Grossi to visit the Kursk NPP to “personally assess the situation unfolding around the operational nuclear facility.”³⁰

After these negotiations, IAEA Director General Grossi issued a statement³¹ urging both sides to remember the seven pillars of nuclear safety³² established by the IAEA after the start of the war in Ukraine and the seizure of the Chernobyl and Zaporizhzhia NPPs by Russian forces, and to exercise “maximum restraint.” The statement emphasized the imperative of ensuring the physical integrity of nuclear power plants, regardless of their location.



The IAEA delegation at the Kursk NPP. Source: Kursk NPP

²⁹ Rosatom State Corporation, August 10, 2024. Rosatom Director General Alexey Likhachev had a telephone conversation with IAEA Director Rafael Grossi [in Russian]. (Accessed: March 21, 2025.) <https://www.rosatom.ru/journalist/arkhiv-novostey/sostoyalsya-telefonnyy-razgovor-generalnogo-direktora-rosatoma-Alexeya-likhachyeva-i-glavy-magate-r/>

³⁰ Rosatom State Corporation, August 17, 2024. Rosatom CEO Alexey Likhachev and IAEA Director Rafael Grossi discussed the situation at the Kursk and Zaporizhzhya NPPs [in Russian]. (Accessed: March 21, 2025.) <https://www.rosatom.ru/journalist/arkhiv-novostey/situatsiyu-na-kurskoy-i-zaporozhskoy-aes-obsudili-glava-rosatoma-Alexey-likhachyev-i-glavy-magate-r/>

³¹ IAEA, August 9, 2024. IAEA Director General Statement on Developments in the Russian Federation (Accessed: March 21, 2025.) <https://www.iaea.org/newscenter/statements/iaea-director-general-statement-on-developments-in-the-russian-federation>

³² IAEA. Nuclear Safety, Security and Safeguards in Ukraine (Accessed: March 21, 2025.) <https://www.iaea.org/topics/response/nuclear-safety-security-and-safeguards-in-ukraine>

On 27 August, Grossi visited³³ the Kursk NPP at the head of an IAEA delegation. He was given a tour of Units 3 and 4 (RBMK-1000) and briefed on the progress of the second phase of the Kursk NPP construction. After visiting the plant, Grossi told journalists³⁴ that the Kursk NPP was still operating under conditions “close to normal”. However, he noted that its safety situation was becoming more serious due to the ongoing hostilities nearby, particularly since RBMK-1000 reactors lack containment structures. It seems somewhat odd that in the midst of an ongoing war, the head of the IAEA would describe the situation at nuclear facilities located near the front line as “close to normal.”

The Zaporizhzhia NPP

By decree of Putin on October 5, 2022, the Zaporizhzhia NPP was transferred to federal ownership under the newly established federal state unitary enterprise Zaporizhzhia Nuclear Power Plant³⁵. However, one gets the impression that for some reason Rosatom tends to rarely mention that the ZNPP is a Russian facility. This may be because there is no international recognition that the ZNPP and the territory on which it is located lawfully belong to Russia. Even the latest annual reports from Rosatom state that Rosenergoatom operates 10 nuclear power plants in Russia and one floating nuclear power plant, but do not mention the Zaporizhzhia NPP. Nevertheless, the operation of the plant is managed by the joint-stock company Operating Organization of the Zaporizhzhia NPP (AO EO ZNPP), which was established on October 3, 2022, and is a subsidiary of Rosatom and a 100% subsidiary of the Rosenergoatom concern. The main events at the ZNPP that drew the attention of experts and the public involved reports that the Russian administration could be preparing to restart the plant’s reactors. Experts and the public also paid attention to reports that the ZNPP continues to transition to Russian standards in order to obtain licenses from Rostekhnadzor for each reactor unit, as well as for the radioactive waste processing facility, the dry storage for spent nuclear fuel, and other plant facilities³⁶. Additionally, in late 2023, the head of Rosatom made statements that “in 2024, as the situation develops, we will look for options and opportunities to classify this facility as operational.”³⁷ However, after a series of consultations and meetings, including a meeting between the head of the IAEA and Putin, it was announced that the restart of the ZNPP reactors is not planned for the present, but that it is not ruled out either.

³³ Rosatom State Corporation, August 27, 2024. IAEA Director General Rafael Grossi visited Kursk NPP [in Russian]. (Accessed: March 21, 2025.) <https://www.rosatom.ru/journalist/arkhiv-novostey/kurskuyu-aes-posetil-generalnyy-direktor-magate-rafael-grossi/>

³⁴ Reuters, August 27, 2024. IAEA chief warns of risk of nuclear accident at Russian plant in Kursk region (Accessed: March 21, 2025.) <https://www.reuters.com/world/europe/iaea-chief-grossi-says-there-is-risk-nuclear-incident-russias-kursk-region-2024-08-27/>

³⁵ RBC, October 5, 2022. Putin orders Zaporizhzhia NPP to be taken into federal ownership [in Russian]. (Accessed: March 21, 2025.) <https://www.rbc.ru/politics/05/10/2022/633d97a79a79a79471b4415e916>

³⁶ Atomic Energy 2.0, December 28, 2023. Zaporizhzhia NPP has completed repairs to safety systems and is transitioning to Russian standards [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2023/12/28/141926>

³⁷ Atomic Energy 2.0, October 6, 2023. Zaporizhzhia NPP may be transferred to the category of operating facilities in 2024 [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2023/10/06/139466>

Bellona analyzed the situation regarding the potential restart of the Zaporizhzhia Nuclear Power Plant in detail in its report³⁸ and concluded that theoretically, within the next two or three years, we could face a situation where Russia intends to restart the ZNPP. It is likely that in order for the ZNPP to be restarted and operational, combat operations must be concluded, and political decisions must be made. The latest statements by the head of Rosatom, Likhachev, that the ZNPP will become part of Russia's overall energy system, may indicate that Russia has already made these decisions³⁹.

However, there is another side that has a say in this matter – the Ukrainians, and their word should be final and decisive. Bellona believes that only the legitimate owner of the ZNPP, Ukraine, has the right to make decisions regarding the fate of the plant and discuss these issues with the IAEA and other international organizations, taking the situation into account and with absolute certainty that nuclear and radiation safety at this facility will be ensured⁴⁰. At present and in the future, while the ZNPP remains under occupation, the Russian administration will evidently try to make the impression that they are ready to address technical, economic, staffing, social, and other issues not only at the station itself but also in the city of Enerhodar, where ZNPP personnel live, by creating new enterprises and infrastructure⁴¹.

In summing up the discussions surrounding the situation at the ZNPP, we may conclude that for Rosatom the Zaporizhzhia NPP continues to be an “unexpected,” “undesirable,” and “difficult” child that it must look after in the hope that the situation and circumstances will eventually become more straightforward.

1.3 Rosatom's nuclear fuel complex

Rosatom's nuclear fuel complex is made up of enterprises and organizations within the mining and fuel divisions. The product of these divisions is nuclear fuel, which supplies all Russian nuclear power plants, as well as many foreign plants of Russian (Soviet) design.

In the first half of 2023, the Euratom Supply Agency (ESA) published an annual report⁴² reviewing the supply and demand for nuclear fuel in EU countries for 2022. It states that Russia's invasion of Ukraine seriously disrupted the global supply system for all energy sources and jeopardized the security of nuclear material and service supplies in the EU. In this regard, the EU decided to gradually reduce its dependence on Russia, including in uranium and

³⁸ Bellona, 2024. The Potential Restart of the Zaporizhzhia Nuclear Power Plant: analysis of technical and political aspects (Accessed: March 21, 2025.) <https://etc.bellona.org/publication/znpn-restart/>

³⁹ Tavria, December 10, 2024. Rosatom: Zaporizhzhya NPP will become part of the general energy system of Russia after the SMO [in Russian]. (Accessed: March 21, 2025.) https://tavria.tv/new-regions/rosatom-zaporozhskaya-aes-stanet-chastyu-obshhej-energosistemy-rossii-posle-svo/?utm_source=yxnews&utm_medium=desktop&utm_referrer=https://dzen.ru/news/search

⁴⁰ Bellona, 2024. The Potential Restart of the Zaporizhzhia Nuclear Power Plant: analysis of technical and political aspects (Accessed: March 21, 2025.) <https://ru.bellona.org/publication/zaes-restart/>

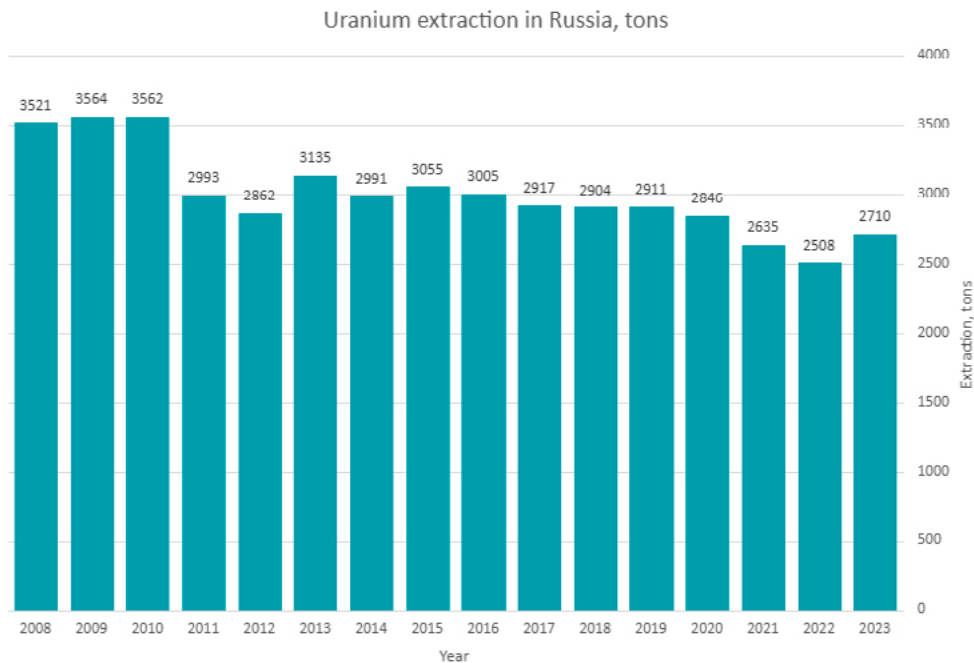
⁴¹ Atomic Energy 2.0, October 8, 2024. Rosenergoatom's new enterprise will handle water supply, sanitation and heat supply in Energodar [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2024/10/08/150090>

⁴² Euratom Supply Agency, 2023. Annual Report 2022. (Accessed: March 21, 2025.) https://euratom-supply.ec.europa.eu/system/files/2023-10/ESA%20Annual%20Report%202022%20-%20Final%20%28website%29_2.pdf

nuclear fuel supplies. Only 16.89% (taking into account the natural uranium contained in enriched uranium products) of the EU's natural uranium supplies came from Russia in 2022. Compared to 2021, Russia's share in uranium supplies to the EU decreased by 16.05%.

On January 22, 2024, Atomredmetzoloto, the managing company of the Mining Division of Rosatom was renamed Rosatom Nedra, with uranium mining remaining its primary activity. Assessing the performance of the mining division during the wartime period is difficult. The division's official reports raise questions and doubts. For example, the 2023 annual report states that uranium production in 2023 amounted to 2,710 tons, significantly exceeding production levels in recent years and nearly 200 tons more than in 2022, despite no significant production expansions or even plans for such expansions in the past year, and no communication from the division on this matter. Therefore, it is unlikely that the reported figures reflect reality.⁴³

The majority of uranium mining by Rosatom's subsidiaries takes place outside of Russia—specifically in Kazakhstan through joint ventures with Uranium One (a Rosatom subsidiary) and NAC Kazatomprom. Rosatom's uranium production in Kazakhstan is approximately twice the amount mined within Russia. According to Rosatom's annual report⁴⁴, in 2023 its subsidiary Uranium One Group extracted 4,831 tons of uranium across all its assets in Kazakhstan, which is 373 tons more than the previous year.



Uranium extraction in Russia, tons. Infographic by Bellona

⁴³ Rosatom State Corporation, 2023. Performance of the Mining Division in 2023. (Accessed: March 21, 2025.)
https://report.rosatom.ru/go_eng/2023/armz_2023_eng.pdf

⁴⁴ Rosatom State Corporation, 2023. Performance of State Atomic Corporation Rosatom in 2023. (Accessed: March 21, 2025.)
https://report.rosatom.ru/go_eng/go_rosatom_eng_2023/rosatom_2023_eng.pdf

However, at the end of 2024, Kazatomprom (National Atomic Company of Kazakhstan) unexpectedly announced that its Russian partner was exiting certain joint ventures of Uranium One Group” and transferring its 49.979% stake in JV Zarechnoye to SNURDC Astana Mining Company Limited, whose ultimate beneficiary is State Nuclear Uranium Resources Development Co., Ltd (China). In addition, Uranium One Group sold a 30% stake in the charter capital of JV Khorasan-U and a 30% stake in the charter capital of Kyzylkum to the China Uranium Development Company Limited, whose ultimate beneficiary is the China General Nuclear Power Corporation (CGN, China)⁴⁵.

The sole provider of conversion services, including the production of nuclear fuel for all Russian nuclear power plants and some foreign NPPs of Russian (Soviet) design, as well as for Russia’s naval and research reactors, is the Fuel Company TVEL. Russia’s invasion of Ukraine has seriously disrupted the global supply system for many energy sources and jeopardized the security of nuclear material and service supplies in the European nuclear market. In this regard, the EU has decided to gradually reduce its dependence on Russia, including in nuclear fuel supplies. However, according to estimates by Bellona, despite efforts by Western countries to reduce their market’s dependence on Russian fuel, TVEL’s financial and technological performance has not significantly deteriorated.

In 2023, the consolidated revenue of the fuel division increased by 48% compared to 2022, exceeding 401 billion rubles. The company’s net assets in 2023 amounted to 406 billion rubles, and its profit reached 66.7 billion rubles⁴⁶. However, it should be noted that this revenue growth was primarily driven by increased supplies to the domestic and Asian markets, as well as by strengthening its position in Asian countries. While 2023 saw an increase in Russian fuel deliveries for European VVER reactors and a rise in purchases of Russian enriched uranium for use in the United States, sanctions imposed by individual countries and the European Union – aimed at gradually phasing out purchases of Russian nuclear fuel and encouraging Western NPPs of Soviet (Russian) design to transition to fuel from alternative suppliers, primarily Westinghouse – are already beginning to take effect.

Over the past two years, TVEL has supplied approximately 22.35% of conversion services to the European market. However, the company’s total volume of conversion contracts has decreased by 25%. Additionally, 30% (3.2 million SWU) of uranium enrichment needs were met through purchases in Russia (from Tenex and TVEL). These figures have remained virtually unchanged compared to 2021⁴⁷ The total revenue of all atomic industry entities from uranium

⁴⁵ NAC Kazatomprom, December 17, 2024. Kazatomprom announces change of partners in some joint ventures [in Russian]. (Accessed: March 21, 2025.) https://www.kazatomprom.kz/ru/media/view/announces_the_change_of_the_partners_in_some_jvs_

⁴⁶ Rosatom State Corporation, 2023. Performance of the Fuel Division in 2023 [in Russian]. (Accessed: March 21, 2025.) <report.rosatom.ru/tvel>

⁴⁷ Euratom Supply Agency, 2023. Annual Report 2022. (Accessed: March 21, 2025.) https://euratom-supply.ec.europa.eu/system/files/2023-10/ESA%20Annual%20Report%202022%20-%20Final%20%28website%29_2.pdf

exports to the EU market amounts to approximately €1 billion per year⁴⁸. For Rosatom, this represents only about 10% of its total foreign revenue⁴⁹ and no more than a third of its foreign revenue from the fuel cycle.

In 2023, TVEL began installing⁵⁰ the W2-EHZ facility for the deconversion of depleted uranium hexafluoride (DUHF). Uranium hexafluoride defluorination facilities allow DUHF – of which approximately 1 million tons have accumulated at four enrichment plant sites in Russia – to be converted into a chemically less reactive and therefore safer form: uranium oxide-oxide (U₃O₈) in powder form. More details on the safety issues and potential uses of DUHF can be found in Bellona's 2020 report⁵¹. The launch of these facilities and the gradual deconversion of accumulated uranium hexafluoride stocks at multiple sites in Russia, including in the Urals and Siberia, could significantly enhance the safety of these locations and positively impact radiation conditions in storage areas for depleted uranium. However, since the construction and operation of deconversion facilities are financially unviable and costly for Rosatom, and cooperation with France could be disrupted at any moment for political reasons, the implementation of the DUHF safe handling project could be halted or seriously delayed in the coming years.

It should be noted that in recent years, to reduce dependence on export markets and mitigate sanctions pressure, TVEL has actively pursued diversification and developed various innovative projects in nuclear material processing, hydrogen energy, gas centrifuge production, and other areas. Within TVEL, Rosatom has established industry integrators responsible for the development of additive manufacturing technologies (3D printing) and energy storage systems. In 2023, TVEL created an intelligent system for reviewing scientific and technical documentation based on artificial intelligence. This system is designed for analyzing unstructured data and verifying complex documents⁵².

One of the key areas of TVEL in sustainable development and environmental safety is its work on eliminating nuclear legacy. This includes projects for the processing and disposal of nuclear materials and the decommissioning of radioactive waste. Rosatom's main pride and hope in this regard is the "Breakthrough" project, under which TVEL is developing technologies for closing the nuclear fuel cycle. According to Rosatom, this will minimize the accumulation of spent nuclear fuel and radioactive waste.

⁴⁸ Bellona, 2023. Russia's nuclear industry on the eve and at the beginning of the war [in Russian]. (Accessed: March 21, 2025.)
https://network.bellona.org/content/uploads/sites/4/2023/10/2023_ATOM.pdf

⁴⁹ Bellona, October 23, 2023. Bellona Atomic Digest. September 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://bellona.ru/2023/10/23/atomic-digest-09-23/#10p>

⁵⁰ JSC TVEL, August 16, 2023. Installation of equipment for the second stage of the depleted uranium hexafluoride processing plant has begun at JSC ZEP [in Russian]. (Accessed: March 21, 2025.)
https://tvel.ru/press-center/news/?ELEMENT_ID=10427

⁵¹ Bellona, 2020. Depleted uranium hexafluoride (current situation, issues of safe handling and prospects) [in Russian]. (Accessed: March 21, 2025.)
<https://network.bellona.org/content/uploads/sites/4/2020/07/OGFU-situation.pdf>

⁵² Atom Media, June 1, 2023. CIPR 2023: TVEL's project based on artificial intelligence wins CIPR DIGITAL award [in Russian]. (Accessed: March 21, 2025.)
<https://atommedia.online/2023/06/01/cipr-2023-proekt-kompanii-tvel-osnovan>

TVEL is currently one of the key companies involved in the creation of the fuel fabrication-refabrication module. Within its structure, TVEL has established a Division for Nuclear Material Processing and Nuclear Legacy Decommissioning, whose main functions include coordinating projects, implementing technologies, dismantling nuclear infrastructure, environmental rehabilitation, and international cooperation. The division comprises four main enterprises—GKhK, PO Mayak, SKhK, and MSZ (Elektrostal). It works in coordination with Rosatom's Environmental Solutions directorate, which defines Russia's nuclear legacy decommissioning strategy, while TVEL is responsible for its technical implementation. Additionally, in 2021, TVEL was designated as the core organization for CIS countries on issues related to spent nuclear fuel management, radioactive waste disposal, and the decommissioning of nuclear and radiation-hazardous facilities⁵³. Russia has traditionally exerted significant influence over CIS countries, a factor that has gained particular importance in the context of the war in Ukraine. In the case of Rosatom and TVEL, their work on nuclear legacy management has been institutionally formalized through a decision by the CIS executive body, further reinforcing this dependency⁵⁴.

1.4. Nuclear and radiation safety, elimination of the nuclear legacy

During the wartime period, the strategy for managing spent nuclear fuel, radioactive waste, and the overall approach to nuclear legacy decommissioning continued to be developed by Rosatom's Environmental Solutions directorate, just as before the war. The primary funding program for these activities in 2023–2024 was the Federal Target Program on Nuclear and Radiation Safety-2 (FCP NRS-2)⁵⁵, the completion and closure of which were postponed from 2030 to 2035 following the onset of the war. Nearly all Rosatom enterprises were involved in implementing projects under this program, with a particularly significant role assigned to TVEL enterprises (FSUE GKhK and JSC ODC UGR), FSUE RADON, FSUE NO RAO, as well as the northern and far eastern branches of FSUE FEO. Bellona has paid close attention to both FCP NRS-1 and FCP NRS-2, regularly covering the projects and activities carried out within these programs in its reports and publications^{56,57}.

⁵³ Atomic Energy 2.0, June 28, 2021. JSC TVEL appointed as the CIS base organization for nuclear legacy elimination [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2021/06/28/115015>

⁵⁴ CIS Internet portal, August 5, 2022. CIS countries discussed the experience and prospects for eliminating nuclear legacy sites in the Commonwealth states [in Russian]. (Accessed: March 21, 2025.) <https://e-cis.info/news/564/10231/>

⁵⁵ FTP NRS-2 [in Russian]. (Accessed: March 21, 2025.) <https://фцп-ярб.рф/>

⁵⁶ Bellona, November 2009. The most expensive program to save Russia from its nuclear past [in Russian]. (Accessed: March 21, 2025.) https://ru.bellona.org/publication/atom_programm/

⁵⁷ Bellona, November 24, 2020. Results of the Federal Targeted Program NRS-2: What has been done to eliminate the nuclear legacy and what remains to be done [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2020/11/24/itogi-ftp-yarb-2/>

Rosatom has published reports on realization of the FCB NRS-2 program for 2023 and 2024^{58,59}

It should be noted that the program is financed from the federal budget as well as extrabudgetary sources, the primary one being Rosatom's own budget. The total budget for FCP NRS-2 amounts to approximately 700 billion rubles⁶⁰.

In the nuclear digest for April 2024 Bellona analyzed the results of realization of the FCB NRS-2 program for 2023⁶¹

Regarding the results of 2024, special attention was given to completing the second phase of the Pilot Demonstration Center (PDC) for spent nuclear fuel (SNF) reprocessing at FSUE GHK (Zheleznogorsk, Krasnoyarsk Krai). The facility's projected capacity is around 220 tons of VVER-1000 SNF per year once it reaches full operational capability. This is one of Rosatom's most critical projects, seen as a step toward safer SNF reprocessing compared to the current methods used at FSUE PO Mayak⁶². According to the annual report, the second phase of the PDC was completed in November 2024.

The final report also notes that since the adoption of the FCP NRS-1 program in 2016, 56 large and small nuclear legacy sites have been brought to a safe final state, with work continuing on 32 more such sites⁶³.

The Bellona Foundation (Oslo, Norway) and the Russian offices of Bellona (St. Petersburg, Murmansk) have been paying special attention to the Leps project, which was initiated in 1994, for more than 25 years⁶⁴. Therefore, it was significant for Bellona when Rosatom announced⁶⁵ that the floating technical base Leps had finally been decommissioned, and the project, which lasted nearly 30 years and cost approximately 60 million euros, was closed in 2024⁶⁶.

Bellona was particularly concerned with the information about the completion of the elimination

⁵⁸ Bellona, May 28, 2024. Federal Target Program "Ensuring Nuclear and Radiation Safety" (FTP NRS-2). Results for 2023 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2024/05/28/nuclear-digest-04-24/#09p>

⁵⁹ FTP NRS-2, December 27, 2024. Brief results of the implementation of the FTP NRS-2 in 2024 [in Russian]. (Accessed: March 21, 2025.) <https://фцп-яpb.рф/society/news/kratie-itogi-realizatsii-ftsp-yarb-2-v-2024-godu/>

⁶⁰ FTP NRS-2. Overview [in Russian]. (Accessed: March 21, 2025.) <https://фцп-яpb.рф/about/overview/>

⁶¹ Bellona, May 28, 2024. Federal Target Program "Ensuring Nuclear and Radiation Safety" (FTP NRS-2). Results for 2023 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2024/05/28/nuclear-digest-04-24/#09p>

⁶² FTP NRS-2, December 18, 2024. The Experimental and Demonstration Center is preparing for SNF reprocessing [in Russian]. (Accessed: March 21, 2025.) <https://фцп-яpb.рф/society/news/opytno-demonstratsionnyy-tsentr-gotovitsya-k-pererabotke-oyat/>

⁶³ FTP NRS-2, December 27, 2024. Brief results of the implementation of the FTP NRS-2 in 2024 [in Russian]. (Accessed: March 21, 2025.) <https://фцп-яpb.рф/society/news/kratie-itogi-realizatsii-ftsp-yarb-2-v-2024-godu/>

⁶⁴ Bellona, 2021. Floating technical base "Lepse". Historical path [in Russian]. (Accessed: March 21, 2025.) https://network.bellona.org/content/uploads/sites/4/2022/02/2021_LEPSE_03.pdf

⁶⁵ Rosatom State Corporation, November 22, 2023. The project for the disposal of the floating technical base Lepse has been successfully implemented in the Murmansk Region [in Russian]. (Accessed: March 21, 2025.) <https://rosatom.ru/journalist/news/v-murmanskoy-oblasti-ustpeshno-realizovan-proekt-utilizatsii-plavtekhbazy-lepse/>

⁶⁶ Nord-News.ru, November 23, 2023. The disposal of the Lepse in the Murmansk region cost about 60 million euros [in Russian]. (Accessed: March 21, 2025.) <https://nord-news.ru/news/2023/11/23/?newsid=160907>

of Soviet nuclear legacy in the Far East⁶⁷. Bellona commented on this event in its nuclear digest⁶⁸, pointing out that there are still issues regarding the disposal of decommissioned nuclear submarines, which are currently stored in a coastal shelter at Cape Ustrichny in the Razboynik Bay, Primorsky Krai.



Isolation point for hazardous nuclear submarines in the Far East. Source: RosRAO

In early December 2024, Rosatom announced that the last – eleventh – set of spent reactor core parts with liquid metal coolant had been removed from the coastal technical base of the Russian Navy in the closed administrative-territorial formation (ZATO) of the city of Ostrovnoy (Gremikha settlement). The parts were dismantled and sent for reprocessing.

⁶⁷ Bellona, October 30, 2024. Bellona Atomic Digest. September 2024 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2024/10/30/nuclear-digest-09-24/#top1>

⁶⁸ Bellona, October 30, 2024. Bellona Atomic Digest. September 2024 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2024/10/30/nuclear-digest-09-24/#06p>



This was the last batch of spent nuclear fuel that was stored at the base in Gremikha⁶⁹.

In the report “The Nuclear Legacy in the Russian Arctic”⁷⁰, Bellona thoroughly described and analyzed the condition of the objects at the former submarine base in Gremikha. According to Bellona’s estimates, despite the fact that solid radioactive waste remains at the Gremikha site, the base no longer poses the high environmental danger it once did, about which Bellona had previously informed both the international and Russian community⁷¹.

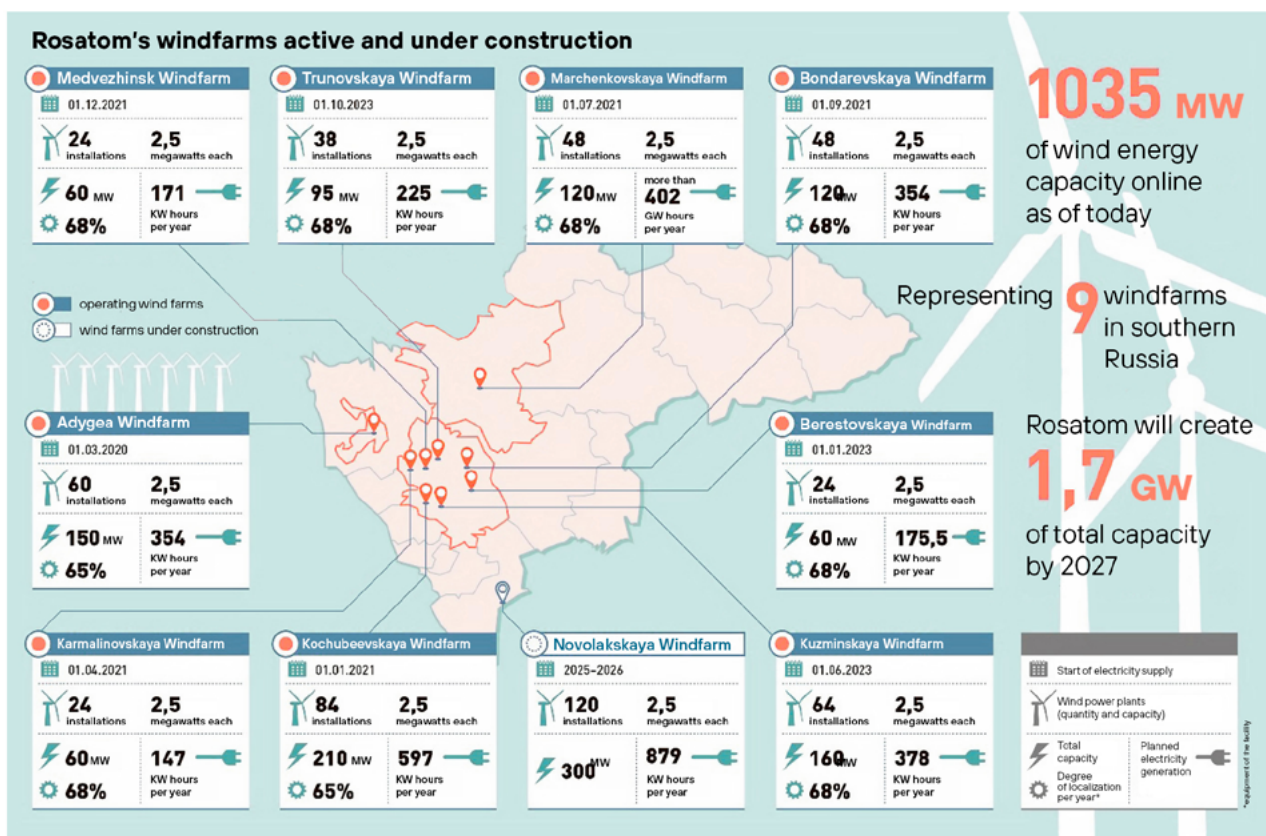
⁶⁹ Atomic Energy 2.0, December 02, 2024. Rosatom completes removal of spent uranium-beryllium fuel from former Russian Navy coastal base Gremikha [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/12/02/151586>

⁷⁰ Bellona, 2024. Nuclear Legacy in the Russian Arctic (status as of late 2023 and prospects for its elimination). (Accessed: March 21, 2025.)
https://network.bellona.org/content/uploads/sites/4/2024/05/Nuclear-legacy-report_PDF.pdf

⁷¹ Bellona, 2001. Nuclear Arctic. Problems and Solutions [in Russian]. (Accessed: March 21, 2025.)
https://network.bellona.org/content/uploads/sites/4/2015/07/fil_arktika.pdf

1.5. Rosatom's renewable energy

In September 2017, a separate division called NovaWind was created within Rosatom, which in 2024 was renamed Rosatom Renewable Energy (hereinafter the Division). The main task of the Division was to manufacture equipment and build wind farms, which, starting in March 2020, began supplying electricity to the Wholesale Electricity and Capacity Market (WECM). Since then, Rosatom has commissioned nine wind farms. The latest, Trunovskaya Wind Farm, was commissioned in October 2023. In Dagestan, the construction of the Novolakskaya Wind Farm, the largest wind farm in Russia with a capacity of 300 MW, has begun.



Source: Rosatom, modified by Bellona.
 Rosatom's wind farms, operational and under construction
<https://www.kommersant.ru/doc/7365812>

With the commissioning of the Trunovskaya Wind Farm, the total installed capacity of wind energy assets of the company reached 1 GW, and the electricity generation from Rosatom's wind farms in 2023 amounted to 2.7 billion kWh⁷². By 2027, the Division plans to establish

⁷² Atomic Energy 2.0, January 30, 2024. Rosatom's nuclear and wind power plants produced 219.7 billion kWh in 2023 [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2024/01/30/142720>

wind farms with a total capacity of about 1.7 GW. In addition, Rosatom is ramping up the production of its own equipment for wind farms. On December 26, 2024, the first factory for manufacturing composite wind turbine blades, measuring 51 meters in length and weighing about 8.5 tons, began operations in Ulyanovsk at the facilities of Rusatom Wind Blades (part of the Composite Division of the Rosatom State Corporation).

In 2024, the Division began implementing its first international project. In the Issyk-Kul region of Kyrgyzstan, a capsule was laid for the construction of a 100 MW wind farm. In addition to wind energy, Rosatom has intensified the construction of production facilities and the development and manufacturing of equipment for energy storage systems and electric vehicle charging stations in recent years. In 2023, RENERA (a company under the management of TVEL) began the construction of Russia's first "Gigafactory" for energy storage production in the Kaliningrad region, with an annual production capacity of 4 GWh. Additionally, TVEL announced the start of development and construction of electric vehicles and related equipment. It is claimed that Rosatom's enterprises can produce about 60% of all components for electric vehicles, including battery packs, localized electric motors, rare-earth magnets (including raw materials for rare earth metals), microelement base, and polymer and composite materials⁷³. In 2024, Rosenergoatom planned to build 292 electric charging stations (ECS). As stated, Rosenergoatom aims to capture at least 25% of the Russian electric vehicle charging market by 2030⁷⁴.

1.6. Rosatom in the Arctic

The unusual recent increase in Rosatom's activity in the Arctic and along the Northern Sea Route, in particular, indicate that the Arctic region and everything happening within it are of geopolitical importance and a strategic goal for Russia, which it intends to pursue and achieve in the foreseeable future. For Rosatom, which has been entrusted with almost all primary management and the majority of Arctic resources, such decisions are evidence of maximum trust placed in it by Russia's leadership, especially by Putin.

Currently, Russia aims to address at least four key Arctic global issues: infrastructure, economic, transportation, and national security. There are also other important Arctic challenges, such as environmental safety, the consequences of climate change, the situation of indigenous northern peoples, and meeting the needs of the residents of the Arctic zone. However, these tasks, along with several others, are considered secondary to the main directions mentioned above.

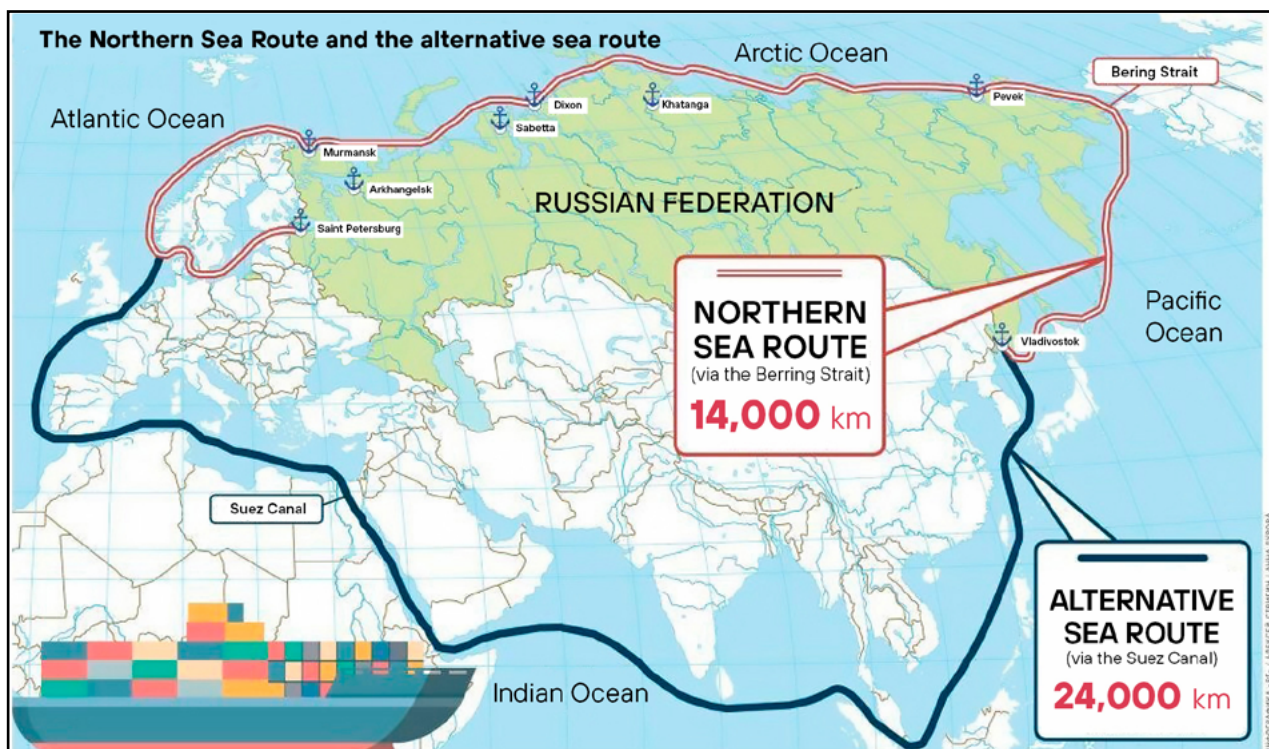
⁷³ Atomic Energy 2.0, May 12, 2023. Rosatom will develop batteries and an electric drive for the Russian electric vehicle ATOM [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/03/28/135151>

⁷⁴ Atomic Energy 2.0, June 26, 2024. Rosenergoatom plans to take 25% of the Russian electric filling station market by 2030 [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/06/26/147060>

The atomic agency is an active participant in the creation and strengthening of Arctic infrastructure, the organization of the transport corridor, as well as ensuring the security of the Arctic region. Under its management are several key management, technical, and design organizations that create and provide the conditions for addressing the aforementioned tasks.

The Northern Sea Route

The development of the Northern Sea Route largely depends on how successfully Rosatom will create the necessary coastal infrastructure and floating means that ensure the passage of vessels of various types through the rather specific and challenging Arctic maritime route. The Northern Sea Route is a unified transportation corridor in Russia’s Arctic region, running along the northern shores of the country through the seas of the Arctic Ocean and connecting ports in the European part of Russia and the mouths of navigable Siberian rivers with the Far East. In 2023–2024, Rosatom’s main activities were focused on the creation of an icebreaker fleet, organizational and coastal infrastructure, as well as the establishment of a transportation and logistics group.



Source: *atomic-energy.ru*, modified by Bellona.
 The Northern Sea Route and the Alternative Sea Route

Map showing the difference in distances of sea routes via the NSR (14000 km) and the Suez Canal (24000 km)⁷⁵

⁷⁵ Atomic Energy 2.0, May 23, 2024. The Russian government will allocate 2 trillion rubles for the development of the nuclear fleet on the Northern Sea Route [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2024/05/23/146038>

A number of important decisions regarding Rosatom's activities in the Arctic, and specifically on the Northern Sea Route, were made by the Russia's top-level state structures in 2023-2024.

In August 2022, the Russian government approved a plan for the development of the Northern Sea Route until 2035, which included more than 150 measures. It was planned that the total funding for this plan would amount to approximately 1.8 trillion rubles⁷⁶. However, in 2023, the Russian government made several decisions to amend the plan and program for the development of the Northern Sea Route and to allocate additional funds for the construction of new icebreakers and marine terminals. In the spring of 2024, the already adopted plan began to be adjusted due to the failure to account for new realities, such as the lack of transport vessels and sanctions-related difficulties, which hindered the implementation of several major Arctic investment projects⁷⁷.

Difficulties were primarily related to the project by the company NOVATEK, Arctic LNG 2, for the development of the Utrenneye gas field on the Gydan Peninsula in the Yamalo-Nenets Autonomous Okrug⁷⁸.

This project was initially planned to be launched at the end of 2023 and early 2024, but it was ultimately delayed because liquefied natural gas from the already launched first line of the plant had nowhere to be offloaded—there were no transport vessels or buyers, who left after the sanctions were imposed. To export the gas, six tankers were ordered from the South Korean shipyard Hanwha Ocean. Three of them had already been built by the time the project was launched, but they became unavailable because their clients, affiliated with Sovcomflot, were subjected to direct US sanctions. The remaining three tankers were ordered by one of the Japanese companies, but their delivery has been delayed, and it is unclear when the ships will be ready. Additionally, some projects, such as the Vostok Oil project by Rosneft to extract low-sulfur oil from the Vankor cluster fields, the Paiakh group, the Western Irkinsky site, the Eastern Taimyr group, and Vostok-Oil, turned out to have planned volumes that did not align with the actual situation. The marine terminal at the "Bukhata Sever" port in the Yenisei Gulf was scheduled to be launched in 2024, but by the end of the year, the work was still not completed.

Moreover, by the end of 2024, only a quarter of the 770-kilometer Vankor-Paiyakha-Bukhata Sever pipeline had been completed. As a result, the planned cargo flow target of 80 million tons for 2024 through the Northern Sea Route became unrealistic. The Russian government will

⁷⁶ Atomic Energy 2.0, March 17, 2023. Using the Northern Sea Route will solve issues with ship insurance [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2023/03/17/133641>

⁷⁷ Ministry of Transport of the Russian Federation, August 10, 2023. Passport of the federal project "Development of the Northern Sea Route" [in Russian]. (Accessed: March 21, 2025.) <https://mintrans.gov.ru/documents/8/12714>

⁷⁸ RG.RU, April 2, 2024. The Russian government will adjust the Northern Sea Route development plan until 2035 [in Russian]. (Accessed: March 21, 2025.) <https://rg.ru/2024/04/02/reg-szfo/pravitelstvo-rt-otkorrektiruet-plan-razvitiia-sevmorputi-do-2035-goda.html>

revise the Northern Sea Route development plan until 2035⁷⁹ and make a decision regarding a unified marine operator for the northern supply. The Ministry for the Development of the Russian Far East and Arctic (MinDalVostok) has proposed appointing the state corporation Rosatom as the unified marine operator for the northern supply. Additionally, the government has approved new rules for the passage of foreign ships along the Northern Sea Route. These regulations require strict control over foreign vessels passing through the NSR, with one of the authorized organizations being the Rosatom structure, the Federal State Budgetary Institution "Main Directorate of the Northern Sea Route" (Glavsevmorput)⁸⁰.

At the end of 2024, the Russian government announced the adoption of the development program for the Big Northern Sea Route (BNSR). The Big Northern Sea Route will cover a path from Kaliningrad to Sakhalin, with a length of about 8,000 nautical miles, nearly three times longer than the traditional NSR. This expanded route will make it possible to involve ports in Arkhangelsk, Saint Petersburg, and Kaliningrad, which are effectively outside the traditional NSR's waters. For the federal project "Development of the BNSR," it was proposed to allocate 55.28 billion rubles from the federal budget in 2025, 63.69 billion rubles in 2026, and 56.48 billion rubles in 2027. However, according to the approved 2025 budget, no funds have been allocated for the BNSR.⁸¹

In August 2024, by decree of President Putin, the Maritime Board of the Russian Federation was established, one of whose structures is the Council for the Protection of Russia's National Interests in the Arctic (hereafter referred to as the Council). The Council is tasked with analyzing the current state and prospects for the development of the international, including military-political, situation in the Arctic, as well as the socio-economic situation in the Arctic zone of Russia. The Council's responsibilities include preparing directives for federal and regional authorities and organizations on matters related to the integrated development of port infrastructure for the Northern Sea Route (NSR) and the Arctic zone of Russia, its connection with inland waterways, and ensuring the development of railway and road access routes. Additionally, the Council is to oversee the development of the navigation management system in the Arctic route's waters, and to improve navigation-hydrographic and hydrometeorological support. It appears that Putin created this structure, managed by Patrushev—his loyal assistant—to aid in promoting his initiatives and ideas, while also ensuring control and reporting to him on matters related to the development of the NSR.

Fleet for the NSR

The successful implementation of tasks related to the development of the Northern Sea Route, assigned to Rosatom, critically depends on the number and quality of ice-class and

⁷⁹ Atomic Energy 2.0, April 4, 2024. The Russian government will adjust the Northern Sea Route development plan until 2035 [in Russian]. (Accessed: March 21, 2025.)

<https://www.atomic-energy.ru/news/2024/04/04/144639>

⁸⁰ Atomic Energy 2.0. Main Directorate of the Northern Sea Route (Glavsevmorput) [in Russian]. (Accessed: March 21, 2025.)

<https://www.atomic-energy.ru/GlavSevMorPut>

⁸¹ Atomic Energy 2.0, October 1, 2024. It is proposed to invest 175 billion rubles in the development of the Great Northern Sea Route in 2025–2027 [in Russian]. (Accessed: March 21, 2025.)

<https://www.atomic-energy.ru/news/2024/10/01/149807>

auxiliary vessels capable of operating in Arctic sea conditions. At present, the FSUE Atomflot (a subsidiary of Rosatom) operates four older-generation nuclear icebreakers (50 Let Pobedy, Vaigach, Yamal, Taymyr) and four new-generation icebreakers of Project 22220 (Arktika, Sibir, Ural), as well as Yakutia.⁸²



*Atomflot. Murmansk.*⁸³

To make up for the shortage of nuclear icebreakers, Rosatom has extended the operational life of the nuclear power plants on older-generation icebreakers from 100,000 to 255,000 hours, increasing their service life from 33 to 40 years. The nuclear-powered icebreaker Taymyr (built in 1989) may be decommissioned in 2030, Vaigach (1990) in 2031, and Yamal (1992) in 2033⁸⁴.

⁸² FSUE Atomflot [in Russian]. (Accessed: March 21, 2025.)
<https://www.rosatomflot.ru/>

⁸³ FSUE Atomflot [in Russian]. (Accessed: March 21, 2025.)
<https://www.rosatomflot.ru/>

⁸⁴ Nuclear Energy 2.0. Atom Fleet [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/naval-fleet>

In addition, as of January 2024, 35 diesel-electric icebreakers are in operation in the Arctic zone, most of which operate in the coastal areas of the Kara Sea and northern rivers⁸⁵.

By the end of 2024, three more nuclear icebreakers were under construction at two Russian shipyards. At the Baltic Shipyard in St. Petersburg (part of USC), two Project 22220 nuclear icebreakers, Leningrad and Chukotka, were being built, while at the Zvezda Shipbuilding Complex in Bolshoy Kamen in the Far East, the chief nuclear icebreaker of the Lider Project 10510 was under construction⁸⁶.



Icebreaker of the Lider Project 10510 (Rossiya). Source: Atomflot

Information regarding actual construction, approved plans, as well as Rosatom's requirements and intentions, frequently changes, and officials' explanations often vary. Russia plans to expand its icebreaker fleet in the Far East to 17 vessels by 2030 and to 18 by 2035. This includes adding four nuclear and four non-nuclear icebreakers to Rosatom's fleet, while Rosmorrechflot's

⁸⁵ Nuclear Energy 2.0. Marine Transportation and Technology [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/marine>

⁸⁶ Atomic Energy 2.0, December 19, 2024. Rosatom proposes to introduce a new Arctic investment fee for Northern Sea Route shippers from 2028 [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/12/19/152127>

fleet is expected to receive one non-nuclear icebreaker⁸⁷. How many icebreakers Russia will realistically be able to build in the near future to achieve the government's goal of a "24/7 Northern Sea Route" remains uncertain, given the country's political situation and economic instability. For instance, the construction of the Lider Project icebreaker at the Zvezda shipyard was initially scheduled for completion in 2027, but according to revised plans, its completion has been tentatively pushed back to 2030⁸⁸.

Thus, nearly everything will depend on the capacity of Russia's shipbuilding industry and the financing of planned projects. In the Russian budget plan⁸⁹ for 2024–2026, funding for the construction of new nuclear icebreakers has been reduced. In particular, allocations for the chief icebreaker of the Lider project have been cut by 5.24 billion rubles, while funding for the third and fourth serial icebreakers of the Arktika type⁹⁰ has been reduced by 0.56 billion rubles, for the fifth by 2.36 billion rubles, and for the sixth by 1.36 billion rubles. Additionally, it has been proposed to reduce funding for the construction of the nuclear service vessel⁹¹ by 0.91 billion rubles.

In May 2023, during a meeting between President Putin and members of the Russian government, the Director General of Rosatom requested approval for the construction of four additional non-nuclear icebreakers, in addition to the five nuclear icebreakers he had previously reported. At the time (May 2023), Likhachev noted that 33 vessels and four floating nuclear power plants were already under construction at Russian shipyards⁹². In addition to the seven Project 22220 icebreakers and the Lider nuclear icebreaker (Project 10510), Atomflot plans to build⁹³ four non-nuclear icebreakers, three hydrographic vessels, two pilot ships, 30 emergency rescue vessels of varying power by 2030, and 16 more such vessels by the end of 2025. At the end of 2024, Deputy Prime Minister Yuri Trutnev stated that given the planned increase in cargo transportation along the Northern Sea Route, an additional 10 icebreakers and 46 auxiliary vessels would need to be built. However, no specific timeline for their construction has been provided⁹⁴.

⁸⁷ Novy Den, October 10, 2024. Rosatom is forming an icebreaker flotilla to operate on the eastern section of the Northern Sea Route [in Russian]. (Accessed: March 21, 2025.)

<https://newdaynews.ru/technology/839047.html>

⁸⁸ Military Review, May 20, 2024. Delivery dates for the lead nuclear icebreaker "Rossiya" of Project 10510 "Leader" have been postponed [in Russian]. (Accessed: March 21, 2025.)

<https://topwar.ru/242745-sroki-sdachi-golovnogo-atomnogo-ledokola-rossija-proekta-10510-lider-pereneseny.html>

⁸⁹ Legislative Support System, 2023. Bill № 448554-8 "On the Federal Budget for 2024 and for the Planning Period of 2025 and 2026" [in Russian]. (Accessed: March 21, 2025.)

<https://sozd.duma.gov.ru/bill/448554-8>

⁹⁰ Bellona, March 13, 2023. Bellona Atomic Digest. February 2023 [in Russian]. (Accessed: March 21, 2025.)

<https://ru.bellona.org/2023/03/13/atomic-digest-02-23>

⁹¹ Bellona, June 18, 2023. Bellona Atomic Digest. May 2023 [in Russian]. (Accessed: March 21, 2025.)

<https://ru.bellona.org/2023/06/18/atomic-digest-05-23>

⁹² PortNews, May 18, 2023. A decision must be made to begin construction of four more non-nuclear icebreakers – Rosatom [in Russian]. (Accessed: March 21, 2025.)

<https://portnews.ru/news/347524/>

⁹³ PortNews, February 27, 2023. Vladimir Putin signed a decree increasing the number of icebreakers and rescue vessels for the Arctic [in Russian]. (Accessed: March 21, 2025.)

<https://portnews.ru/news/343545/>

⁹⁴ Russian Shipping, December 26, 2024. 10 icebreakers and 46 auxiliary vessels need to be built for the Northern Sea Route – Yuri Trutnev [in Russian]. (Accessed: March 21, 2025.)

<https://www.rus-shipping.ru/ru/shipbuilding/news/?id=55785>



The flag-raising ceremony on the Yakutia icebreaker⁹⁵.

At the beginning of 2023, Baltic Shipyard JSC and FSUE Atomflot signed a contract for the construction of two more Project 22220 icebreakers: Leningrad (scheduled for completion in 2028) and Stalingrad (2030)⁹⁶. On January 26, 2024, the keel-laying ceremony for Leningrad took place. It should be noted, however, that Baltic Shipyard is facing capacity shortages due to various factors, and the modernization and reconstruction of its facilities are currently estimated at 74 billion rubles. Additionally, the shipyard has reportedly suffered significant financial losses in the construction of nuclear icebreakers.

According to the 2023 annual report⁹⁷, the shipyard's revenue increased by 7% to 21.1 billion rubles, while net losses reached nearly 19 billion rubles, compared to a profit of 5.1 billion rubles the previous year. The report states that "the primary losses resulted from the delivery of planned loss-making orders: the first and second serial Project 22220 icebreakers (Sibir and Ural)." Furthermore, the report indicates that "the execution of the contract for the construction of the third and fourth serial universal nuclear icebreakers of Project 22220 is

⁹⁵ Atomic Energy 2.0 [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/>

⁹⁶ JSC Baltic Shipyard, February 3, 2023. Baltic Shipyard signed a contract for new nuclear icebreakers [in Russian]. (Accessed: March 21, 2025.)
<https://www.bz.ru/press-office/news/baltiyskiy-zavod-podpisal-kont/>

⁹⁷ Corporate Information Disclosure Center, 2025. Company card of JSC Baltic Shipyard [in Russian]. (Accessed: March 21, 2025.)
<https://www.e-disclosure.ru/portal/files.aspx?id=5552&type=2>

expected to result in a negative financial outcome.” In 2024, Baltic Shipyard underwent a management change, including the replacement of its general director. Therefore, it remains uncertain how successfully Russia’s only nuclear icebreaker-producing shipyard will fulfill its plans and contracts under difficult economic conditions.

As mentioned earlier, in the Russian Far East, the *Zvezda* shipyard—responsible for constructing the *Lider* icebreaker and other vessels—is owned by Modern Shipbuilding Technologies and operates under the management of Rosneft. One of the key problems facing *Zvezda* is that ship construction is progressing simultaneously with the construction of the shipyard itself. The current order backlog is substantial and includes crude oil tankers, product tankers, Arctic LNG carriers, multifunctional ice-class supply vessels, the world’s largest nuclear icebreaker *Lider*, and other ships. According to the shipyard’s long-term workload plan, an additional 92 ice-class cargo ships are planned for construction.

At the end of 2024, President Putin approved the sale of the *Zvezda* shipyard, as well as the Primorsky Metallurgical Plant and other project companies of the United Shipbuilding Corporation (USC), to consolidate shipbuilding assets in the Russian Far East⁹⁸. It is worth noting that USC is Russia’s largest shipbuilding holding, with more than 40 design and engineering offices, research centers, shipyards, ship repair, and machine engineering companies. In 2023, the state-owned share in USC was transferred for five years to a trust management agreement with VTB Bank⁹⁹. It is difficult to say how these decisions regarding the change of ownership of large enterprises will affect the goal of creating a shipbuilding center in the Russian Far East. To date, there have been no significant results. As experts have noted, and even the Russian government agrees, with a shortage of ice-class cargo vessels — at least 70 ships — the capacity of Russian shipyards allows for the construction of only 16 ships by 2030¹⁰⁰.

Infrastructure of sea ports

The infrastructure of sea ports and navigational-geographical support for shipping plays as important a role as the quantity and quality of ships and other floating assets planned for use along the Northern Sea Route (NSR). Therefore, in the coming years, significant funds are planned for the construction and modernization of terminals in Chukotka (Pevek), dredging of the ports of Naiba and Tiksi in Yakutia, completion of the Arkhangelsk port, and several other infrastructure projects critical for the NSR. Rosatom has announced its involvement in the dredging of Naiba port, the construction of a road from the port to the future nuclear power plant in Yakutia, as well as the hydrological surveys of the waters around the ports of Tiksi and Naiba by the Hydrographic Enterprise, along with other related projects and initiatives.

⁹⁸ Atomic Energy 2.0, December 27, 2024. USC’s negotiations with Rosneft on the acquisition of *Zvezda* Shipbuilding Complex will be completed by March 2025 [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/12/27/152410>

⁹⁹ Atomic Energy 2.0, 2025. United Shipbuilding Corporation (USC) [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/OSK>

¹⁰⁰ Atomic Energy 2.0, October 24, 2024. The capacity of Russian shipyards allows for the construction of only 16 of the required 70 ice-class vessels by 2030 [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/10/24/150638>

In the next four years, over 19 billion rubles are planned to be invested in the development of infrastructure for sea ports along the Northern Sea Route. Additionally, by the decision of the Russian government, 27.6 billion rubles will be allocated for the construction of a new sea terminal in Pevek¹⁰¹.

Within the structure of the State Corporation *Rosatom*, an industry logistics operator was established as part of the “Logistics” project, which since January 2024 has been called Rosatom Logistics (formerly Rusatom Cargo). Rosatom Logistics handles the delivery of oversized cargo to nuclear power plants under construction abroad and also organizes and develops international transit maritime cargo transportation along the emerging transport route of the Northern Sea Transit Corridor (NSTC)¹⁰².

In 2023, *Rosatom* quickly became one of the largest transportation and logistics companies in Russia. First, Rosatom entered into management with the Delo group, acquiring 49% of its shares. Then, after a decree by President Putin in November 2023, Rosatom was transferred more than 92.4% of the shares in the parent company of FESCO, Far Eastern Shipping Company (DVMP), gaining full control over FESCO. Following these acquisitions, *Rosatom* now controls a range of important cargo transportation by sea, rail, and land.



The *Delo* group includes 47 land terminals and nine sea terminals located in Novorossiysk, the Baltic and Far Eastern basins, as well as in Finland. The total capacity of the sea terminals is 3.9 million TEU (the equivalent of a 20-foot container) per year, while the land terminals have a capacity of 3.7 million TEU. The group operates a fleet of 40,000 fitting platforms and containers, along with its own fleet. The transport and logistics division of the group includes the intermodal container operator *Transcontainer* and the multimodal transport operator *Ruscon*.



By the end of 2022, *FESCO* owned over 83,000 units in its container fleet. The *FESCO* fleet consists of 35 transport vessels, mainly operating on its own sea routes. This includes container ships, multipurpose vessels that can carry various cargo types, ranging from turbines to bulk cargo, as well as general cargo ships. The group also owns the *Vladivostok Sea Commercial Port* and operates container terminal complexes with a total capacity of over 952,000 TEU per year¹⁰³.

¹⁰¹ Atomic Energy 2.0, 2025. Ports and Terminals [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/ports>

¹⁰² Atomic Energy 2.0, 2025. Rosatom Logistics (former Rusatom Cargo) [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/Rusatom-Cargo>

¹⁰³ Atomic Energy 2.0, December 11, 2023. Why is Rosatom taking control of the Russian transport market? [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/SMI/2023/12/11/141359>

In 2023, the infrastructure operator of the Northern Sea Route (NSR) and the Arab company DP World (Dubai, UAE) established a joint venture, "International Container Logistics," to develop transit container shipping along the Northern Sea Route. The newly created JV will be 51% owned by Rosatom's subsidiary and 49% by the Russian division of DP World. In June 2023, Rosatom and DP World signed an agreement¹⁰⁴ to jointly develop Eurasian transport logistics and container shipping along the Northern Sea Route. In December, both parties signed another agreement to create a global logistics operator for operations in both the Russian and international markets¹⁰⁵.

The CEO of Rosatom, commenting on these activities and the events surrounding the transfer of shares to Rosatom, emphasized¹⁰⁶ that the state corporation is fulfilling the role of the single infrastructure operator for the Northern Sea Route (NSR), is responsible for icebreaker escort services for the fleet, and has been tasked with managing all maritime traffic along the NSR and overseeing part of the northern supply chain. He stressed that Rosatom has been entrusted with the task of creating a new global logistics corridor along the NSR that will be competitive with other global logistics chains. "Our goal is to redirect a significant portion of global maritime shipments between the growing economies of Asia, Southeast Asia, and, though conservative, the fairly large European market," he added. "It's difficult to do this without our own logistics asset. We have such experience, the company Delo is in a serious alliance with us, but it primarily handles land transport. As for maritime transport, FESCO holds a significant share of the global market and is absolutely dominant in the interests of Russian transport."

In 2023, the transit cargo flow (from China to Arkhangelsk and Murmansk) along the Northern Sea Route (NSR) reached 2.15 million tons, while the total volume of cargo transported was 36.25 million tons. By the end of 2024, the total volume of cargo transported along the NSR increased to 38 million tons, although the updated NSR development plan for the period until 2035, which was revised in April 2023, projected that the total cargo volume should reach about 80 million tons by the end of 2024¹⁰⁷. The discrepancy in these figures is hard to explain. It should be noted that transporting goods via the Northern Sea Route is generally more expensive¹⁰⁸ than other routes. However, it is expected to become even more costly, as Rosatom proposes to introduce a new Arctic investment fee for cargo shippers on the NSR starting in 2028. According to representatives of Rosatom, this fee will help finance

¹⁰⁴ Rosatom State Corporation, June 15, 2023. Rosatom and DP World agreed to jointly develop Eurasian logistics [in Russian]. (Accessed: March 21, 2025.) <https://web.archive.org/web/20240908061743/https://rosatom.ru/journalist/news/rosatom-i-dp-world-dogovorilis-sovmestno-razvivat-evroaziatskuyu-logistiku/>

¹⁰⁵ Atom Media, December 7, 2023. Rosatom and DP World to create global logistics operator [in Russian]. (Accessed: March 21, 2025.) <https://atommedia.online/2023/12/07/rosatom-i-dp-world-sozhdadut-globalnogo-logi/>

¹⁰⁶ Interfax, November 9, 2023. Rosatom CEO expects successful development of Northern Sea Route after transfer of FESCO shares to State Corporation [in Russian]. (Accessed: March 21, 2025.) <https://www.interfax.ru/russia/929842>

¹⁰⁷ Atomic Energy 2.0, February 27, 2024. The volume of transit shipments along the Northern Sea Route amounted to 2.15 million tons [in Russian]. (Accessed: March 21, 2025.) <https://www.atomic-energy.ru/news/2024/02/27/143463>

¹⁰⁸ PortNews, November 29, 2023. Market participant: Transportation via the NSR is 10-20% more expensive than traditional routes [in Russian]. (Accessed: March 21, 2025.) <https://portnews.ru/news/356871/>

the construction of icebreakers, as the state corporation currently lacks sufficient funds to complete the construction of new, powerful nuclear icebreakers¹⁰⁹.

Between 2023 and 2024, Rosatom made a series of organizational and structural decisions regarding its activities on the Northern Sea Route (NSR). Since 2018, the state corporation Rosatom has been the infrastructure operator of the NSR, responsible for organizing shipping, building infrastructure, providing navigational and hydrographic support, and ensuring maritime safety in Arctic conditions. In December 2023, Rosatom established a subsidiary, Rusatom Arctic, to develop new business directions in the Arctic zone. The sole shareholder of Rusatom Arctic is the Atomic Energy Industrial Complex (Atomenergom). The new company is headed by Vladimir Panov, the special representative of Rosatom for Arctic development issues. According to Rosatom, the task of Rusatom Arctic is to implement Arctic projects related to the development of the cargo base of the Northern Sea Route. Key areas of focus will include transport and logistics support, the development of mineral resource clusters, energy and infrastructure provision, in order to form comprehensive offerings for the market, including assistance with the development of existing and prospective investment projects^{110,111}.

In summary, we may highlight and emphasize several more key facts, aspects, and trends related to Rosatom's activity in the Arctic:

An undeniable fact is that the war in Ukraine has influenced decisions regarding the development and use of the Northern Sea Route (NSR) by many Russian state and international structures and organizations. Rosatom's activities in the Arctic have been affected by the consequences of international sanctions and certain decisions by Western countries. In March 2023, one of the key enterprises supporting the NSR, the state-owned enterprise Atomflot, was subjected to European Union sanctions. In May 2023, the United States joined the EU by extending sanctions to Atomflot and Hydrographic Enterprise, both of which are under the management of Rosatom. Additionally, the deep-water port in Indiga, located in the Nenets Autonomous Okrug, became a subject of sanctions, despite the fact that it has not yet been built and there is no information about when construction will begin.

This sanction decision is aimed at the future of the Northern Sea Route (NSR), as the depth near the shore will allow the Indiga port to accommodate vessels with a deadweight of up to 300,000 tons. The port is planned to be the largest hub for transshipment of international transit cargo and feeder lines along the Arctic route connecting Europe, Asia, and Europe. Most importantly, a railway is planned to be constructed to the port, linking Indiga with Sosnogorsk, and continuing to Surgut over a distance of more than 1,200 km. This railway was supposed to become part of the "Belkomur" transport corridor, which had attracted interest from China, which had actively participated in various Russian-Chinese intergovernmental commissions and other activities related to the development and arrangement of the NSR.

¹⁰⁹ Go Arctic, December 18, 2024. Rosatom proposes to introduce an Arctic investment fee for Northern Sea Route shippers from 2028 [in Russian]. (Accessed: March 21, 2025.)

<https://goarctic.ru/work/rosatom-predlagaet-vvesti-s-2028-goda-arkticheskiy-investitsionnyy-sbor-dlya-gruzootpraveley-sevmo/>

¹¹⁰ Atomic Energy 2.0, December 29, 2023. Rosatom created a new subsidiary, Rusatom Arctic, to develop the Northern Sea Route cargo base [in Russian]. (Accessed: March 21, 2025.)

<https://www.atomic-energy.ru/news/2023/12/29/141987>

¹¹¹ Sudostroenie.info, December 28, 2023. Rosatom created a subsidiary to develop the cargo base of the NSR [in Russian]. (Accessed: March 21, 2025.) <https://sudostroenie.info/novosti/41258.html>

In 2023, the Chinese company COSCO made the first eight voyages along the Northern Sea Route since the war began and submitted applications to continue navigating in the following years¹¹². The geopolitical situation is forcing China and Russia to create a new architecture in logistics, finance, and industrial cooperation. In 2024, 10 round trips were made between Arkhangelsk and China along the Northern Sea Route.

Year-round navigation along the Northern Sea Route (NSR) is the declared goal, but it currently appears to be a distant prospect. One of the reasons for this distant timeline is the lack of a sufficient satellite group for navigation over the NSR. As a result, Rosatom has to rely on GLONASS and China's Beidou satellite navigation system, although this presents certain risks for Russia¹¹³.

Additionally, there remains a significant dependency on foreign manufacturers and technologies. For instance, the casting of the icebreaker hulls was to be supplied by the Kramatorsk plant Energomashspetsstal, which is now unable to do so due to the war. The exit of the Finnish company Wärtsilä Solutions Oy from the Russian market deprived the Baltic Shipyard of already ordered essential equipment sets for shaft lines, backup diesel generators, stern tube seals, and other parts for the icebreakers under construction.

Thus, although the Northern Sea Route is being developed, money is being invested, and ships are being built, it is premature to speak of a large northern maritime route being established in the near future, or even of the smaller NSR becoming operational year-round, let alone any competition with the Suez Canal.

Nevertheless, Bellona believes that Rosatom has come to the Arctic, and specifically to the Northern Sea Route, for the long term with serious intentions. It is becoming increasingly involved in various areas that need to be developed for the exploration of the Arctic. In addition to solving transport issues, it is evident that Rosatom is showing growing interest in the prospect of its participation in the extraction of minerals in the Arctic zone. This is indicated by the intensification of the project for the extraction of lead-zinc ores from the Pavlovskoye deposit on Novaya Zemlya¹¹⁴, the Kolmoozerskoye lithium deposit, as well as the interest in acquiring a gold mining project in the Irkutsk region. For this purpose, Rosatom's structure Atomredmetzoloto signed an agreement with the government of Chukotka for the joint development of the Sovino deposit, among other projects¹¹⁵.

Furthermore, Rosatom has not been relieved of its responsibilities for eliminating the nuclear legacy on the Arctic coast and in the northern seas, as Bellona wrote in its 2024 report¹¹⁶.

¹¹² Atomic Energy 2.0, July 10, 2024. Russia invites China to work together on developing the Northern Sea Route and building a merchant fleet [in Russian]. (Accessed: March 21, 2025.)

<https://www.atomic-energy.ru/news/2024/07/10/147475>

¹¹³ KO Magazine, May 23, 2023. Nuclear ricochet: what does it mean that the Northern Sea Route and Atomflot are subject to US sanctions [in Russian]. (Accessed: March 21, 2025.)

<https://ko.ru/articles/atomnyy-rikoshet-cto-oznachaet-popadanie-sevmorputi-i-atomflota-pod-sanktsii-ssha/>

¹¹⁴ Arctic Russia. Pavlovskoye deposit [in Russian]. (Accessed: March 21, 2025.)

<https://arctic-russia.ru/project/pavlovskoe-mestorozhdenie/>

¹¹⁵ Atomenergopromsbyt, November 14, 2023. Rosatom's Mining Division and the Government of the Chukotka Autonomous Okrug signed a cooperation agreement [in Russian]. (Accessed: March 21, 2025.)

<https://apsbt.ru/media-centr/novosti-otrasli/ornorudnyy-divizion-rosatoma-i-pravitelstvo-chukotskogo-avtonomnogo-okruga-podpisali-soglashenie-o-sotrudnichestve/>

¹¹⁶ Bellona, 2024. Nuclear Legacy in the Russian Arctic (status as of late 2023 and prospects for its elimination). (Accessed: March 21, 2025.)

<https://etc.bellona.org/publication/nuclear-legacy-arctic-2/>

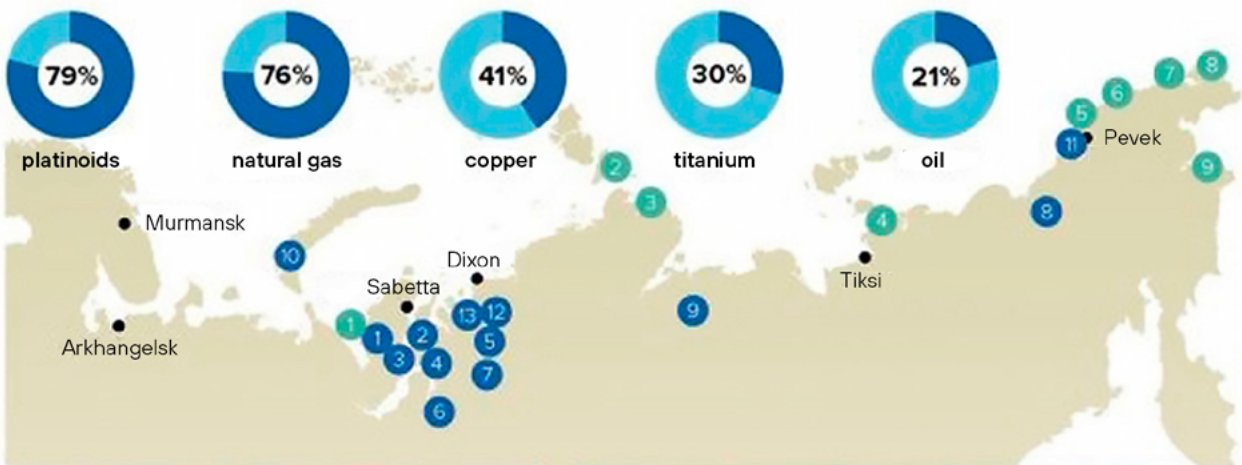


Loading the reactor installation Ritm-200 on to the Chukotka nuclear submarine, February 2024. Source: Baltic Shipyard

Resource base of the Russian Arctic Zone

Indicative GDP until 2035:
3.1 trillion rubles

Indicative tax revenue for the Russian budget until 2035:
13.2 trillion rubles



Active projects and deposits	
1. Yamal LNG	8. Baimskaya
2. Arctic LNG 2	9. Tomtor
3. Ob LNG	10. Pavlovsky
4. Arctic LNG 1	11. Mayskoye
5. Vostok Oil	12. Severnaya Zvezda
6. Novy Port	13. Vostokugol-Dikson
7. Norilsk Nickel	

Potential mineral and raw material clusters of polymetallic ores	
1. Saureyskoe deposit (Yamal-Nenets Autonomous Republic)	6. Papyangaysky (Chukotka Autonomous Republic)
2. Bolshevik (Taimyr Autonomous Republic)	7. Ryveem (Chukotka Autonomous Republic)
3. East Taimyr (Taimyr Autonomous Republic)	8. Ekugskoe (Chukotka Autonomous Republic)
4. Churpuninsk (Yakutia)	9. Mainitsky (Chukotka Autonomous Republic)
5. Elveneyskaya (Chukotka Autonomous Republic)	

The resource base of the Arctic zone of the Russian Federation / Vestnik Atomprom magazine¹⁷⁷

¹⁷⁷ Vestnik Atomprom, October 20, 2023. The history of the Arctic and the Northern Sea Route is being written before our eyes [in Russian]. (Accessed: March 21, 2025.) <https://atomvestnik.ru/2023/10/30/istorija-arktiki-i-sevmorputi-pishetsja-na-nashih-glazah/>

Year-round navigation to the east on the NSR

2026-2030

Distance between icebreakers up to 500 nautical miles



▶ Nuclear icebreakers | 9
 ▶ Nuclear icebreakers | 9
 ▶ Non-nuclear icebreakers | 5

2031-2035

Distance between icebreakers up to 250 nautical miles



▶ Nuclear icebreakers | 13
 ▶ Nuclear icebreakers | 13
 ▶ Non-nuclear icebreakers | 5

Year-round navigation in the eastern section of the NSR
 Vestnik Atomprora magazine¹¹⁸



Photo: atomic-energy.ru

¹¹⁸ Vestnik Atomprora, October 20, 2023. The history of the Arctic and the Northern Sea Route is being written before our eyes [in Russian]. (Accessed: March 21, 2025.)
<https://atomvestnik.ru/2023/10/30/istorija-arktiki-i-sevmorputi-pishetsja-na-nashih-glazah/>

1.7. Sanctions and import substitution

As of early 2025, global international sanctions against the state corporation Rosatom have not been implemented. Only Ukraine has imposed full-scale sanctions against Rosatom and its leadership. Other countries have introduced individual sanctions targeting specific Rosatom enterprises, organizations, and high-ranking managers connected to the atomic agency throughout the course of the war. At the beginning of the war, Bellona studied, analyzed, and agreed with the recommendations of various states and expert groups regarding the content of sanctions and the scenarios for their phased implementation, taking into account the changing situation and long-term goals¹¹⁹.

It was reasonably proposed that sanctions against Rosatom be introduced gradually in several stages. The first (preventive) stage suggested sanctions for actions already committed, such as participation in the seizure of nuclear facilities in Ukraine, support for the war through various political, economic, and technological means, involvement in illegal activities in occupied territories, and others. The recommendations included about ten sanctions actions, such as freezing any new contracts with Rosatom, imposing personal sanctions on senior officials, restricting the supply of raw uranium, excluding Rosatom from the United Nations Global Treaty, and limiting its influence in the IAEA, among others. In the second, more severe, "punitive stage," it was proposed that in the event of a nuclear or large-scale radiation incident at the Zaporizhzhia Nuclear Power Plant or other Ukrainian nuclear energy facilities, sanctions against Rosatom and all its 262 subsidiaries and 50 affiliated companies should be expanded, blocking their business and assets, closing Rosatom offices abroad, and excluding Rosatom from projects like INPRO, GIF, SNETP, ITER, and many intergovernmental agreements.

Almost three years of war have passed, and to this day we can say that only a very small portion of the aforementioned sanction proposals has been agreed upon and implemented by some countries.

The United States has levied sanctions listed below¹²⁰:

- In April 2023, sanctions were imposed against the company Rusatom Overseas, responsible for promoting projects abroad, as well as the Kovrov Mechanical Plant and VPO Tochmash, which manufacture centrifuges for uranium enrichment¹²¹.
- in 2024 the sanctions list was expanded to include the Kirov-Energomash plant, NIIP and NPP Inject, and also the companies Rosatom Digital Solutions and Rosatom Microelectronics¹²²

¹¹⁹ Freeman Spogli Institute for International Studies, 2025. The International Working Group on Russian Sanctions. (Accessed: March 21, 2025.)
<https://fsi.stanford.edu/working-group-sanctions>

¹²⁰ OFAC Sanction List Service, January 15, 2025. Consolidated list (Accessed: March 21, 2025.)
<https://sanctionslist.ofac.treas.gov/Home/ConsolidatedList>

¹²¹ DW, April 13, 2023. The US has imposed sanctions against the Russian nuclear industry for the first time [in Russian]. (Accessed: March 21, 2025.)
<https://www.dw.com/ru/ssa-vpervye-vveli-sankcii-protiv-atomnoj-otrasli-rf/a-65297177>

¹²² InBusiness.kz, October 30, 2024. The US imposed sanctions on two Rosatom subsidiaries [in Russian]. (Accessed: March 21, 2025.)
<https://inbusiness.kz/ru/news/ssha-nalozhili-sankcii-na-dve-dochki-rosatoma>

- in January 2025 sanctions were extended to Rosatom director Likhachev, his deputies and other top managers¹²³.

- In May 2024 the US senate passed a Law banning the import of Russian uranium¹²⁴

In February 2023 the UK levied sanctions against:

- Rosatom general director Alexey Likhachev,

- The companies Atomflot and Renera¹²⁵

The European Union imposed limited sanctions on certain enterprises associated with "Rosatom," but the corporation itself and its key structures largely avoided broad sanctions. In December 2023, as part of the 12th sanctions package, the following entities were included under restrictions:

- The Russian Federal Nuclear Center – All-Russian Scientific Research Institute of Technical Physics named for Academician Zababakhin in Snezhinsk

- The Vladimir production association Tochmash specializing in the manufacture of high-precision instrument and machine construction¹²⁶.

As part of the 15th and 16th sanctions packages, measures against Russia's nuclear industry enterprises were considered, but no specific decisions were made. The reasons for the absence of European sanctions include the dependence of some EU countries on Russian nuclear technologies and fuel, as well as active lobbying against sanctions by countries dependent on Rosatom, such as Hungary, Slovakia, and France. Therefore, at present, Rosatom and most of its structures are not subject to direct EU sanctions, except for certain enterprises mentioned above.

Nevertheless, after sanctions were imposed and a series of other significant restrictions were placed on Rosatom and other Russian financial and economic state structures and companies, import substitution became an important and necessary area of activity for the nuclear sector and other agencies. Rosatom had to set up the production of numerous industrial products and materials that had been lost due to the war. In essence, import substitution became a new type of state order for Rosatom. The first orders focused on digital technologies, new materials, and the production of spare parts for equipment that was previously not typical for Rosatom, such as aircraft, including parts for foreign-made airliners. Some experts considered this the starting point for the formation of a new aviation direction within Rosatom¹²⁷.

¹²³ BigPower Electric, January 13, 2025. The US imposed sanctions against Rosatom CEO Alexey Likhachev and 13 other top managers of the state corporation [in Russian]. (Accessed: March 21, 2025.)
<https://www.bigpowernews.ru/news/document117627.phtml>

¹²⁴ TASS, August 12, 2024. The US has introduced a ban on uranium imports from Russia [in Russian]. (Accessed: March 21, 2025.)
<https://tass.ru/ekonomika/21580369>

¹²⁵ Kun.uz, May 19, 2023. UK imposes sanctions against companies linked to Rosatom [in Russian]. (Accessed: March 21, 2025.)
<https://kun.uz/ru/news/2023/05/19/velikobritaniya-vvela-sanksii-protiv-svyazannyx-s-rosatomom-kompaniy>

¹²⁶ Eur-Lex: Access to European Union law, December 18, 2023. Council Implementing Regulation (EU) 2023/2875
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302875

¹²⁷ Izvestia, 2025. All news tagged "Rosatom" [in Russian]. (Accessed: March 21, 2025.)
<https://iz.ru/tag/rosatom>

The company TVEL launched the comprehensive service “AtomReverse” on the Russian market. This service includes the creation of digital twins of parts, preparation of working design documentation, production of prototype samples, and serial deliveries. Rosatom joined the effort to address the import substitution of components for the updating, repair, and maintenance of high-tech equipment, as acquiring original imported parts became increasingly difficult due to the refusal of their manufacturers to cooperate. As a result, Russian industrialists faced the urgent task of ensuring the production of spare parts¹²⁸.

Even nuclear power plants have joined the import substitution program. The Rostov Nuclear Power Plant in Volgodonsk, as part of the import substitution program, launched¹²⁹ the production of parts for its own needs began at the renovated centralized repair shop. The list of components that were previously purchased abroad and will now be manufactured directly on the nuclear plant site already includes more than 150 items that are simple to produce, such as shafts, axles, bushings, and valve stems, which are actively used in the repair and maintenance of turbine and pump equipment. The Beloyarsk Nuclear Power Plant has introduced the first batch of domestically produced personal computers Bober at workstations. In parallel with the substitution of computers, Russian server equipment and virtualization environments are being installed¹³⁰.

1.8. Rosatom in the CIS

In 2023–2024, Rosatom made various efforts to establish cooperation and intensify projects in the CIS countries. The corporation’s interests span various areas, including the construction and maintenance of nuclear power plants, fuel supply, development of nuclear technologies, services for the disposal and reprocessing of spent nuclear fuel, liquidation of Soviet nuclear legacy, and others. The greatest interest and active participation of Rosatom were in those countries that have political agreements with Russia and joint business structures with Rosatom or other projects that require active involvement from the Russian side.

Belarus

Undoubtedly, Belarus is a key partner for Rosatom in the CIS, thanks to favorable political relations between the two countries, as well as close business cooperation between the governments and nuclear authorities, established during the construction of the Belarusian Nuclear Power Plant. For Rosatom, the Belarusian Nuclear Power Plant became the first

¹²⁸ Strana Rosatom, March 14, 2023. More than a copy: TVEL presented turnkey reverse engineering [in Russian]. (Accessed: March 21, 2025.)
<https://strana-rosatom.ru/2023/03/14/bolshe-chem-kopiya-tvel-prezentoval-rev/>

¹²⁹ Rosenergoatom, May 4, 2023. Rostov NPP to launch production of over 150 types of spare parts as part of import substitution program [in Russian]. (Accessed: March 21, 2025.)
<https://www.rosenergoatom.ru/zhurnalistam/news/43544/>

¹³⁰ Atomic Energy 2.0, October 18, 2023. Beloyarsk NPP prepared the first 80 Russian computers “Bober” for operation [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2023/10/19/139787>

completed foreign project with VVER generation III+ reactors. In 2023–2024, Rosatom actively participated in various events in Belarus aimed at strengthening cooperation in the energy, environmental, and digital sectors. The main ones focused on cooperation between nuclear enterprises and organizations, science, and the public of both countries. No significant Russian-Belarusian events occurred that would affect Rosatom's international or domestic activities in 2023–2024. Belarus and the activities of its state authorities, industrial enterprises, and organizations, including those in the nuclear sector, are fully integrated with Russian federal districts or regions, which depend entirely on Russia, from political direction to organizing work with the nuclear community, as demonstrated by the international public forum-dialogue held in Minsk in October 2024, organized by the Public Council of Rosatom¹³¹.

Kazakhstan

The Republic of Kazakhstan is a strategic partner of Russia, a member of the CIS, the Eurasian Economic Union, the Collective Security Treaty Organization, and the Shanghai Cooperation Organization. These affiliations form the basis of political relations and multifaceted cooperation in many economic and other fields. For the Russian nuclear sector, Kazakhstan is an important and promising partner, not only because it possesses the largest uranium reserves in the world but also because it plans to actively develop its own nuclear energy, intending to build several nuclear power plants. Until recently, it seemed that Rosatom had a strong and promising position in its uranium mining projects in Kazakhstan. However, unexpectedly, in mid-December 2024, Kazatomprom announced a change in partners in some joint ventures¹³².

Russian Uranium One, a subsidiary of the state corporation Rosatom, sold its stakes in three uranium mining joint ventures with Kazatomprom (Zarechnoye JV - 49.99% of shares; Khorasan-U JV - 30% of shares; and Kyzylkum JV - 30% indirect stake) to Chinese companies. Many experts are asking what lies behind this deal, why the sale was made despite the stable rise in uranium prices, and why China was chosen as the buyer. Kazakhstan is taking real steps to implement its decision to build a nuclear power plant. At this stage, the question of constructing one nuclear power plant consisting of two reactors with capacities ranging from 1.2 to 1.4 GW each is being worked out. The project is planned to begin in 2025. The shortlist for inclusion in the construction consortium that Kazakhstan intends to organize includes four companies with proposed options: APR1400 from Korea Hydro & Nuclear Power (South Korea), the EPR1200 reactor from Electricité de France (France), the HPR1000 reactor from CNNC (China), and the VVER-1200 reactor from Rosatom.

The choice of partners for the consortium remains with the Ministry of Energy and/or the government of Kazakhstan, but as of now, it has not yet been formed. Rosatom's desire to either build its own Kazakh nuclear power plant or at least be part of the construction consortium is

¹³¹ Atomic Energy 2.0, October 18, 2024. An international public forum-dialogue of the Public Council of the Rosatom State Corporation was held on the sidelines of the Belarusian Energy and Environmental Forum [in Russian]. (Accessed: March 21, 2025.)
<https://www.atomic-energy.ru/news/2024/10/18/150464>

¹³² NAC Kazatomprom, December 17, 2024. Kazatomprom announces change of partners in some joint ventures [in Russian]. (Accessed: March 21, 2025.)
https://www.kazatomprom.kz/ru/media/view/announces_the_change_of_the_partners_in_some_jvs_

clear from all perspectives. To push for its participation, Rosatom has mobilized all possible resources and the most powerful lobbyists, including President Putin. The President of Kazakhstan, Tokayev, mentioned that during Putin's visit to Astana, the issue of building the plant was discussed. Kazakhstan's decisions on this matter are intriguing, as this involves more than just another foreign construction project for Rosatom and its departmental interests¹³³.

Armenia

Armenia is slowly but steadily turning towards the West. It has already managed to agree on a strategic partnership with the United States and has begun work on a law for joining the EU. And although Armenia formally remains part of the Russian sphere, its drift towards the West seems to be unstoppable¹³⁴.

In late January 2024, the head of Rosatom, Alexey Likhachev, stated¹³⁵ that Armenia must decide on the future direction of its nuclear energy development. The operational life of the second unit of the Metsamor Nuclear Power Plant, with a capacity of 430–440 MW, has been extended until 2026, and work is underway¹³⁶ to extend it further for another 10 years. Back in 2021, the Armenian government discussed¹³⁷ the need to start construction¹³⁸ of a new nuclear power plant by 2026–2027, so that it could begin operating after the current station's service life ends. It was mentioned that, besides Russia, proposals from other countries were being considered. In May 2023, Prime Minister Nikol Pashinyan announced¹³⁹ that Armenia was interested in American small modular reactor technologies. In the same month, Maria Longhi, a representative of the U.S. State Department coordinating aid to former Soviet countries, stated¹⁴⁰ at a Congressional hearing that the U.S. was evaluating the possibility of creating small modular nuclear reactors in several countries, including Armenia, which could contribute to greater energy independence from both Russia and China.

In June 2023, South Korea and France were added¹⁴¹ to the list of potential candidates for the construction of a nuclear power plant. In the autumn, it was reported that a government

¹³³ LS, January 14, 2025. Will Rosatom participate in the construction of nuclear power plants? [in Russian] (Accessed: March 21, 2025.)
<https://lsm.kz/stroit-aes>

¹³⁴ Carnegie Center in Berlin, January 17, 2025. While Moscow is busy. What will Armenia's drift away from Russia to the West lead to [in Russian]. (Accessed: March 21, 2025.)
<https://carnegieendowment.org/russia-eurasia/politika/2025/01/armenia-eu-drift?lang=ru¢er=russia-eurasia>

¹³⁵ TASS, January 27, 2024. Rosatom plans physical launches at NPPs in Bangladesh and India in 2024 [in Russian]. (Accessed: March 21, 2025.)
<https://tass.ru/ekonomika/19836817>

¹³⁶ Bellona, January 22, 2024. Bellona Atomic Digest. December 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://bellona.ru/2024/01/22/atomic-digest-12-23/#07p>

¹³⁷ RIA Novosti, April 15, 2021. Armenia spoke about negotiations on a new nuclear power plant with partners from Russia [in Russian]. (Accessed: March 21, 2025.)
<https://ria.ru/20210415/aes-1728471321.html>

¹³⁸ Arka, November 10, 2021. Armenia discusses construction of new nuclear power plant in the country by 2036 [in Russian]. (Accessed: March 21, 2025.)
https://arka.am/news/economy/armeniya_obsuzhdaet_stroitelstvo_v_strane_novoy_aes_do_2036_goda/

¹³⁹ Arka, May 24, 2023. Negotiations on the construction of a new nuclear power plant in Armenia are underway with the United States and Russia – Prime Minister [in Russian]. (Accessed: March 21, 2025.)
https://arka.am/ru/news/economy/peregovory_o_stroitelstve_v_armenii_novoy_aes_vedutsya_s_ssha_i_rossiey_premier/

¹⁴⁰ US Congress, May 23, 2023. Examining the fiscal year 24 state and foreign operations budget request for Europe. (Accessed: March 21, 2025.)
<https://www.congress.gov/event/118th-congress/house-event/116006/text>

¹⁴¹ Arka, July 3, 2023. Armenia studies proposals from 4 countries on the project to build a new nuclear power plant – CEO [in Russian]. (Accessed: March 21, 2025.)
https://arka.am/ru/news/economy/armeniya_izuchaet_predlozheniya_iz_4_kh_stran_po_proektu_stroitelstva_novoy_aes_gendirektor/

commission in Armenia was intensively studying¹⁴² three options for building a new nuclear power station: Russian, American, and South Korean. Russia is offering projects with capacities of 1200 MW or 600 MW. The American option proposes¹⁴³ modular units of 77 MW – six blocks totaling 462 MW, or 300 MW units working with light water, or boiling water reactors (some of these blocks have not yet received licenses). In South Korea, there are two options for blocks – 1000 MW and 1400 MW, as well as developments of small modular reactors that are in the licensing phase.

At the end of 2024, the Armenian government approved an agreement with the European Commission to strengthen nuclear safety infrastructure and manage radioactive waste¹⁴⁴. In early 2025, the Armenian government officially approved a draft law to initiate the process of the country's accession to the European Union¹⁴⁵.

How Rosatom will protect its interests is still speculative. Clearly, political pressure will be a primary tool (possibly even involving support for a change in the Armenian leadership, which would not be particularly surprising) or economic pressure (money and, for example, offering a full or partial "build-own-operate" model). In the latter case, not only financial support will be offered, but also the possibility of returning spent nuclear fuel (SNF) and radioactive waste to Russia, which could become a rather appealing proposal for Armenia with its seismically active territory.

Uzbekistan

Rosatom signed its first export contract for the construction of a small-capacity nuclear power plant with Uzbekistan in 2024. Rosatom will act as the general contractor for the construction. The contract involves building a small modular reactor (SMR) power plant with a capacity of 330 MW in the Jizzakh region, featuring six RITM-200 reactors, each with 55 MW capacity. The energy startup for the first reactor is scheduled¹⁴⁶ for 60 months after the start of work, with subsequent units planned to be commissioned every six months. The full commissioning of the SMR plant is expected after 2033. The chosen site has already been studied, and its suitability and safety have been confirmed, which will significantly reduce the project's implementation timeline. The project cost has not been disclosed. However, the unit construction costs for small nuclear power plants may be higher compared to large

¹⁴² Arka, September 5, 2023. Armenia is studying three projects for a new nuclear power plant, there are important nuances – Deputy Minister [in Russian]. (Accessed: March 21, 2025.)

https://arka.am/ru/news/interview/armeniya_izuchaet_tri_proekta_novoy_aes_est_vazhnye_nyuansy_zamministra_eksklyuziv/

¹⁴³ Arka, September 5, 2023. Armenia is studying three projects for a new nuclear power plant, there are important nuances – Deputy Minister [in Russian]. (Accessed: March 21, 2025.)

https://arka.am/ru/news/interview/armeniya_izuchaet_tri_proekta_novoy_aes_est_vazhnye_nyuansy_zamministra_eksklyuziv/

¹⁴⁴ RAW Safety, December 28, 2024. EU to Help Armenia Manage Radioactive Waste [in Russian]. (Accessed: March 21, 2025.)

<https://bezrao.ru/n/8387>

¹⁴⁵ Forbes, January 9, 2025. The Armenian government has approved a bill to begin the country's accession process to the EU [in Russian]. (Accessed: March 21, 2025.)

<https://www.forbes.ru/society/528486-pravitel-stvo-armenii-odobrilo-zakonoproekt-o-nacale-processa-vstuplenia-stranii-v-es>

¹⁴⁶ Spot, June 5, 2024. The first reactor of a small nuclear power plant is planned to be launched in five years – Uzatom [in Russian]. (Accessed: March 21, 2025.)

<https://www.spot.uz/ru/2024/06/05/smr-construction/>

ones, which could lead to an increase in the cost of the electricity generated. Rosatom head Alexey Likhachev stated¹⁴⁷ that the project will be fully funded by Uzbekistan, and no state loan from Russia is being discussed.

It seems that the signing of the agreement for the construction of the Russian SMR in Uzbekistan came as a surprise to Central Asian countries, particularly neighboring Kazakhstan. As evident from reports, Likhachev has already mentioned the construction timeline, indicating that Rosatom is eager and hurrying to “stake its claim” to the Central Asian and Caucasian nuclear power plant construction markets.

Other CIS countries

As for other CIS member states, Rosatom currently does not have any firm signed and approved contracts for the construction of nuclear power plants and other large projects, with the possibilities for future construction being discussed by some countries. For example, Kyrgyzstan is also in discussions with Rosatom regarding the construction of SMRs. A memorandum of cooperation for the construction of small modular reactors between Russia and Kyrgyzstan was signed¹⁴⁸ in January 2022.

With Tajikistan and Turkmenistan, as well as with other CIS countries, Rosatom has agreements and individual contracts concerning cooperation in nuclear and radiation safety, nuclear medicine, science, and education.

¹⁴⁷ RIA Novosti, May 27, 2024. Tashkent to finance construction of nuclear power plant in Uzbekistan [in Russian]. (Accessed: March 21, 2025.)
<https://ria.ru/20240527/aes-1948740569.html>

¹⁴⁸ RAOS, January 20, 2022. Rosatom and Kyrgyzstan agreed to cooperate in the construction of a low-power nuclear power plant [in Russian]. (Accessed: March 21, 2025.)

<https://rusatom-overseas.com/ru/media/news/rosatom-i-kirgiziya-dogovorilis-o-sotrudnicestve-v-sooruzhenii-atomnoy-stantsii-maloy-moshchnosti.html>

Chapter 2.

Rosatom's projects in EU countries and the USA

Rosatom's foreign projects in Western countries, primarily in the European Union and the United States, are mostly related to supplies in the nuclear fuel sector. Deliveries of enriched uranium from Russia covered up to 30% of demand¹⁴⁹ in these markets, while for Rosatom itself, these exports were the main direction in this segment. For example, in 2023, the United States accounted for more than half¹⁵⁰ of all Rosatom's exports of enriched uranium (about \$1 billion in monetary terms).

Western countries also account for the majority of Russia's export deliveries of nuclear fuel for reactors of Soviet and Russian design. In five EU countries, 19 VVER reactors still use Russian fuel, while in other countries, it is supplied to only eight operational nuclear units in Armenia, Iran, Belarus, India, and China. Although this ratio is likely to change in the coming years in favor of countries from the Global South.

These sectors have hardly been affected by direct sanctions related to Russia's invasion of Ukraine, except for the delayed ban on purchasing Russian-enriched uranium in the United States, adopted in 2024. However, significant changes have occurred in these market segments since 2022, which are expected to lead to a sharp reduction in Rosatom's presence in them in the coming years.

¹⁴⁹ Bellona, 2023. Russia's nuclear industry on the eve and at the beginning of the war [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/publication/atom-russia-2023/>

¹⁵⁰ Bellona, January 14, 2025. EU and US to Reduce Uranium and Nuclear Fuel Purchases from Russia in 2024 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2025/01/14/eu-us-reduce-russian-nuclear-fuel/>

NPP construction

As of early 2022, Rosatom had only two nuclear power plant construction projects in Western countries – in Finland and Hungary. Rosatom's structures also played a minor role in completing the construction of the Mochovce-3 unit in Slovakia.

Finland, Hanhikivi NPP

The contract for the supply and construction of the Hanhikivi-1" nuclear power plant (EPC contract) with a single VVER-1200 reactor in Finland was signed in 2013 between the customer, the Finnish company Fennovoima Oy, and Rosatom Overseas (since December 17, 2015, REIN). As of early 2022, the project was at the stage of obtaining a construction permit, and preparatory works were already underway at the site.

A few months after the start of Russia's invasion of Ukraine, in May 2022, the Finnish construction customer, Fennovoima, terminated the contract with Rosatom. The termination was attributed by Fennovoima to disrupted logistics chains due to Russia's military operation in Ukraine and delays in obtaining the license. The company initiated arbitration proceedings against Rosatom, demanding the return of funds allocated for the project. Rosatom, on the other hand, argued that Fennovoima had no grounds for contract termination. In the arbitration proceedings, both companies made claims¹⁵¹ against each other amounting to billions of euros: Fennovoima for approximately 2 billion euros and Rosatom for 3 billion euros.

In May 2024, Fennovoima bought¹⁵² the land and property at the site from Rosatom's Finnish subsidiary, RAOS Project, and the last employees of Rosatom left the site. According to statements from the Finnish company, it plans to demolish the buildings on the project site and focus on selling the land.

Hungary, Paks-2 NPP

The Paks-2 nuclear power plant project, with two VVER-1200 reactors, is the only nuclear construction project by Rosatom in the European Union after Finland abandoned the Hanhikivi project. Although the Hungarian project has not been canceled and no comprehensive sanctions have been imposed on Rosatom in the EU, the project has encountered difficulties and delays of at least 3 years.

Before the full-scale invasion of Ukraine, back in March 2021, Rosatom had planned¹⁵³ to pour the first concrete at the Paks-2 nuclear power plant site in 2022. However, as of February 2025, this has still not happened.

¹⁵¹ Bellona, May 16, 2023. Bellona Atomic Digest. April 2023 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2023/05/16/atomic-digest-04-23/#04p>

¹⁵² Bellona, August 25, 2024. Bellona Atomic Digest. July 2024 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2024/08/25/nuclear-digest-07-24/#06p>

¹⁵³ TASS, March 10, 2021. Rosatom said the pandemic did not affect the Akkuyu NPP construction schedule [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/10874139>

Throughout 2022, Hungary actively fought at the EU level to preserve the project and blocked any sanctions on Russia's nuclear sector from the European Union. In April 2023, Russia and Hungary agreed¹⁵⁴ on amendments to the contracts for the construction of the Paks-2 nuclear power plant, likely prompted by complications in implementing the project due to sanctions imposed on Russia and the war in Ukraine. In May 2023, the European Commission approved¹⁵⁵ these amendments.

In the summer of 2023, active preparatory works began at the Paks-2 site with the involvement of European contractors, including the installation of anti-seepage protection and excavation for the foundations of the power units. On August 18, 2023, an amendment to the EPC contract for the construction of the Paks-2 nuclear power plant was signed¹⁵⁶ in Budapest between the construction customer, Paks II Nuclear Power Plant Ltd, and the general contractor, the Russian company Atomstroyexport. The signing of the agreement on August 18 allowed Rosatom to begin manufacturing the main equipment for the future nuclear plant, which has a long production cycle.



The Paks II NPP construction site in October 2024. The units of the operating Paks NPP are visible in the background, and in front of them is the excavation pit for the first unit of the Paks II NPP (or the fifth unit of the entire Paks NPP). Photo source: Facebook Paks II. Atomerőmű Zrt¹⁵⁷.

¹⁵⁴ Bellona, May 16, 2023. Bellona Atomic Digest. April 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2023/05/16/atomic-digest-04-23>

¹⁵⁵ Reuters, May 25, 2023. Hungary gets EU's OK to amend Russian nuclear plant contract (Accessed: March 21, 2025.)
<https://www.reuters.com/world/europe/hungary-gets-eus-ok-amend-russian-nuclear-plant-contract-2023-05-25/>

¹⁵⁶ Bellona, September 15, 2023. Bellona Atomic Digest. August 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2023/09/15/atomic-digest-08-23>

¹⁵⁷ Paks II Nuclear Power Plant Ltd [Facebook], October 21, 2024 [in Hungarian]. (Accessed: March 21, 2025.)
https://www.facebook.com/photo/?fbid=1014848600441524&set=pb.100057491798455.-2207520000&locale=hu_HU

In November 2023, the construction site of the Paks-2 nuclear power plant was visited¹⁵⁸ by Rosatom's CEO Alexey Likhachev and Hungary's Minister of Foreign Affairs and Trade, Péter Szijjártó. According to Szijjártó, the Paks-2 project is an international undertaking, involving not only the Russian general contractor but also 94 Hungarian companies, along with many American, German, French, Swedish, and Austrian contractors. In the same month, Vitaly Polyanyin, Vice President of Atomstroyexport, was appointed as the director of the Paks-2 project. Polyanyin had previously led the construction of the Belarusian Nuclear Power Plant, where the second reactor was commissioned just a few weeks¹⁵⁹ prior.

On December 18, 2023, the 12th package of sanctions¹⁶⁰ from the European Union against Russia came into force. This package explicitly included exceptions to the bans for the ongoing Paks-2 nuclear power plant project in Hungary. Section 21¹⁶¹ of the document states: "In view of the importance of the Paks II project for the interests of Hungary in relation to security of energy supply, the exemptions and derogations in this Decision concerning civil nuclear projects are fully applicable to all goods and services needed for that project." The Paks-2 project was also explicitly included in all sections describing these exceptions related to the security of the civil nuclear sector.

On December 21, 2023, Vitaly Polyanyin, who was appointed¹⁶² director of the Paks-2 project in November, announced¹⁶³ that the first concrete could be poured for the foundation of the nuclear power plant ahead of schedule in December 2024, instead of March 2025.

In March 2024, representatives of the Hungarian customer arrived in Russia to begin the factory acceptance¹⁶⁴ of the first large equipment for the plant—the melt localization device for the first unit of the Paks II nuclear power plant. In late April, at the AEM-Special Steel plant, in the presence of both Russian and Hungarian delegations, the production of reactor vessel blanks for unit № 1 of Paks II began¹⁶⁵.

¹⁵⁸ Bellona, December 15, 2023. Bellona Atomic Digest. November 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2023/12/15/atomic-digest-november-23>

¹⁵⁹ Bellona, November 21, 2023. Bellona Atomic Digest. October 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2023/11/21/atomic-digest-11-23>

¹⁶⁰ Eur-Lex: Access to European Union law, December 18, 2023. Council Decision (CFSP) 2023/2874 of 18 December 2023 amending Decision 2014/512/CFSP concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. (Accessed: March 21, 2025.)
<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023D2874&qid=1704444208527>

¹⁶¹ Eur-Lex: Access to European Union law, December 18, 2023. Council Decision (CFSP) 2023/2874 of 18 December 2023 amending Decision 2014/512/CFSP concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. (Accessed: March 21, 2025.)
[https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023D2874&qid=1704444208527#:~:text=\(21\),for%20that%20project.](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023D2874&qid=1704444208527#:~:text=(21),for%20that%20project.)

¹⁶² Bellona, December 15, 2023. Bellona Atomic Digest. November 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2023/12/15/atomic-digest-november-23/#08p>

¹⁶³ TASS, December 21, 2023. Paks-2 NPP builders expect to pour the first concrete by the end of 2024 [in Russian]. (Accessed: March 21, 2025.)
<https://tass.ru/ekonomika/19597301>

¹⁶⁴ ASE, March 19, 2024. Factory acceptance process of the Paks II nuclear power plant's "melt catcher" has begun [in Russian]. (Accessed: March 21, 2025.)
<https://ase-ec.ru/for-journalists/news/2024/mar/nachalsya-protsess-zavodskoy-priemki-lovushki-rasplava-dlya-aes-paksh-2-on-prodlitsya-dve-nedelij/>

¹⁶⁵ Atom Media, April 26, 2024. Rosatom metallurgists have begun manufacturing a reactor unit for the Paks-2 NPP in Hungary [in Russian]. (Accessed: March 21, 2025.)
<https://atommedia.online/2024/04/26/metallurgi-rosatoma-nachali-izgotovl/>

On June 24, 2024, the European Union adopted the 14th sanctions package¹⁶⁶ against Russia in response to its aggression towards Ukraine, which included amendments regarding the construction of the Paks II nuclear power plant in Hungary. The new sanctions document features a separate article (Article 12h) specifically dedicated to the Paks II project. The revised document confirms a full exemption¹⁶⁷ of the future Hungarian nuclear plant from any prohibitions or restrictions. It now stipulates that any activities related to the Paks II project, involving organizations and institutions engaged in its construction and future operation, will only be required to notify the relevant authority of the European state in which they are registered two weeks in advance. The state, in turn, must inform other EU member states and the European Commission about the received information. According to Hungary's Minister of Foreign Affairs, Péter Szijjártó, this means¹⁶⁸ that European companies involved in investments (such as French, German, and Austrian companies) will no longer have to seek permits from member state authorities, which should accelerate the related procedures. "This general exemption has created a situation regarding the Paks investment as if there were no war in Ukraine, and the war did not entail in sanctions or economic restrictions," he added.

On 1 August 2024, the first large-scale equipment – the melt localization device – was delivered¹⁶⁹ to the construction site of the Paks II nuclear power plant. The equipment was transported by sea¹⁷⁰ from Volgodonsk, Russia, passing through Turkey (Istanbul), Romania (Constanța), and Serbia.

On November 29, 2024, Péter Szijjártó announced¹⁷¹ that the Hungarian National Atomic Energy Authority had approved the preliminary safety report for the Paks II nuclear power plant, which means permission has been granted to pour the first concrete for the station's foundation.

At the end of 2023, representatives of Rosatom stated¹⁷² that the pouring of the first concrete was planned for the end of 2024. However, by February 2025, this has not yet occurred. The main construction work is scheduled to be completed by 2028, with the commissioning of two power units expected in the early 2030s. The EU's sanctions policy over the past few years has only led to delays in the project due to the need to agree on new terms, but in the end, the Paks II nuclear power plant project continues with the involvement of contractors from across Europe and is likely to be completed.

¹⁶⁶ European Commission. Sanctions adopted following Russia's military aggression against Ukraine. (Accessed: March 21, 2025.)
https://finance.ec.europa.eu/eu-and-world/sanctions-restrictive-measures/sanctions-adopted-following-russias-military-aggression-against-ukraine_en#timeline-measures-adopted-since-2022

¹⁶⁷ About Hungary, June 25, 2024. FM: Paks has received a full exemption from EU sanctions (Accessed: March 21, 2025.)
<https://abouthungary.hu/news-in-brief/fm-paks-has-received-a-full-exemption-from-eu-sanctions>

¹⁶⁸ About Hungary, June 25, 2024. FM: Paks has received a full exemption from EU sanctions (Accessed: March 21, 2025.)
<https://abouthungary.hu/news-in-brief/fm-paks-has-received-a-full-exemption-from-eu-sanctions>

¹⁶⁹ Atom Media, August 1, 2024. A melt localization device has been delivered to the Paks-2 NPP construction site (Hungary) [in Russian]. (Accessed: March 21, 2025.)
<https://atommedia.online/2024/08/01/na-ploshhadku-sooruzheniya-aes-paksh-2-ven/>

¹⁷⁰ Rosatom [Youtube], August 5, 2024. Safety Element. How the Paks-2 NPP is being built [in Russian]. (Accessed: March 21, 2025.)
<https://youtu.be/RXO8kIWj9cQ?t=84>

¹⁷¹ TASS, November 29, 2024. Hungary gives green light to pour concrete into Paks-2 NPP foundation [in Russian]. (Accessed: March 21, 2025.)
<https://tass.ru/ekonomika/22536351>

¹⁷² TASS, December 21, 2023. Paks-2 NPP builders expect to pour the first concrete by the end of 2024 [in Russian]. (Accessed: March 21, 2025.)
<https://tass.ru/ekonomika/19597301>

In December 2024, Hungary's Minister of Foreign Affairs, Péter Szijjártó, announced¹⁷³ that negotiations were underway with Rosatom to amend the contract for the construction of the Paks II nuclear power plant, specifically regarding the cost of the project. He explained that over nearly 11 years since the signing of the contract, "technological issues, raw material prices, the cost of equipment and parts necessary for construction have changed dramatically."

Slovakia, units 3 and 4 of the Mochovce NPP

In January 2023, Unit 3 of the Mochovce Nuclear Power Plant in Slovakia, equipped with a Soviet-designed VVER-440 reactor, was connected to the grid for the first time. Construction of the unit began back in 1987, was frozen in 1992, and then resumed in 2009. The main investors in the project were the Italian (Enel) and Czech (Energetický a průmyslový holding) shareholders of Slovenské Elektrárne, the owner and operator of Slovakia's nuclear plants. Among the main contractors, including those who supplied the primary equipment¹⁷⁴ for the first circuit (Škoda JS), are also European companies such as ENSECO, VUJE, Siemens, and others.

However, part of the equipment was supplied by structures of Rosatom. In particular, in 2009, a contract was signed with Atomstroyexport (ASE), and in 2016, with Rusatom Service to provide technical support¹⁷⁵ for the installation of the primary circuit equipment, as well as for the commissioning of both Unit 3 of Mochovce and the adjacent Unit 4, which is expected to be commissioned next year. Startup and commissioning works have already begun on Unit 4, and in December 2024, cold hydrotests¹⁷⁶ were initiated.

Additionally, after 2022 Unit 3 of Mochovce became the 19th VVER reactor in the EU to use Russian nuclear fuel.

Services for foreign NPPs in the EU

Structures of Rosatom continue to provide services and supply certain spare parts for several European nuclear power plants, receiving exemptions from sanctions.

In particular, in July 2023, it was reported¹⁷⁷ that Czech authorities granted exemptions from sanctions to over 10 Czech organizations in the nuclear energy sector, mainly at the request

¹⁷³ National Association of Oil and Gas Services, December 10, 2024. Hungary in talks with Rosatom over Paks-2 NPP price [in Russian]. (Accessed: March 21, 2025.) <https://nangs.org/news/renewables/nuclear/vengriya-vedet-peregovory-s-rosatomom-o-tsene-aes-paksh-2>

¹⁷⁴ Škoda JS, 2023. Units 3 and 4 at Mochovce NPP, Slovakia. (Accessed: March 21, 2025.) <https://www.skoda-js.cz/reference/nuclear-powerplant-mochovce/>

¹⁷⁵ World Nuclear Association, January 23, 2025. Nuclear Power in Slovakia. (Accessed: March 21, 2025.) <https://world-nuclear.org/information-library/country-profiles/countries-o-s/slovakia#:~:text=In%20May%202016>

¹⁷⁶ Slovenské elektrárne, December 20, 2024. Mochovce: Cold hydro test started on Unit 4. (Accessed: March 21, 2025.) <https://www.seas.sk/en/press-releases/mochovce-cold-hydro-test-started-on-unit-4/>

¹⁷⁷ Bellona, August 11, 2023. Bellona Atomic Digest. July 2023 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2023/08/11/atomic-digest-07-23>

of ČEZ, so it could continue cooperation with certain engineering companies owned by Russian legal and physical entities sanctioned by the EU.

In August 2023, the Bulgarian government approved an exemption¹⁷⁸ from the sanctions regulation due to Russia's military actions in Ukraine, allowing the National Electric Company (NEC) to continue the conservation of equipment delivered for Units 1 and 2 of the Belene Nuclear Power Plant under the technical supervision of Russian Atomstroyexport. In October 2022, Bulgaria also granted an exemption from sanctions to Atomstroyexport, allowing NEC and Kozloduy Nuclear Power Plant to continue working within previously signed contracts for maintenance. According to Rosatom's annual reports¹⁷⁹ for 2022 and 2023, its structures carried out work supporting scheduled maintenance and the completion of the modernization of reactor control systems at Units 5 and 6 of the Kozloduy Nuclear Power Plant.

Waste treatment

On July 8, 2024, it was announced¹⁸⁰ that the Japanese company Muroosystems Corp had signed an agreement to acquire Nukem Technologies Engineering Services GmbH (NUKEM), a German company specializing in radioactive waste management, spent nuclear fuel, and the decommissioning of nuclear and radiation-hazardous facilities. The deal was completed¹⁸¹ in September 2024.

Since 2009, NUKEM had been owned by Rosatom's subsidiaries – Atomstroyexport and later TVEL. The decision to sell NUKEM was made in 2022 "due to the tense geopolitical situation and difficulties associated with the continuation of the company's existence with a Russian owner."

According to Kommersant¹⁸², in 2023 Rosatom conducted financial recovery for NUKEM and cleared its accounts receivable to increase the asset's attractiveness. However, due to legal uncertainties surrounding Russian ownership and the legality of such an acquisition, the sale attempts had not been concluded. In April, the company filed for bankruptcy¹⁸³ under self-management, which separated it from Russian ownership and opened up new opportunities for interested parties to invest without fearing potential legal consequences.

The German company Nukem Technologies Engineering Services was one of Rosatom's key assets in Europe in the field of nuclear decommissioning and the backend of the nuclear

¹⁷⁸ Bellona, September 15, 2023. Bellona Atomic Digest. August 2023 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2023/09/15/atomic-digest-08-23>

¹⁷⁹ Rosatom State Corporation, 2023. Performance of State Atomic Corporation Rosatom in 2023. (Accessed: March 21, 2025.)
https://report.rosatom.ru/go_eng/go_rosatom_eng_2023/rosatom_2023_eng.pdf

¹⁸⁰ NUKEM Technologies, July 8, 2024. Agreement to acquire NUKEM Technologies signed by Japanese investor [in German]. (Accessed: March 21, 2025.)
<https://www.nukemtechnologies.de/news/uebernahmevertrag-von-nukem-technologies-durch-japanischen-investor-unterzeichnet>

¹⁸¹ NUKEM Technologies, July 8, 2024. Agreement to acquire NUKEM Technologies signed by Japanese investor [in German]. (Accessed: March 21, 2025.)
<https://www.nukemtechnologies.de/news/uebernahmevertrag-von-nukem-technologies-durch-japanischen-investor-unterzeichnet>

¹⁸² Kommersant, July 17, 2024. Rosatom has left Germany [in Russian]. (Accessed: March 21, 2025.)
<https://www.kommersant.ru/doc/6836740>

¹⁸³ Bellona, May 28, 2024. Bellona Atomic Digest. April 2024 [in Russian]. (Accessed: March 21, 2025.)
<https://ru.bellona.org/2024/05/28/nuclear-digest-04-24/#06p>

fuel cycle. This promising area (due to the aging nuclear fleet in Europe) was viewed by Rosatom as an important aspect of diversifying its nuclear business in Europe, where Rosatom already had limited prospects for building nuclear reactors even before the war. After the war began, many other areas of work, such as supplying fuel for VVER reactors and Western-style reactors, also began to shrink. With the loss of Nukem, Rosatom's prospects in the European backend market are significantly reduced.

Services in the nuclear fuel cycle for Western countries

Russia remains a major supplier of goods and services in the nuclear fuel cycle for EU and US countries. In recent years, purchases from Russia have even increased, as the uncertainty surrounding future supplies and potential restrictions has prompted nuclear power plant operators to build up reserves of nuclear materials.

In the United States, Russia mainly supplies enriched uranium. In the European Union, both uranium and services related to its conversion and enrichment are supplied, as well as nuclear fuel in the form of fuel assemblies for VVER reactors of Soviet-Russian design. A significant portion of nuclear fuel cycle supplies from Russia to the EU is made up of comprehensive contracts that include not only the fabrication of fuel for VVER reactors but also the supply of uranium for that fuel, its conversion, and enrichment.

Deliveries of nuclear fuel for VVER reactors in EU countries

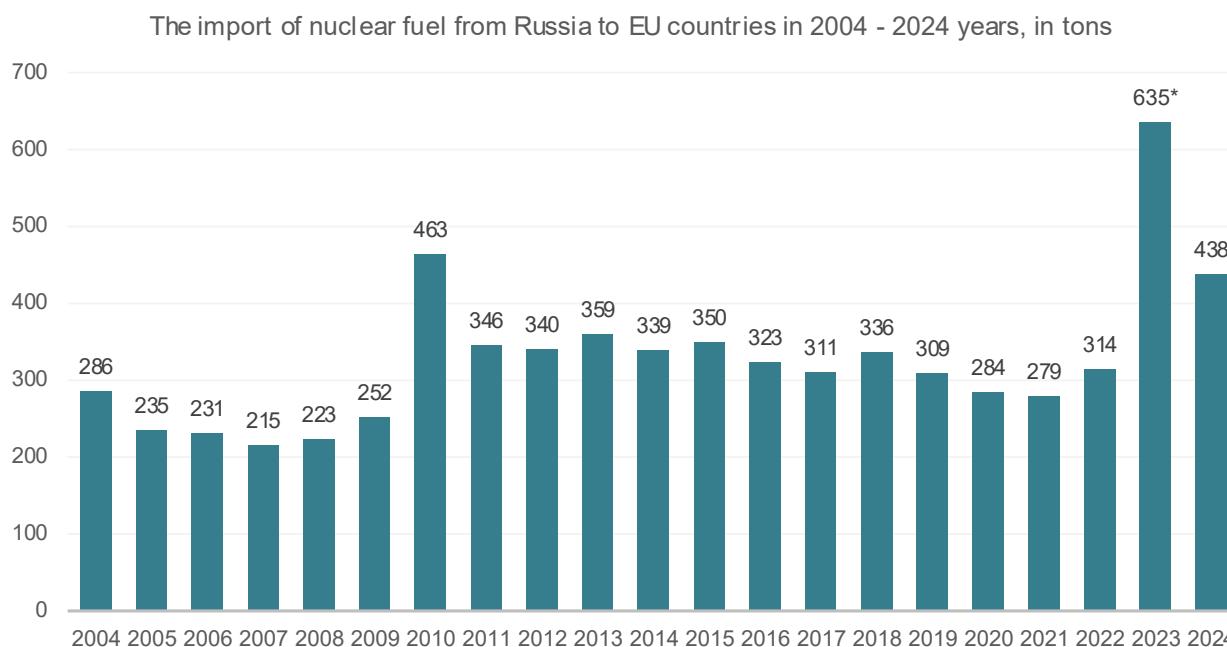
In the European Union, only five countries use Russian nuclear fuel for 19 of their Soviet-designed reactors – VVER-440 or VVER-1000. These countries are the Czech Republic (Dukovany Nuclear Power Plant with four VVER-440 reactors and Temelin Nuclear Power Plant with two VVER-1000 reactors), Slovakia (Mochovce and Bohunice Nuclear Power Plants with a total of five VVER-440 reactors), Bulgaria (two VVER-1000 reactors at Kozloduy Nuclear Power Plant), Hungary (four VVER-440 reactors at Paks Nuclear Power Plant), and Finland (two VVER-440 reactors at Loviisa Nuclear Power Plant).

In 2023, Bellona found¹⁸⁴ that according to data from Eurostat and the international trade service Comtrade, there was a more than two-fold increase in the import of fresh nuclear fuel to EU countries in monetary terms – from 280 million euros in 2022 to 686 million euros

¹⁸⁴ Bellona, March 15, 2024. Europe doubled its import of Russian nuclear fuel for 2023, data say. (Accessed: March 21, 2025.) <https://etc.bellona.org/2024/03/15/europe-russian-nuclear-fuel/>

in 2023. In physical terms, the increase in deliveries was from 314 tons of nuclear fuel to 573 tons. These figures do not include 62.3 tons of nuclear fuel worth €83.4 million supplied to Bulgaria in 2023, as this data appeared in the Eurostat database with a delay. Overall, this is the only recorded Eurostat data on nuclear fuel supplies from Russia to Bulgaria in more than 20 years, even though it is known¹⁸⁵ that Bulgaria uses Russian nuclear fuel. This raises doubts about the accuracy of the reported data for this country in the available databases.

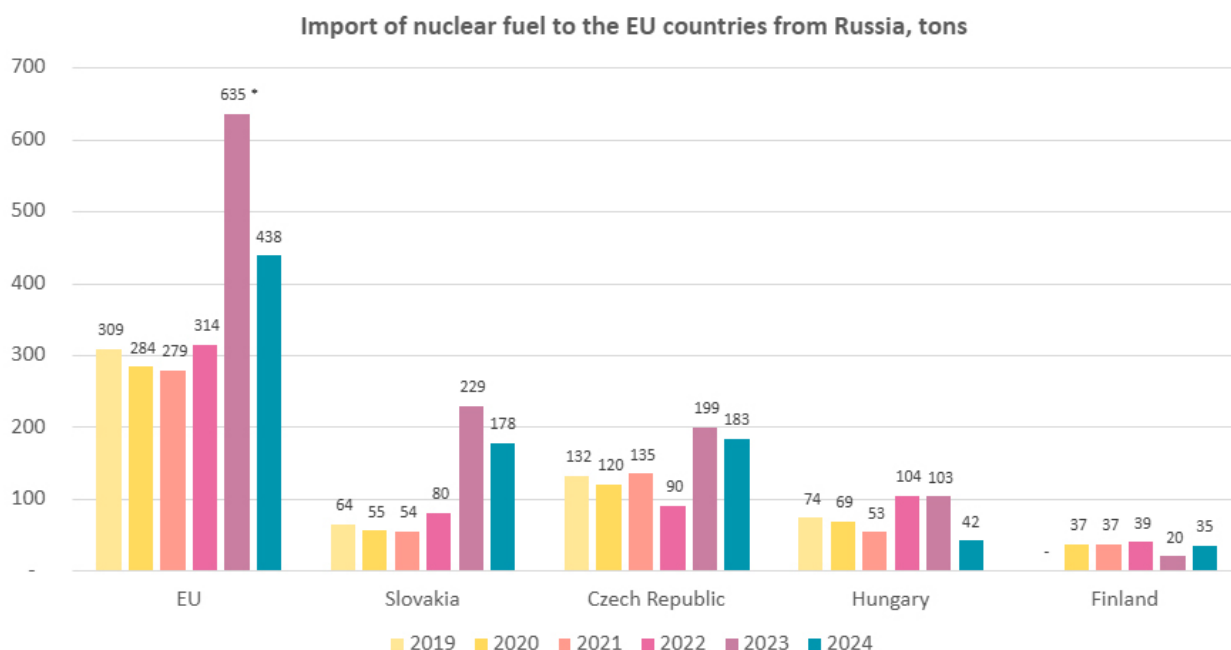
This growth was driven by buyers’ desire to secure contracted fuel volumes to ensure a reliable supply during the period of changing suppliers and potential difficulties with deliveries in the event of tougher sanctions on the nuclear industry or other escalations in relations between Russia and the EU.



*The import of nuclear fuel from Russia to EU countries (Czech Republic, Slovakia, Hungary, and Finland, with Bulgaria excluded due to incomplete data) according to Eurostat¹⁸⁶, in tons. *The 2023 data in the chart of 635 t also includes 62.3 t supplied to Bulgaria this year, according to Eurostat. However, for other years, data on nuclear fuel supplies to Bulgaria are missing from this Eurostat database, which may indicate incomplete information.*

¹⁸⁵ JSC TVEL, December 4, 2019. Rosatom’s fuel company TVEL and the Kozloduy NPP (Bulgaria) signed contract documents for the supply of Russian nuclear fuel until 2025 [in Russian]. (Accessed: March 21, 2025.) https://www.tvel.ru/press-center/news/?ELEMENT_ID=7880

¹⁸⁶ Bellona, January 14, 2025. EU and US reduce Russian uranium and nuclear fuel purchases in 2024. (Accessed: March 21, 2025.) <https://etc.bellona.org/2025/01/14/eu-us-reduce-russian-uranium/>



*Nuclear fuel supplies from Russia to EU countries. * Data for 2023 includes data for Bulgaria, which is not available in other years. Source: Eurostat*

In 2024, the volume of purchases decreased by almost one and a half times – from 635 tonnes to 438 tonnes. However, it still remains above the average pre-war level. Given that all EU buyers of Russian nuclear fuel signed contracts for alternative supplies between 2022 and 2024 – and some, such as Bulgaria and Finland¹⁸⁷, have already started loading alternative fuel – no new peaks in imports of Russian nuclear fuel are expected.

Deliveries of enriched uranium to EU countries

At the end of 2023, according to data from the Euratom Supply Agency (ESA)¹⁸⁸, Rosatom’s deliveries of natural uranium to EU countries increased by 73% compared to 2022, reaching 3,419 tons, or 23.45% of all purchases. At the same time, the total volume of natural uranium purchases by European companies from all suppliers grew by 24%.

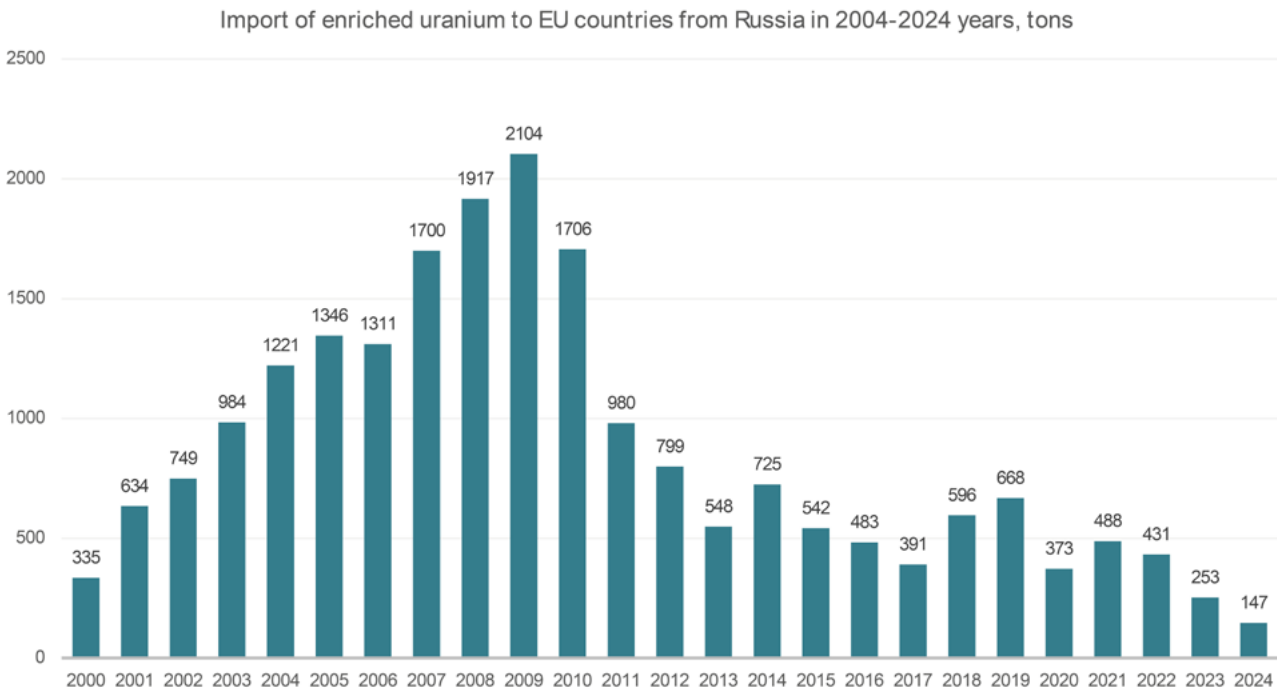
According to ESA data, the volume of conversion deliveries to the EU increased by 22% compared to 2022, reaching 13,364 tons of uranium. Russia’s share in this amounted to 26.5%, with 3,543 tons, which is 45% more than in 2022.

¹⁸⁷ Bellona, January 14, 2025. EU and US reduce Russian uranium and nuclear fuel purchases in 2024. (Accessed: March 21, 2025.) <https://etc.bellona.org/2025/01/14/eu-us-reduce-russian-uranium/>

¹⁸⁸ Bellona, October 8, 2024. Bellona Atomic Digest. August 2024 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2024/10/08/nuclear-digest-08-24/#02p>

Additionally, in 2023, uranium enrichment services deliveries grew by 12%, reaching 12.3 million SWU. In this segment, Russia’s share rose from 30.2% in 2022 to 37.9% (4.6 million SWU).

Much of this increase in purchases from Russia in 2023 is linked to the rise in nuclear fuel imports, as described earlier. Typically, fuel contracts include the supply of other components of the fuel cycle—uranium and services for its conversion and enrichment. Comprehensive assessments (accounting for all types of contracts, both as part of fuel supply and separately) of uranium procurement and conversion/enrichment services by EU countries for 2024 will only be available in the annual report of the Euratom Supply Agency (ESA) in the second half of 2025. However, it is expected that following the decline in nuclear fuel imports these figures will also decrease.



Deliveries of enriched uranium from Russia to the EU (excluding the United Kingdom) from 2004 to 2024, excluding enriched uranium contained in supplied nuclear fuel, in tons. Source: Eurostat.

Some of the enriched uranium from Russia is also supplied to the EU outside of fuel supply contracts, serving as raw material for European nuclear fuel cycle enterprises, which independently manufacture nuclear fuel for Western-design reactors. These deliveries can be tracked through foreign trade data services and specific customs codes, particularly HS 284420¹⁸⁹ (“Uranium; enriched in U235,...”).

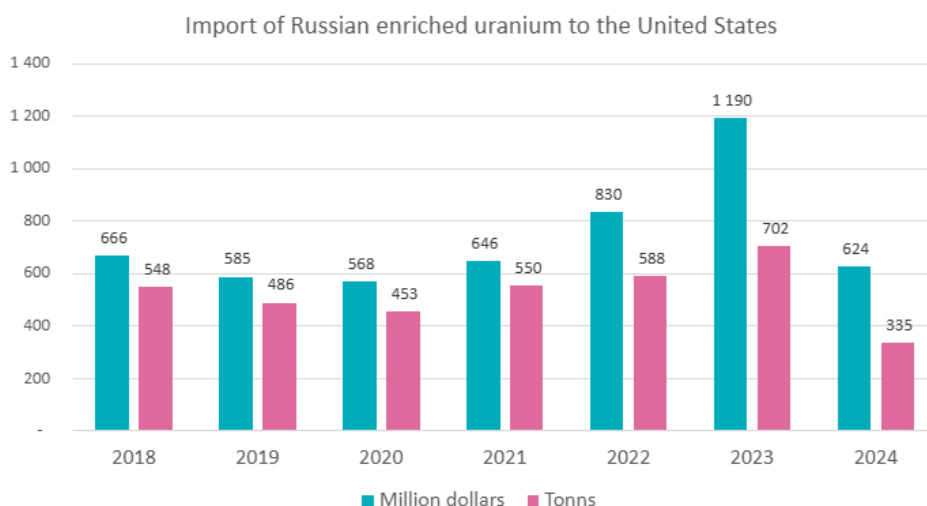
¹⁸⁹ UN Department of Economic and Social Affairs, Statistics Division, 2012. Harmonized System. (Accessed: March 21, 2025.) <https://unstats.un.org/unsd/classifications/Econ/Detail/EN/32/284420>

In 2024, following the decline in nuclear fuel purchases, EU imports of low-enriched uranium from Russia also decreased. According to Eurostat data available at the beginning of March 2025, in 2024, enriched uranium purchases in the EU were carried out mainly by French companies. Around 65 tons were imported directly into France, and approximately 80 tons into Germany, primarily for the Framatome-owned fuel plant in the German city of Lingen¹⁹⁰. Total purchases of Russian low-enriched uranium by EU countries in 2024 (147 tons) were almost half as much as in 2023 (253 tons), and much lower than purchases in 2022 and 2021, which amounted to about 430–480 tons.

Deliveries of enriched uranium to the USA

For over 30 years, the United States has actively imported up to 25% of its required enriched uranium from Russia, making it the largest buyer of this material from Russia. For Rosatom, the U.S. market accounts for up to 50% of its total export sales of uranium enrichment services, generating around \$1 billion annually.

On May 13, 2024, U.S. President Joe Biden signed a law banning the import of Russian enriched uranium into the United States. The law came into effect on August 11, 2024. However, it allows for exceptions until early 2028 if the U.S. Department of Energy determines that there is a threat to national interests or a risk of supply disruptions due to the lack of viable alternatives. In such cases, the Department of Energy may approve purchases of enriched uranium upon request from companies.



Deliveries of enriched uranium from Russia to the USA from 2018-2024, in million dollars and tons. Bellona graphic based on data from Comtrade.

¹⁹⁰ Bellona, January 9, 2025. This German town could decide the future of EU reliance on Russian nuclear fuel. (Accessed: March 21, 2025.) <https://etc.bellona.org/2025/01/09/lingen-rosatom/>

The largest American buyer of Russian enriched uranium, Centrus Energy Corp, promptly submitted a request for an exemption and, in November 2024, received the first waiver¹⁹¹ from the ban, allowing it to import low-enriched uranium (LEU) from Russia for deliveries to its U.S. customers between 2024 and 2027.

Despite record-high U.S. purchases of enriched uranium from Russia in 2023 (slightly over 700 tons worth more than \$1.2 billion)¹⁹² driven by a rush ahead of the impending ban – imports began to decline in 2024.

According to Comtrade data analyzed by Bellona, Russian enriched uranium deliveries to the U.S. for the whole 2024 (as of March 10, 2025) totaled approximately 335 tons, valued at \$624 million. This is half the volume of 2023 and below the new legal import limits.

The passage of the law also enabled the U.S. Department of Energy to secure an additional \$2.7 billion from the federal budget to support and expand the domestic uranium industry. By December 10, 2024, the Department of Energy had completed the selection process and identified six companies eligible for contracts to supply low-enriched uranium (LEU) as part of efforts to stimulate the construction of new uranium production facilities in the U.S. Among these companies, in addition to American firms, were the U.S. subsidiaries of the European companies Urenco and Orano. The Department of Energy plans to procure LEU under these contracts from newly built facilities or through projects expanding existing capacity. The contracts will have a duration of up to 10 years, with a total maximum value of \$3.4 billion.

Four of the aforementioned companies (American Centrifuge Operating, General Matter, Louisiana Energy Services, and Orano Federal Services) were selected in October as potential suppliers of enrichment and storage services for high-assay low-enriched uranium (HALEU). Until recently, Rosatom was the only supplier of HALEU on the international market.

Conclusions and Forecasts for Chapter 2

In the nuclear power plant construction market in Western countries, Rosatom has retained only one active project: the Paks-2 NPP in Hungary. However, this project has faced significant delays since the beginning of Russia's full-scale invasion of Ukraine in 2022. At present, it remains exempt from EU sanctions and is likely to be completed.

The situation regarding Western countries' dependence on Russian nuclear fuel supplies remains complex. While this sector is still not subject to EU sanctions, restrictions on Russian uranium imports in the U.S. have been temporarily deferred. However, over the past three

¹⁹¹ S&P Global, July 19, 2024. DOE allows nuclear company Centrus to import Russian uranium in 2024-25. (Accessed: March 21, 2025.) <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/071924-doe-allows-nuclear-company-centrus-to-import-russian-uranium-in-2024-25>

¹⁹² Vedomosti, February 8, 2024. In 2023, the United States purchased a record amount of uranium from Russia [in Russian]. (Accessed: March 21, 2025.) <https://www.vedomosti.ru/economics/news/2024/02/08/1019151-ssha-zakupili-u-rossii-uran>

years, significant steps have been taken by governments and businesses to reduce reliance on Russia in the energy sector.

For example, as of early 2025, all consumers of Russian nuclear fuel in the EU have signed contracts with alternative suppliers, and some nuclear power plant operators, such as those in Bulgaria and Finland, have already begun loading alternative fuel into reactors in 2024. This transition has encountered certain difficulties, such as cooperation between Rosatom and the French company Framatome, which are attempting¹⁹³ to establish licensed production of Russian fuel at a plant in Lingen, Germany.

Nonetheless, it is clear that Rosatom's presence in the European nuclear fuel market will decline in the coming years. Our estimates suggest that by 2030, nuclear fuel deliveries from Russia to the EU may decrease by at least 60% compared to 2022, falling below 100 tons per year.

A similar trend is expected in uranium enrichment services. Given the expansion plans of Urenco and Orano in the U.S. and the EU, Western countries are likely to reduce their dependence on Russian enrichment services by at least threefold within the next five years, bringing Russian market share below 10% of their total procurement.

¹⁹³ Bellona, January 9, 2025. This German town could decide the future of EU reliance on Russian nuclear fuel. (Accessed: March 21, 2025.)
<https://etc.bellona.org/2025/01/09/lingen-rosatom/>

Chapter 3.

Rosatom projects in countries of the Global South

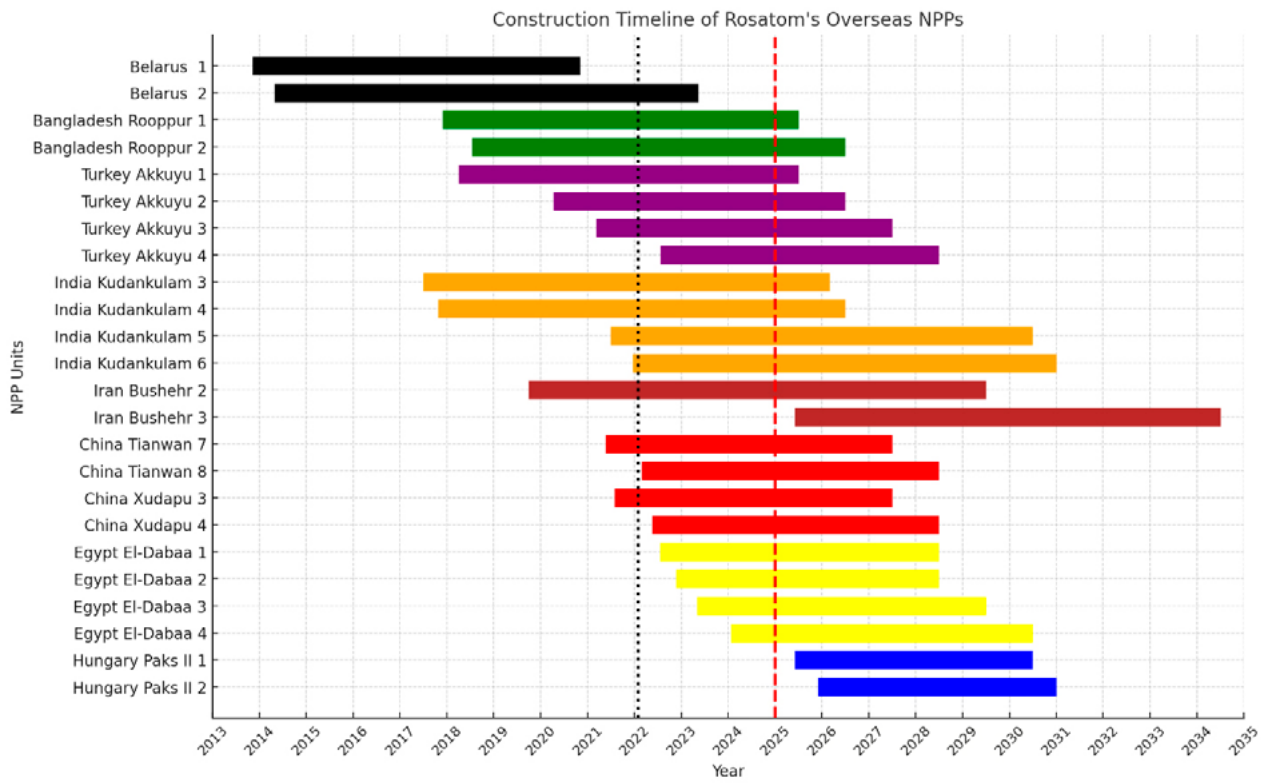
Countries and projects of Russian NPP construction

In recent years, Rosatom has maintained its leadership among nuclear corporations worldwide in terms of the number of power units being built abroad for foreign clients. As of February 2025, with four units under construction in Russia, Rosatom is responsible for 23 major (with a capacity of over 300 MW) power units under construction in 7 countries. According to the IAEA PRIS database, as of February 23, 2025, there are 62 power units under construction in 15 countries globally¹⁹⁴. Thus, Rosatom is involved in nearly one-third of all power unit constructions worldwide, in half of the countries building nuclear power plants.

Almost all of Rosatom's foreign nuclear power plant construction projects are concentrated in Global South countries. As of early 2025, Rosatom is actively involved in the construction of 19 major nuclear power units in Turkey, Egypt, India, China, Bangladesh, and Iran.

In other regions, particularly in Europe, Rosatom recently completed the construction of a nuclear power plant in Belarus and plans to begin pouring the first concrete and construction of the Paks-2 nuclear power plant in Hungary in 2025. Almost all of these projects are accompanied by contracts for the supply of fuel for these plants. In addition to nuclear power plant construction, Rosatom is also actively developing other areas of cooperation, promoting proposals for building research reactors and mineral extraction.

¹⁹⁴ IAEA Power Reactor Information System (PRIS), March 13, 2025. Reactors under construction. (Accessed: March 21, 2025.) <https://pris.iaea.org/PRIS/WorldStatistics/UnderConstructionReactorsByCountry.aspx>



Current nuclear power plant construction projects abroad with Rosatom’s involvement, including construction start and completion intervals. A vertical red dashed line marks February 2025, at which time 19 nuclear power units were under construction in Turkey, Egypt, India, China, Bangladesh, and Iran. Infographic by Bellona based on IAEA PRIS¹⁹⁵ data and an analysis of open sources gathered in this report.

Turkey, Akkuyu NPP

The main nuclear cooperation project between Russia and Turkey is the construction of Turkey’s first nuclear power plant, the Akkuyu NPP located in the Mersin province on the Mediterranean coast.

The intergovernmental agreement on cooperation for the construction of this nuclear power plant was signed¹⁹⁶ in 2010. Preparatory work at the site began in 2013. In April 2018, the official groundbreaking ceremony (the pouring of the first concrete for the first unit) took place, with Vladimir Putin and Recep Tayyip Erdoğan personally attending¹⁹⁷.

¹⁹⁵ IAEA Power Reactor Information System (PRIS). (Accessed: March 21, 2025.)
<https://pris.iaea.org/pris/>

¹⁹⁶ Akkuyu Nuclear. Our company. (Accessed: March 21, 2025.)
<https://akkuyu.com/en/company/info>

¹⁹⁷ RBC, April 3, 2018. Erdogan and Putin launch construction of Akkuyu NPP in Turkey [in Russian]. (Accessed: March 21, 2025.)
<https://www.rbc.ru/economics/03/04/2018/5ac387ee9a79472a4f288a66>

The plant will consist of four power units with VVER-1200 reactors, with a total capacity of 4800 MW. Once operational, it is expected to supply up to 10% of Turkey's electricity needs.

The cost of the Akkuyu NPP project was estimated at \$22 billion¹⁹⁸ at the start of construction in 2018. In June 2024, the head of Rosatom estimated the current cost of the Akkuyu NPP at \$24–25 billion¹⁹⁹.

This is the first plant for Rosatom being built under the BOO (build-own-operate) scheme, meaning the Russian state corporation, through its subsidiary, Akkuyu Nuclear²⁰⁰, is the main investor, owner (Rosatom's initial stake will be 100%, and in the future, it should not drop below 51%²⁰¹), and operator of the new plant, planning to recover its investment through revenues from the subsequent sale of electricity.

According to the contract²⁰², the Turkish side is committed to purchasing up to half of the electricity generated by the nuclear plant (70% of the energy from the first two units and 30% from the second two) during the first 15 years of operation at a fixed price of \$0.1235 per kWh. The contract also stipulates that up to 40% of the work will be carried out by Turkish companies, and Turkish engineers will make up at least 30% of the technical staff during the plant's startup.

In 2022, there was also a change of the general contractor. From 2019, the general contractor²⁰³ for the entire Akkuyu NPP project had been Titan 2 İc İc İc İnşaat Anonim Şirketi (T2IC)²⁰⁴, a joint venture established by the Russian company Concern Titan-2 and the Turkish company İc İc İc İnşaat Sanayi Ve Ticaret Anonim Şirketi (İC İctas). However, in July 2022, the contract with this company was terminated due to "numerous violations during construction," as stated in Rosatom's corporate publication²⁰⁵.

The new general contractor became TSM Enerji İnşaat Sanayi Limited Şirketi (TSM)²⁰⁶. Later, in September 2022, T2IC rejoined the project. As a result, it was decided²⁰⁷ that TSM would

¹⁹⁸ RBC, April 3, 2018. Erdogan and Putin launch construction of Akkuyu NPP in Turkey [in Russian]. (Accessed: March 21, 2025.)
<https://www.rbc.ru/economics/03/04/2018/5ac387ee9a79472a4f288a66>

¹⁹⁹ Interfax, June 13, 2024. Rosatom CEO Estimates Cost of Akkuyu NPP Construction in Turkey at \$24–25 Billion [in Russian]. (Accessed: March 21, 2025.)
<https://www.interfax.ru/business/966515>

²⁰⁰ Akkuyu Nuclear. Our company. (Accessed: March 21, 2025.)
<https://akkuyu.com/en/company/info>

²⁰¹ International Energy Agency, 2021. Turkey 2021: Energy policy review. (Accessed: March 21, 2025.)
https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf

²⁰² International Energy Agency, 2021. Turkey 2021: Energy policy review. (Accessed: March 21, 2025.)
https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf

²⁰³ Neftegaz.ru, September 22, 2022. Former contractor for Akkuyu NPP construction returns to the project [in Russian]. (Accessed: March 21, 2025.)
<https://neftegaz.ru/news/nuclear/751758-byvshiy-podryadchik-stroitelstva-aes-akkuyu-vozvrashchaetsya-v-proekt/>

²⁰⁴ TITAN 2 İC İC İC İNŞAAT ANONİM ŞİRKETİ [in Russian]. (Accessed: March 21, 2025.)
<https://t2ic.com/>

²⁰⁵ Strana Rosatom, August 11, 2022. Rosatom terminated the contract with the general contractor for the construction of the Akkuyu NPP [in Russian]. (Accessed: March 21, 2025.)
<https://strana-rosatom.ru/2022/08/11/rosatom-rastorg-kontrakt-s-genpodr/>

²⁰⁶ Anadolu Agency, August 1, 2022. Akkuyu Nuklear AŞ CEO Announces Change of Project's Main Contractor [in Russian]. (Accessed: March 21, 2025.)
<https://www.aa.com.tr/tr/ekonomika/glava-akkuyu-nuklear-as-zayavila-o-smene-glavnogo-podryadchika-proekta/2650596>

²⁰⁷ Neftegaz.ru, September 22, 2022. Former contractor for Akkuyu NPP construction returns to the project [in Russian]. (Accessed: March 21, 2025.)
<https://neftegaz.ru/news/nuclear/751758-byvshiy-podryadchik-stroitelstva-aes-akkuyu-vozvrashchaetsya-v-proekt/>

be responsible for the construction of the first power unit and associated facilities, while T2IC would handle the construction of the remaining three units.

The project also extensively uses Western equipment. For example, the turbine generator equipment for all units will be supplied by GE Steam Power. The contract for the supply of turbines was signed²⁰⁸ in 2017 with Turbine Technologies AAEM, a joint venture between Atomenergomash and GE. However, under a subcontract, all major turbine generator equipment is manufactured at the GE plant in the French city of Belfort. Additionally, the Akkuyu NPP project includes the use of Siemens electrical equipment²⁰⁹.

Key events of 2023-2024

By 2023, all four power units were in the active phase of construction, with the first unit in the final stage of preparation for launch in 2025.

Overseeing the preparations for the commissioning of the first unit, Rosatom head Alexey Likhachev visited the plant site at least three times in 2023 and no fewer than five times²¹⁰ in 2024, participating in several key stages and ceremonies.

In April 2023, nuclear fuel for the first unit was delivered to the site for the first time. The ceremony²¹¹ to mark the occasion was attended at the site by Likhachev and IAEA Director General Rafael Grossi, while Vladimir Putin and Turkish President Recep Erdoğan participated via video link.

In 2024, the main construction work on the first unit of the nuclear power plant was completed: in May²¹², the transportation lock was installed; in November²¹³, the concreting of the reactor building's protective shell was finished; and in December²¹⁴, the turbine installation was completed. Starting in the spring of 2024, after receiving the necessary licenses²¹⁵, commissioning work began²¹⁶.

²⁰⁸ Rosatom Machine Building, April 5, 2021. Delivery of the first Arabelle steam turbine rotor to the Akkuyu NPP site completed [in Russian]. (Accessed: March 21, 2025.)

<https://aem-group.ru/mediacenter/news/zavershena-postavka-pervogo-rotora-parovoj-turbiny-arabelle-na-ploshhadku-aes-%C2%ABakkuyu%C2%BB.html>

²⁰⁹ Reuters, September 11, 2024. Turkish nuclear plant delayed by withheld Siemens parts, China to supply

<https://www.reuters.com/business/energy/turkish-nuclear-plant-delayed-by-withheld-siemens-parts-china-supply-2024-09-11/>

²¹⁰ New analysis on trips taken from the page for the Akkuyu NPP project on the ASE website.

<https://ase-ec.ru/for-journalists/news/search/?tags=AЭC+«Аккыу»>

²¹¹ Rosatom State Corporation, April 27, 2023. The first batch of nuclear fuel was delivered to the Akkuyu NPP [in Russian]. (Accessed: March 21, 2025.)

<https://web.archive.org/web/20240725060751/https://rosatom.ru/journalist/arkhiv-novostey/na-aes-akkuyu-dostavlena-pervaya-partiya-yadernogo-topliva/>

²¹² Akkuyu Nuclear, May 2, 2024. A transport gateway has been installed at Unit 1 of the Akkuyu NPP [in Russian]. (Accessed: March 21, 2025.)

<https://akkuyu.com/ru/news/na-bloke-1-aes-akkuyu-ustanovlen-transportnyy-shlyuz>

²¹³ Rosatom State Corporation, November 11, 2024. The reactor compartment dome has been concreted at Unit 1 of the Akkuyu NPP (Türkiye) [in Russian].

(Accessed: March 21, 2025.)

<https://www.rosatom.ru/journalist/arkhiv-novostey/na-bloke-1-aes-akkuyu-turtsiya-zabetonirovan-kupol-reaktornogo-otdeleniya/>

²¹⁴ Atom Media, December 12, 2024. Turbine installation completed at power unit № 1 of Akkuyu NPP (Türkiye) [in Russian]. (Accessed: March 21, 2025.)

<https://atommedia.online/2024/12/12/na-energobloke-1-aes-akkuju-turciya-z-2/>

²¹⁵ Akkuyu Nuclear, December 12, 2023. Permission received to commission the first power unit of the Akkuyu NPP [in Russian]. (Accessed: March 21, 2025.)

<https://akkuyu.com/ru/news/polucheno-razreshenie-na-vvod-v-ekspluatatsiyu-pervogo-energobloka-aes-akkuyu->

²¹⁶ Atom Media, April 9, 2024. Full-scale commissioning work has begun at power unit № 1 of the Akkuyu NPP (Türkiye) [in Russian]. (Accessed: March 21, 2025.)

<https://atommedia.online/2024/04/09/na-energobloke-1-aes-akkuju-turciya/>



Akkuyu Nuclear Power Plant. Photo: Communications Service of Akkuyu Nuclear JSC

Work on the second unit is slightly behind schedule. By the end of 2024, fresh nuclear fuel also began to be delivered²¹⁷ for this unit. On the third unit, in 2024, the concreting of the turbo-generator foundation²¹⁸ was completed, and the reactor vessel²¹⁹ was installed in its designated position in the reactor hall. As of the end of 2024, preparations were underway for the installation of the reactor vessel²²⁰ on the fourth unit.

Delays and sanctions

Before the war in 2022, it was expected that the first unit of the Akkuyu NPP would be launched in 2023²²¹, in time for the 100th anniversary of the Turkish Republic. However, this

²¹⁷ Akkuyu Nuclear, December 30, 2024. Two key operations have been completed at units 2 and 3 of the Akkuyu NPP (Türkiye) [in Russian]. (Accessed: March 21, 2025.)

<https://akkuyu.com/ru/news/na-blokakh-2-i-3-aes-akkuyu-turtsiya-zaversheny-dve-klyucheve-operatsii>

²¹⁸ Akkuyu Nuclear, September 3, 2024. Builders of the Akkuyu NPP (Türkiye) completed concreting the foundation of the turbine unit of Unit 3 [in Russian]. (Accessed: March 21, 2025.)

<https://akkuyu.com/ru/news/stroiteli-aes-akkuyu-turtsiya-zavershili-betonirovanie-fundamenta-turboagregata-bloka-3>

²¹⁹ Akkuyu Nuclear, December 30, 2024. Two key operations have been completed at units 2 and 3 of the Akkuyu NPP (Türkiye) [in Russian]. (Accessed: March 21, 2025.)

<https://akkuyu.com/ru/news/na-blokakh-2-i-3-aes-akkuyu-turtsiya-zaversheny-dve-klyucheve-operatsii>

²²⁰ Akkuyu Nuclear, December 2, 2024. The main components of the reactor shaft have been installed at Unit 4 of the Akkuyu NPP [in Russian]. (Accessed: March 21, 2025.)

<https://akkuyu.com/ru/news/na-bloke-4-aes-akkuyu-ustanovleny-osnovnye-komponenty-shakhty-reaktora>

²²¹ Vedomosti, August 18, 2017. Novak: Akkuyu NPP may be launched by the 100th anniversary of the Turkish Republic [in Russian]. (Accessed: March 21, 2025.) <https://www.vedomosti.ru/business/news/2017/08/18/730153-blok-akkuyu>

did not happen. Throughout 2023, Turkey's Minister of Energy, Alparslan Bayraktar, hoped²²² for the launch of the first unit by 29 October, 2024, Republic Day in Turkey. But this did not take place either.

In March 2024, Bayraktar noted²²³ that despite some issues related to sanctions (without specifying what they were), the launch of the first unit was still planned for 2024. In the same month, Anastasia Zoteeva, CEO of Akkuyu Nuclear, stated²²⁴ that the process of equipment and material deliveries was unaffected by sanctions, adding that "the technologies and equipment for NPPs built under Russian projects are 98% independent of imports."

However, on May 18, Denis Sezemin, Director of Construction and Production Organization at Akkuyu Nuclear, announced²²⁵ that the planned commissioning date for the first unit was likely April 2025. He emphasized²²⁶ that this delay did not violate the terms of the intergovernmental agreement, which allows Rosatom seven years before the start of commercial electricity generation. The construction license for the first unit was issued in April 2018, so the 2025 commissioning date aligns with the agreed timeline.

In June 2024, Pavel Zavalny, Chairman of the State Duma Energy Committee, during his visit to the Akkuyu NPP, stated²²⁷ that everything was proceeding according to schedule. However, the efforts to expedite the commissioning of the first unit at Turkey's request were hindered by the COVID-19 pandemic in 2020, which caused personnel issues, and by the earthquake²²⁸ in Turkey in February 2023, which diverted construction equipment to address the aftermath.

The third factor he mentioned was sanctions against Russia²²⁹: "These sanctions caused delays in the delivery of already paid-for equipment," Zavalny was quoted as saying. "Some equipment has not been delivered yet. For example, this concerns the power distribution systems and other devices that are not produced either in Russia or Turkey. We ordered them from Siemens. This equipment has already been ordered from China, and it is supposed to be delivered to us this year."

²²² TASS, August 1, 2023. Projects for two more nuclear power plants in Turkey are planned to begin within five years [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/18419275>

²²³ Takvim, March 7, 2024. Minister of Energy and Natural Resources Alparslan Bayraktar announced on Turkuvas Media: "There are 3 alternatives for Turkmenistan gas" [in Turkish]. (Accessed: March 21, 2025.) <https://www.takvim.com.tr/guncel/2024/03/07/turkuvaz-medya-6-enerji-ve-iklim-forumu-yesil-yuzuil-bugunu-ve-gelecegi-tasarlamak/4#:~:text=%C3%87a%C4%B1%C5%9Fmalar%20yo%C4%9Fun%20%C5%9Fekilde,buradan%20kar%C5%9F%C4%B1lamay%C4%B1%20hedefliyoruz>

²²⁴ TASS, March 27, 2024. Localization potential at Akkuyu NPP is \$6.5 billion [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/20369645>

²²⁵ TASS, May 18, 2024. The first power unit at the Akkuyu NPP will begin operation in April 2025 [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/20840185>

²²⁶ TASS, May 18, 2024. The first power unit at the Akkuyu NPP will begin operation in April 2025 [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/20840185>

²²⁷ TASS, June 14, 2024. The State Duma reported that the contractual deadlines for commissioning the Akkuyu NPP have not changed [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/21095889>

²²⁸ Bellona, March 13, 2023. Bellona Atomic Digest. February 2023 [in Russian]. (Accessed: March 21, 2025.) <https://ru.bellona.org/2023/03/13/atomic-digest-02-23/#:~:text=Землетрясение в Турции>

²²⁹ TASS, June 14, 2024. The State Duma reported that the contractual deadlines for commissioning the Akkuyu NPP have not changed [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/21095889>

He also stated that due to the refusal to provide special ships for submerging the reactor's water conduit blocks, the project had to be changed, as there was no other way to install these structures. "Several billion dollars were prepaid for the equipment. Now, they are neither returning the funds nor supplying the equipment," he said.

In January 2025, the Wall Street Journal reported²³⁰, and Rosatom confirmed²³¹, that in previous years, the U.S. Department of Justice had frozen \$2 billion that had been transferred from Russia to accounts at JPMorgan, which were connected to the financing of the Akkuyu NPP.

Plans and prospects

Russia is counting on expanding its cooperation with Turkey and building another nuclear power plant in the country. In 2023, the Turkish Minister of Energy announced²³² plans to begin implementing projects for the second and third nuclear power plants in the country within five years, in Sinop and Thrace, which will have a capacity comparable to the Akkuyu Nuclear Power Plant. According to him, Russia, South Korea, and France are interested in building the second plant, while discussions with China have been ongoing for several years regarding the construction of the third plant in Thrace.

The issue of constructing a Russian nuclear power plant in Sinop was raised²³³ during negotiations between Vladimir Putin and Recep Tayyip Erdoğan in September 2023. In this regard, Erdoğan stated at a press conference, "Regarding the nuclear power plant in the city of Sinop: I believe that we will take such a step with respect to the construction of a new nuclear power plant." However, no further details or specifics were provided.

The head of Rosatom, who attended the negotiations, stated²³⁴ that the revenue generated from electricity sales at the Akkuyu nuclear plant owned by Russia under the Build-Own-Operate (BOO) model, could serve as a source of investment for the construction of a new nuclear power plant in Turkey.

In February 2024, Likhachev stated²³⁵ that Turkey had made a political decision to allocate a site for Rosatom's second nuclear power plant. "Negotiations are currently underway between Rosatom and Turkey's Ministry of Energy, focusing on the plant's technical design, management structure, and economic parameters. From Rosatom's perspective, the Sinop

²³⁰ The Wall Street Journal, February 2, 2025. Moscow has \$2 billion stuck in JPMorgan. The U.S. isn't sure what to do with it. (Accessed: March 21, 2025) <https://www.wsj.com/politics/policy/moscow-has-2-billion-stuck-at-jpmorgan-the-u-s-isnt-sure-what-to-do-with-it-b0669584>

²³¹ TASS, February 3, 2025. Rosatom expects resolution of situation with funds for Akkuyu NPP [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/23041877>

²³² TASS, August 1, 2023. Projects for two more nuclear power plants in Turkey are planned to begin within five years [in Russian]. (Accessed: March 21, 2025.) <https://tass.ru/ekonomika/18419275>

²³³ TRT in Russian [Youtube], September 4, 2023. Live broadcast: Putin and Erdogan hold joint press conference in Sochi [in Russian]. (Accessed: March 23, 2025.) <https://www.youtube.com/watch?t=3077&v=1JfcSzh7C4&feature=youtu.be>

²³⁴ TASS, September 4, 2023. Likhachev said that revenue from the Akkuyu NPP could go toward building a new station [in Russian]. (Accessed: March 23, 2025.) <https://tass.ru/ekonomika/18654337>

²³⁵ Strana Rosatom, February 29, 2023. In one Okhotny Ryad: the head of Rosatom called on deputies to help develop atomic cities [in Russian]. (Accessed: March 23, 2025.) <https://strana-rosatom.ru/2024/02/29/v-odnom-ohotnom-ryadu-glava-rosatoma/>

site is suitable for a plant similar to Akkuyu, featuring the same type of reactors. However, financing and project management issues have yet to be resolved. The Turkish government is generally satisfied with the progress of Akkuyu's construction, which opens up further opportunities for cooperation in this sector," Likhachev said.

However, no final decisions have been made yet. An unnamed representative of Turkey's Ministry of Energy, commenting²³⁶ on Likhachev's remarks to TASS, stated that negotiations on the matter were ongoing and that no definitive agreements had been reached. A couple of weeks later, Turkey's Minister of Energy reiterated²³⁷ that both Russia and South Korea were interested in constructing the second nuclear power plant in Sinop and that discussions were continuing with both parties.

In June 2024, Pavel Zavalny, head of the State Duma Committee on Energy, stated²³⁸ that there was a "90% probability that Turkey would grant Rosatom the contract for the Sinop nuclear power plant project". He explained that the plan for Sinop includes the construction of two units, each housing two reactors with a capacity of 1,250 MW each. "The proposed scheme is 50/50 – project financing, joint investment attraction, and a Turkish general contractor. However, this is just one of the proposals from the Russian side. Turkey's Ministry of Energy is also considering offers from South Korea and China. The process is still ongoing," Zavalny noted.

Egypt, El-Dabaa NPP

General description

Cooperation between Russia and Egypt in the nuclear sector is based on an intergovernmental agreement on peaceful nuclear energy use signed on March 25, 2008. On November 19, 2015, another intergovernmental agreement was signed for the construction of Egypt's first nuclear power plant, El Dabaa.

The El Dabaa NPP with four Russian VVER-1200 reactors with a total capacity of 4,800 MW, is under construction in the city of El Dabaa, Matrouh Province, on the Mediterranean coast, approximately 300 km northwest of Cairo. The contract is valued at \$30 billion²³⁹, with most of the sum (\$25 billion) financed through a Russian loan. Egypt will begin repaying the loan in 2029 at an annual interest rate of 3%²⁴⁰.

²³⁶ TASS, February 28, 2024. Source: No decision yet on Turkey's second NPP project [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/20107123>

²³⁷ Takvim, March 7, 2024. Minister of Energy and Natural Resources Alparslan Bayraktar announced on Turkuvaz Media: "There are 3 alternatives for Turkmenistan gas" [in Turkish]. (Accessed: March 21, 2025.)
<https://www.takvim.com.tr/guncel/2024/03/07/turkuvaz-medyada-6-enerji-ve-iklim-forumu-yesil-yuzuil-bugunu-ve-gelecegi-tasarlamak>

²³⁸ TASS, June 14, 2024. The State Duma believes that Türkiye will give the second NPP project in Sinop to Russia with a 90% probability [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/21095867>

²³⁹ TASS, March 25, 2024. What is known about Russia's nuclear projects abroad [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/info/18916163>

²⁴⁰ NS Energy, July 16, 2020. El Dabaa Nuclear Power Project. (Accessed: March 23, 2025.)
<https://www.nsenegybusiness.com/projects/el-dabaa-nuclear-power-project/>

On December 11, 2017, the project officially commenced as the contracts for the construction of the plant, signed on December 31, 2016, between Atomstroyexport and Egypt's Nuclear Power Plants Authority, came into effect. Under the contractual obligations²⁴¹, the Russian side will not only build the plant but also supply Russian nuclear fuel for the entire operational lifespan of the facility. Additionally, Russia will provide personnel training, operational support, and maintenance services for the first ten years of the plant's operation. As part of a separate agreement, Russia will also construct a specialized storage facility and supply containers for the temporary storage of spent nuclear fuel.

Construction was initially planned to begin in 2020 but was postponed due to the pandemic. It officially commenced on July 20, 2022²⁴², with the pouring of the first concrete for the foundation of the first reactor building. A similar ceremony took place on November 19, 2022, for the second unit. As a result, El Dabaa remains the only foreign site where Rosatom has moved into the active construction phase for all reactor units after Russia's invasion of Ukraine in February 2022.



Satellite image of the El Dabaa Nuclear Power Plant construction site in October 2024. Source: Google Earth.

²⁴¹ ASE. El-Dabaa NPP (Egypt) [in Russian]. (Accessed: March 23, 2025.)
<https://ase-ec.ru/about/projects/aes-el-dabaa/>

²⁴² ASE, July 20, 2022. The main stage of construction of the first power unit has begun at the El Dabaa NPP [in Russian]. (Accessed: March 23, 2025.)
<https://ase-ec.ru/for-journalists/news/2022/jul/na-aes-el-dabaa-nachalsya-osnovnoy-etap-sooruzheniya-pervogo-energobloka/>

A key feature of the project is the involvement of South Korean subcontractors. In August 2022²⁴³, Korea Hydro and Nuclear Power (KHNP) signed a \$2.25 billion contract with Atomstroyexport, a subsidiary of Rosatom, for the construction of buildings and components at El Dabaa. Under the contract, KHNP is responsible for constructing approximately 80 buildings and structures, as well as procuring and supplying equipment and materials for the turbine halls²⁴⁴.

In November 2022, KHNP signed an additional \$1.2 billion contract²⁴⁵ with another South Korean subcontractor, Doosan Enerbility (formerly Doosan Heavy Industries), for the construction of 82 buildings and structures at the plant. These include turbine buildings, air conditioning systems, and water treatment facilities, with completion expected by 2029.

The plant's turbines will be manufactured and supplied by GE Power. The company won a 2018 tender²⁴⁶ to provide four turbo generators, including Arabelle low-speed steam turbines. The contract is being fulfilled through Turbine Technology AAEM, a joint venture between GE Power and Atomenergomash. The same turbines are also being supplied for Turkey's Akkuyu nuclear power plant.

Key events 2023-2024

In March 2023, the first batch of large equipment, including the core catcher for the first unit, was delivered²⁴⁷ to the construction site of the El Dabaa nuclear power plant. On May 3, 2023, the first concrete was poured for the foundation of the third unit, and on August 31, Rosatom received the license²⁴⁸ to begin construction of the fourth unit of the Egyptian El Dabaa nuclear power plant.

On January 23, 2024, a ceremony took place marking the pouring of the "first concrete"²⁴⁹ for the foundation slab of the fourth unit of the El Dabaa nuclear power plant. The ceremony, held via video conference, was attended by Vladimir Putin and Egyptian President Abdel Fattah el-Sisi.

²⁴³ NucNet, August 30, 2022. South Korea's KHNP wins \$2.25 billion El Dabaa contract from Russia. (Accessed: March 23, 2025.)
<https://www.nucnet.org/news/south-korea-s-khnp-wins-usd2-25-billion-el-dabaa-contract-from-russia-8-2-2022>

²⁴⁴ World Nuclear News, August 26, 2022. Contract signed for El Dabaa turbine islands. (Accessed: March 23, 2025.)
<https://www.world-nuclear-news.org/Articles/Contract-signed-for-El-Dabaa-turbine-islands>

²⁴⁵ NS Energy, November 11, 2022. Doosan Enerbility wins \$1.2 billion contract for El Dabaa nuclear power plant. (Accessed: March 23, 2025.)
<https://www.nsenenergybusiness.com/news/doosan-enerbility-khnp-el-dabaa-nuclear-power-plant-contract/>

²⁴⁶ GE Power, October 9, 2018. GE Power to supply 4 nuclear turbine islands for El Dabaa, Egypt's first nuclear plant. (Accessed: March 23, 2025.)
<https://www.ge.com/news/press-releases/ge-power-supply-4-nuclear-turbine-islands-el-dabaa-egypts-first-nuclear-plant>

²⁴⁷ Egypt Nuclear Power Plants Authority, March 21, 2023. Arrival of the first long-term nuclear equipment, the "core meltdown catcher", at the El Dabaa Nuclear Power Plant's dedicated port [in Arabic]. (Accessed: March 23, 2025.)
<https://nppa.gov.eg/News/Details?id=1771>

²⁴⁸ Atom Media, August 31, 2023. License issued for construction of power unit № 4 of El Dabaa NPP (Egypt) [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2023/08/31/vydana-licenziya-na-sooruzhenie-energo/>

²⁴⁹ ASE, January 23, 2024. The main stage of construction began at power unit № 4 of the El Dabaa NPP [in Russian]. (Accessed: March 23, 2025.)
<https://www.ase-ec.ru/for-journalists/news/2024/jan/na-energobloke-4-aes-el-dabaa-nachalsya-osnovnoy-etap-stroitelstva/>

Originally, this event was scheduled²⁵⁰ for November 19, 2023, to coincide with Egypt's National Nuclear Energy Day. However, the ceremony was delayed by nearly two months for unclear reasons. For the first three units of the plant, the pouring of the first concrete took place within a month of receiving the corresponding license from Egypt's regulatory body in 2022-2023. In contrast, the interval between these events for the fourth unit was about six months. It is possible that the delay in holding the ceremony with the online participation of the heads of state was influenced by the escalation of the situation in the Middle East, triggered by the Hamas group's invasion of Israel on October 7, 2023.



Pouring the first concrete into the foundation slab of Unit 4 of the El Dabaa NPP on January 23, 2024.
Source: ASE

²⁵⁰ National Association of Oil and Gas Services, October 6, 2023. The installation of the first nuclear equipment has begun at the El Dabaa NPP under construction in Egypt [in Russian]. (Accessed: March 23, 2025.)
<https://nangs.org/news/renewables/nuclear/na-stroyashchejsya-v-egipte-aes-ed-dabaa-nachali-ustanovku-pervogo-yadernogo-oborudovaniya>

Key stages in the construction process in 2024 also include building²⁵¹ the internal protective shell for the first and second²⁵² units, as well as the installation of melt localization devices on the third²⁵³ and fourth²⁵⁴ units. It is expected that by 2025, the reactor vessel will be installed in its designated place on the first unit.

After the start of construction on the 4th unit in 2024, Egypt became the fourth country (excluding Russia) where Rosatom is simultaneously involved in the construction of four nuclear power units. The other three countries are Turkey, India, and China.

Sanctions and delays

Apart from the aforementioned delays with the start of construction on the fourth unit at the end of 2023, no significant delays have been observed in the construction of the nuclear power plant so far. The estimated completion dates for the station (2028–2030) are still some way off, allowing Rosatom and Russian officials to report that everything is progressing “strictly according to schedule.”²⁵⁵

However, certain sanctions related to the war in Ukraine could affect the project, particularly in the logistics and financial sectors.

In March 2023, the first batch of large equipment was delivered²⁵⁶ to the site of the station. Based on indirect evidence, we assume that the delivery might have been carried out using the vessel *Baltic Leader*²⁵⁷, which was seized²⁵⁸ in France in February 2022 due to US sanctions. Difficulties with sanctions on vessels associated with Russia could impact the progress of the project.

²⁵¹ ASE, May 20, 2024. Installation of the first tier of the containment of the reactor building of power unit № 1 of the El Dabaa NPP into the design position has been completed [in Russian]. (Accessed: March 23, 2025.)
<https://www.ase-ec.ru/for-journalists/news/2024/may/zavershilas-ustanovka-v-proektnoe-polozhenie-pervogo-yarusa-vzo-zdaniya-reaktora-energobloka-1-aes-e/>

²⁵² Atom Media, September 27, 2024. Work has begun on installing the internal containment shell at the second power unit of the El Dabaa NPP (Egypt) [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/09/27/na-vtorom-energobloke-aes-el-dabaa-2/>

²⁵³ Rosatom State Corporation, October 7, 2024. Installation of the core catcher housing has begun at the third power unit of the El Dabaa NPP in Egypt [in Russian]. (Accessed: March 23, 2025.)
<https://rosatom.ru/journalist/arkhiv-novostey/na-tretem-energobloke-aes-el-dabaa-v-egipte-nachat-montazh-korpusa-ustroystva-lokalizatsii-rasplava/>

²⁵⁴ Rosatom State Corporation, November 19, 2024. Installation of the “melt catcher” has begun at the fourth power unit of the El Dabaa NPP in Egypt [in Russian]. (Accessed: March 23, 2025.)
<https://www.rosatom.ru/journalist/arkhiv-novostey/na-chetvertom-energobloke-aes-el-dabaa-v-egipte-nachalsya-montazh-lovushki-rasplava/>

²⁵⁵ TASS, November 25, 2024. The Russian ambassador reported that the construction of El-Dabaa is proceeding according to schedule [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/22487797>

²⁵⁶ Egypt Nuclear Power Plants Authority, March 21, 2023. Arrival of the first long-term nuclear equipment, the “core meltdown catcher”, at the El Dabaa Nuclear Power Plant’s dedicated port [in Arabic]. (Accessed: March 23, 2025.)
<https://nppa.gov.eg/News/Details?id=1771>

²⁵⁷ Marine Traffic, 2025. Vessel “Baltic Leader”. (Accessed: March 23, 2025.)
https://www.marinetraffic.com/ru/ais/details/ships/shipid:756167/mmsi:273297850/imo:9220639/vessel:BALTIC_LEADER

²⁵⁸ Splash, February 26, 2022. Russian ship seized in France. (Accessed: March 23, 2025.)
<https://splash247.com/russian-ship-seized-in-france/>

On November 23, 2024, a law²⁵⁹ ratifying the protocol to the agreement on providing Egypt with a government export loan for the construction of the El-Dabaa nuclear power plant, dated November 19, 2015, came into force in Russia. The protocol stipulates²⁶⁰ a two-year extension for the use and repayment of the loan, as well as the exemption of the debtor from paying accrued penalty interest, provided that the accumulated debt for interest, dating back to March 2022, is repaid on time. The implementation of the protocol will allow Egypt to resume servicing the loan, repay overdue debt amounting to approximately \$185 million, and resume financing the project using government credit funds. According to these reports, certain financial issues with the project's financing exist, which may be related to financial sanctions imposed by the United States.

The progress of the project may also be significantly affected by the loss of Rosatom's special steel plant, EMSS, in Kramatorsk, southeastern Ukraine, due to the war. Until 2022, the plant supplied blanks for many of Rosatom's foreign projects, and in 2022, it planned²⁶¹ to start producing blanks for the El-Dabaa NPP equipment. The problems with supply of blanks may be indirectly suggested by the fact that the production of the reactor vessel for the second unit of the station from Russian blanks only began in November 2024²⁶², two years after the first concrete was poured for this unit. In contrast, similar equipment for the first unit began production²⁶³ in the summer of 2022 (possibly using blanks that EMSS had delivered), even before the first concrete was poured for that unit.

China, Tianwan and Xudapu NPPs

General description

Russian-Chinese cooperation in the nuclear sector is the most extensive and long-standing for modern Russia. The first agreement was signed²⁶⁴ in 1992, followed by a contract in 1997 for the construction of the first units of the Tianwan Nuclear Power Plant in China, featuring Russian VVER-1000 reactors (V-428²⁶⁵). The first two units were commissioned in 2006²⁶⁶ and 2007²⁶⁷, and the two units of the second phase were commissioned in 2018²⁶⁸.

²⁵⁹ Official publication of legal acts, November 23, 2024. Federal Law of November 23, 2024 № 394-FZ [in Russian]. (Accessed: March 23, 2025.)
<http://publication.pravo.gov.ru/Document/View/0001202411230007?index=1>

²⁶⁰ Parlamentskaya Gazeta, November 19, 2024. Egypt to get deferment on repayment of Russian loan for construction of nuclear power plant [in Russian]. (Accessed: March 23, 2025.)
<https://www.pnp.ru/economics/egipet-poluchit-otsrochku-po-pogasheniyu-vydannogo-rf-kredita-na-stroitelstvo-aes.html>

²⁶¹ Metallurgprom, February 21, 2022. Energomashspetsstal begins work on a new project – a nuclear power plant in Egypt [in Russian]. (Accessed: March 23, 2025.)
<https://metallurgprom.org/news/ukraine/11099-jenergomashspecstal-nachinaet-rabotu-na-nad-novym-proektom-atomnoj-stancii-v-egipte.html>

²⁶² Atom Media, September 20, 2024. Atom mash has begun manufacturing reactor equipment for the second unit of the El Dabaa NPP (Egypt) [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/09/20/atom-mash-nachal-izgotavlivat-reakt/>

²⁶³ TASS, June 1, 2022. Russia has begun manufacturing equipment for Egypt's first nuclear power plant, El Dabaa [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/14789299>

²⁶⁴ Vestnik Atomproma, May 30, 2025. Tianwan NPP and Xudapu NPP [in Russian]. (Accessed: March 23, 2025.)
<https://atomvestnik.ru/2023/05/30/tjanvanskaja-ajes-i-ajes-sjudapu/>

²⁶⁵ Rosatom History, WWER-1000: V-187, V-302, V-338, V-320, V-412, V-446, V-428 [in Russian]. (Accessed: March 23, 2025.)
<https://www.biblioatom.ru/core-systems/nuclear-reactors/vver-1000/>

²⁶⁶ IAEA Power Reactor Information System (PRIS), March 22, 2025. Tianwan-1. (Accessed: March 23, 2025.)
<https://pris.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=838>

²⁶⁷ IAEA Power Reactor Information System (PRIS), March 22, 2025. Tianwan-2. (Accessed: March 23, 2025.)
<https://pris.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=839>

²⁶⁸ ASE. Tianwan Nuclear Power Plant (China) [in Russian]. (Accessed: March 23, 2025.)
<https://ase-ec.ru/about/projects/aes-tyanvan/>

The construction of Russian reactor units in China has been marked by an increasing level of localization²⁶⁹, with greater involvement of Chinese industry in the design and production of equipment. The first two units were fully designed by the Russian side and equipped with Russian-made equipment. For the subsequent two units, Russian specialists designed the nuclear island and supplied their equipment, while the Chinese side was responsible for the design and completion of the non-nuclear part of the power units, including the turbine halls. In later projects, Rosatom's role was reduced to technical assistance, with the Chinese side taking on the majority of the work.

Since 2009, the operator of the Tianwan Nuclear Power Plant, the China National Nuclear Corporation (CNNC), has begun independently producing²⁷⁰ nuclear fuel for the plant at its Yibin plant in Sichuan province, under a Russian license.



Tianwan Nuclear Power Plant, 2024. In the foreground are the first four Russian-designed VVER-1000 reactor units. Source: Xinhua/Li Bo

²⁶⁹ Vestnik Atomproma, May 30, 2025. Tianwan NPP and Xudapu NPP [in Russian]. (Accessed: March 23, 2025.)
<https://atomvestnik.ru/2023/05/30/tjanvanskaja-ajes-i-ajes-sjudapu/>

²⁷⁰ JSC TVEL, May 16, 2023. JSC TVEL delivered modernized equipment to China for the Yibin Fuel Plant [in Russian]. (Accessed: March 23, 2025.)
https://www.tvel.ru/press-center/news/?ELEMENT_ID=10363

In 2018, an intergovernmental protocol was signed for cooperation in the serial construction of four VVER-1200 reactors in China: two at the Tianwan Nuclear Power Plant (Units 7 and 8) and two at the Xudapu Nuclear Power Plant (Units 3 and 4).

On May 19, 2021, a ceremony was held with the participation of Vladimir Putin and Xi Jinping to mark the commencement of work at two sites, which included the pouring of the first concrete at Unit 7 of the Tianwan Nuclear Power Plant and Unit 3 of the Xudapu Nuclear Power Plant.

On February 25, 2022, just a day after Russia's full-scale invasion of Ukraine, the first concrete was poured for Unit 7 at Tianwan. Three months later, the first concrete was poured for Unit 4 at Xudapu.

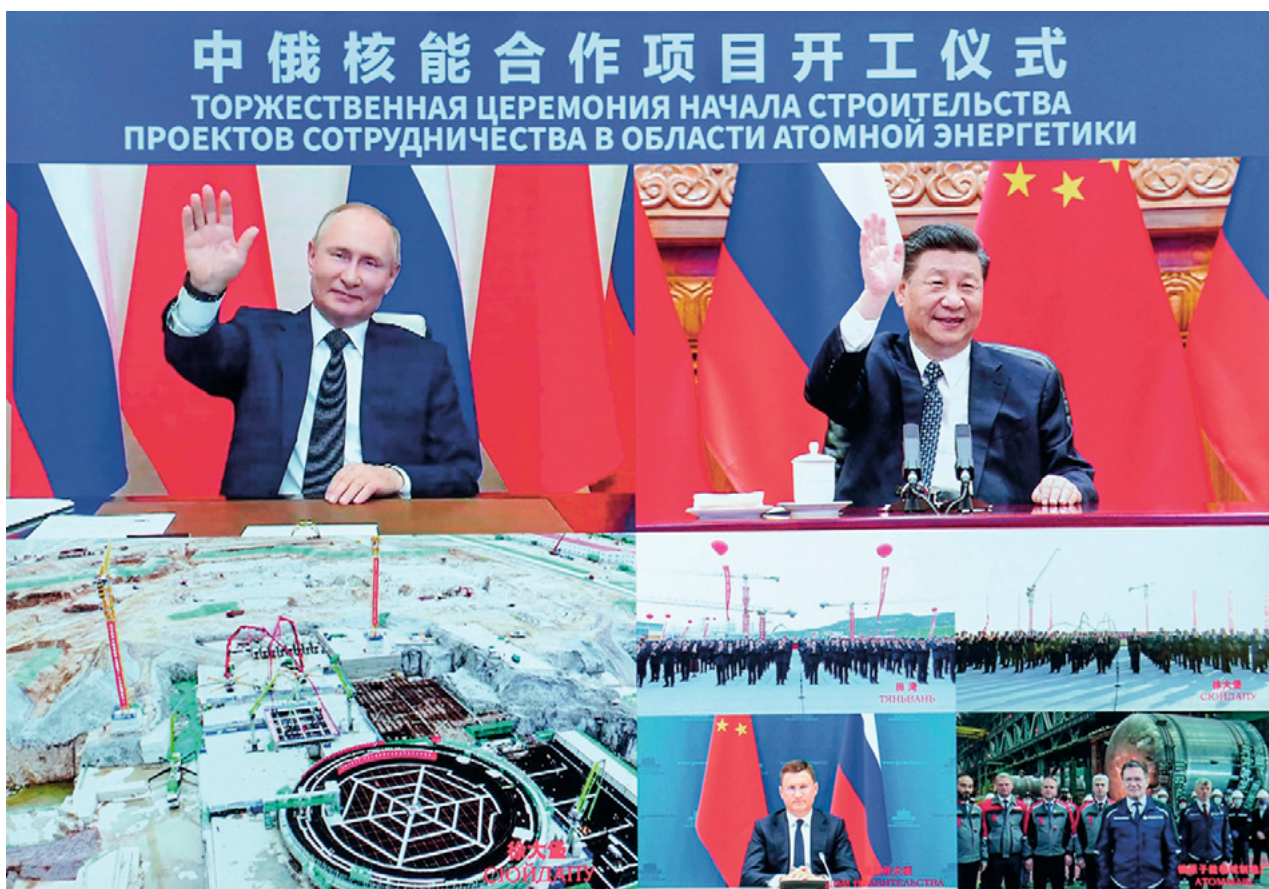
By the end of 2022, Rosatom was involved in the simultaneous construction of four VVER-1200 reactors across two sites in China. A distinctive feature of these projects was their exceptionally high level of localization. The China National Nuclear Corporation (CNNC) took responsibility for all construction, installation, and commissioning works, as well as the supply of most of the equipment outside the "nuclear island." Rosatom's role was focused on designing and supplying key equipment for the "nuclear island," along with providing essential services such as project supervision, assembly oversight, and equipment commissioning.

Key events of 2023-2024

On July 25, 2023, a single-stage lift²⁷¹ and installation of the reactor building's containment dome took place at Unit 3 of the Xudapu Nuclear Power Plant. Previously, during the construction of Russian-designed nuclear power plants, this process was carried out in two stages. Additionally, this time the installation of the dome occurred just two years after the pouring of the first concrete. On average, this operation takes about 4.5 years after the first concrete is poured when constructing similar Russian nuclear units.

²⁷¹ July 25, 2023. Single-stage lifting and installation of the dome on the reactor building of Unit 3 of the Xudapu NPP took place in China [in Russian]. (Accessed: March 23, 2025.)

<https://www.ase-ec.ru/for-journalists/news/2023/jul/odnoetapnyy-podem-i-ustanovka-kupola-na-zdanie-reaktora-bloka-3-aes-syuydapu-sostoyalsya-v-kitae/>



A screenshot from the broadcast of the ceremony to mark the start of construction of new units of the Tianwan NPP and Unit 3 of the Xudapu NPP on May 19, 2021, with the participation of Vladimir Putin and Xi Jinping.

On October 16, 2023, the reactor vessel was installed²⁷² in its designated position at Unit 7 of the Tianwan Nuclear Power Plant.

On March 14, 2024, the lower part of the inner containment dome was installed²⁷³ at Unit 8 of the Tianwan NPP in China., on 15 April, the upper part of the inner containment dome²⁷⁴ was installed at the reactor building of Unit 8.

²⁷² October 16, 2023. The reactor vessel was installed at Unit 7 of the Tianwan NPP [in Russian]. (Accessed: March 23, 2025.)
<https://ase-ec.ru/for-journalists/news/2023/oct/na-energobloke-7-aes-tyanvan-ustanovlen-korpus-reaktora/>

²⁷³ ASE, March 14, 2023. The lower part of the containment dome was installed at Unit 8 of the Tianwan NPP [in Russian]. (Accessed: March 23, 2025.)
<https://ase-ec.ru/for-journalists/news/2024/mar/na-energobloke-8-aes-tyanvan-ustanovlena-nizhnaya-chast-kupola-vzo/>

²⁷⁴ ASE, April 15, 2024. Installation of the upper part of the containment dome of the reactor building has been completed at Unit 8 of the Tianwan NPP [in Russian]. (Accessed: March 23, 2025.)
<https://www.ase-ec.ru/for-journalists/news/2024/apr/na-energobloke-8-aes-tyanvan-zavershena-ustanovka-verkhney-chasti-kupola-vzo-zdaniya-reaktora/>

In early September, the reactor vessel was installed²⁷⁵ in its design position at Unit 8 of the Tianwan NPP, with the equipment arriving from Russia just days²⁷⁶ before the installation operation.

On June 18, 2024, the dome was lifted and installed²⁷⁷ on the reactor building of Unit 4 at the Xudapu Nuclear Power Plant. This operation was performed in a single-stage format²⁷⁸ for the second time in the practice of Russian nuclear engineers (the first being the previous year at Unit 3 of the same plant).

In mid-December, the reactor vessel was installed²⁷⁹ at its designated position at Unit 4 of the Xudapu Nuclear Power Plant.

Sanctions and delays

The projects of Rosatom in China are the least affected by Western sanctions due to the high degree of localization in China and the relatively small involvement of Rosatom itself. Most of the equipment for the primary circuit of the reactor units is produced by Rosatom independently, while the project is financed by China. Therefore, the risks of non-supply of Western components or difficulties with financial operations, which affect other Rosatom export projects, are unlikely to significantly impact the export projects within the Russian-Chinese cooperation.

Moreover, judging by the shipment and installation schedules, Rosatom barely manages to deliver the equipment to the construction sites of the nuclear power plants, where it is almost immediately installed upon arrival.

The commissioning of the units is scheduled for 2027-2028, just six years after the start of construction. Given the current pace of construction, these deadlines are likely to be met, and possibly even exceeded. Based on the operations²⁸⁰ planned for January 2025, such as the pouring of the safety systems for the reactor unit at Unit 7 of the Tianwan Nuclear Power Plant, it can be expected that the physical startup of this unit will begin later this year.

However, Western sanctions on Russia may affect domestic projects for cooperation with China in the nuclear sector. China is interested in collaborating on the development of the

²⁷⁵ Atom Media, September 3, 2024. The reactor vessel has been installed in its design position at Unit 8 of the Tianwan NPP (China) [in Russian]. (Accessed: March 23, 2025.)

<https://atommedia.online/2024/09/03/na-energobloke-8-aes-tyanvan-kita-2/>

²⁷⁶ World Nuclear News, August 27, 2024. Nuclear island components arrive at Tianwan site. (Accessed: March 23, 2025.)

<https://www.world-nuclear-news.org/Articles/Nuclear-island-components-arrive-at-Tianwan-site>

²⁷⁷ Atom Media, June 18, 2024. At the construction site of power unit № 4 of the Xudapu NPP (China), the dome was lifted and installed on the WWER-1200 reactor building [in Russian]. (Accessed: March 23, 2025.)

<https://atommedia.online/2024/06/18/na-strojploshhadke-energobloka-4-aes/>

²⁷⁸ Bellona, August 11, 2023. Bellona Atomic Digest. July 2023 [in Russian]. (Accessed: March 23, 2025.)

<https://ru.bellona.org/2023/08/11/atomic-digest-07-23/#08p>

²⁷⁹ ASE, December 17, 2024. The reactor vessel of Unit 4 of the Xudapu NPP in China was installed in its normal position [in Russian]. (Accessed: March 23, 2025.)

<https://ase-ec.ru/for-journalists/news/2024/dec/korpus-reaktora-energobloka-4-aes-syuydapu-v-kitae-ustanovlen-v-shtatnoe-polozhenie/>

²⁸⁰ ASE, January 20, 2025. The Tianwan NPP Unit 7 began flushing all safety systems onto the open reactor [in Russian]. (Accessed: March 23, 2025.)

<https://ase-ec.ru/for-journalists/news/2025/jan/na-energobloke-7-aes-tyanvan-nachalsya-proliv-vsekh-sistem-bezopasnosti-na-otkrytyy-reaktor/>

Northern Sea Route, which is overseen by Rosatom, and is also involved in the construction of Russian floating nuclear power units (FNPU). Under a 2021 contract²⁸¹, the Chinese shipyard Wison (Nantong) Heavy Industry was to supply two of the four hulls (barges) needed for the floating nuclear power plants being constructed to supply energy to the Baimsky mining and processing plant on Chukotka. In June 2024, it was reported²⁸² that a contract had also been signed with the same supplier for a third hull.

However, in June 2024, it was reported²⁸³ that the Chinese parent company Wison New Energies, which owns the shipyard, was planning to withdraw from Russian projects. This seems to be related to concerns about secondary sanctions from the United States, as some of the company's structures had worked on supplying equipment for the sanctioned Arctic LNG-2 project²⁸⁴ since the autumn of 2023. Nevertheless, this decision did not help, and on January 10, 2025, its subsidiary, Zhoushan Wison Offshore and Marine, which had supplied modules for Arctic LNG-2, was placed under U.S. secondary sanctions²⁸⁵.

It is difficult to say at this point whether these developments have affected the supply of hulls for the floating nuclear power plants. According to the contract, the delivery date for the first hull was October 2, 2023, and the second hull was due by February 2, 2024. However, there have been no reports on the delivery of the hulls to Russia or the commencement of the assembly of the floating nuclear power plants so far.

Prospects

The progress of the aforementioned projects within China demonstrates that China is mastering Russian nuclear technologies at a very rapid pace, with a constant increase in the speed of construction and the level of equipment localization.

Over 30 years of collaboration with Russia (and others) in the nuclear sector, China has built a powerful nuclear industry, which now surpasses Russia's and all others in many respects. Currently, China is constructing more nuclear power units domestically than Rosatom is building worldwide. Moreover, on the first four VVER-1000 units at the Tianwan Nuclear Power Plant and the four VVER-1200 units under construction, China has learned to build Russian-designed nuclear plants faster than Rosatom itself does in Russia and on other international projects.

The cooperation agreements signed in 2018, under which four VVER-1200 units are currently

²⁸¹ Kommersant, June 21, 2024. Wison did not work out in Russia [in Russian]. (Accessed: March 23, 2025.)
<https://www.kommersant.ru/doc/6776043>

²⁸² Interfax, June 7, 2024. The body of the third power unit of the floating NPP for Baimsky GOK will also be manufactured in China [in Russian]. (Accessed: March 23, 2025.)
<https://www.interfax.ru/spief2024/965563>

²⁸³ Kommersant, June 21, 2024. Wison did not work out in Russia [in Russian]. (Accessed: March 23, 2025.)
<https://www.kommersant.ru/doc/6776043>

²⁸⁴ Kommersant, December 27, 2024. On liquefied engine speed [in Russian]. (Accessed: March 23, 2025.)
<https://www.kommersant.ru/doc/7402508>

²⁸⁵ Interfax, January 10, 2025. US sanctions Chinese and Indian companies for helping Arctic LNG 2 [in Russian]. (Accessed: March 23, 2025.)
<https://www.interfax.ru/world/1002345>

being built in China, foresee²⁸⁶ the possibility of constructing new units in the future. However, there are no specific details regarding new constructions at this time. It is likely that more information will emerge after the commissioning of the current units.

China is also actively adopting Rosatom's developments in the nuclear fuel cycle, gaining access to technologies that Russia shares with virtually no one else on such a scale. Between 2000 and 2011, Russia built four phases of an enrichment plant in Hanzhong²⁸⁷, China, equipped with Russian centrifuges with a capacity of approximately 1 million SWU²⁸⁸.

China is the only country using Russian reactors that has also acquired the technology to produce fuel for them. Since 2009, fuel for the four VVER-1000 units at the Tianwan Nuclear Power Plant has been produced at the Yibin plant under a license from TVEL. In 2014, the plant mastered the fabrication of TVS-2M fuel assemblies, which replaced the older UTVS assemblies. In 2023, TVEL supplied²⁸⁹ additional equipment to modernize the plant. For now, China continues to order initial fuel loads from Russia for the VVER-1200 reactors under construction²⁹⁰ and its own CFR-600 fast reactor²⁹¹. However, it is likely that in the future, China will also shift the production of fuel for these reactors domestically, leaving Rosatom structures responsible only for the technical support of these projects.

In 2023, according to data from the international trade service Comtrade²⁹², China surpassed the European Union in purchasing volumes of enriched uranium from Russia, now second only to the United States in this regard. Russia supplied 701 tons of enriched uranium to the U.S. in 2023, 470 tons to China, and only 250 tons to the EU. Moreover, Russia sells enriched uranium to China at nearly half the price it charges Western countries.

China is expected to remain a major, if not the largest, customer and partner for Russia in general and for Rosatom in particular. However, it will do so on its own terms and to its own advantage, securing access to new technologies and inexpensive raw materials.

For instance, on March 21, 2024, during Chinese President Xi Jinping's state visit to Russia, a comprehensive long-term cooperation program was signed²⁹³, specifically in the areas of nuclear technology where Russia still holds an advantage over China. Collaboration in these

²⁸⁶ ASE. Xudapu Nuclear Power Plant (China) [in Russian]. (Accessed: March 23, 2025.)

<https://ase-ec.ru/about/projects/aes-syuydapu/>

²⁸⁷ AtomInfo, May 4, 2009. Centrifuges for the fourth stage of the plant have arrived in China [in Russian]. (Accessed: March 23, 2025.)

<http://www.atominfo.ru/news/air6470.htm>

²⁸⁸ China National Nuclear Corporation, March 21, 2018. China launches new uranium enrichment centrifuges. (Accessed: March 23, 2025.)

https://en.cnn.com.cn/2018-03/21/c_1026722.htm

²⁸⁹ JSC TVEL, May 16, 2023. JSC TVEL delivered modernized equipment to China for the Yibin Fuel Plant [in Russian]. (Accessed: March 23, 2025.)

https://www.tvel.ru/press-center/news/?ELEMENT_ID=10363

²⁹⁰ JSC TVEL, November 6, 2019. Rosatom's fuel company TVEL will supply fuel for new power units of the Xudapu NPP [in Russian]. (Accessed: March 23, 2025.)

https://tvel.ru/press-center/news/?ELEMENT_ID=91

²⁹¹ Nuclear Engineering International, January 3, 2023. Russia completes fuel deliveries for China's CFR-600 fast reactor. (Accessed: March 23, 2025.)

<https://www.neimagazine.com/news/russia-completes-fuel-deliveries-for-chinas-cfr-600-fast-reactor-10486493/>

²⁹² UN Comtrade Database. (Accessed: March 23, 2025.)

<https://comtradeplus.un.org>

²⁹³ TASS, March 21, 2023. Full list of documents signed during Xi Jinping's visit to Russia [in Russian]. (Accessed: March 23, 2025.)

<https://tass.ru/politika/17331407>

fields will significantly accelerate China's progress. Key areas of focus include fast neutron reactors, closing the nuclear fuel cycle, the production of uranium-plutonium fuel, and the management of spent nuclear fuel.

In turn, China is helping Russia circumvent certain sanctions or address the challenges they create for Russian projects in third countries. For instance, to meet contractual deadlines for the first unit of the Akkuyu Nuclear Power Plant in Turkey, Rosatom ordered electrical equipment from Chinese companies instead of Siemens²⁹⁴, whose deliveries were delayed due to a decision by the German government.

For the Rooppur Nuclear Power Plant project in Bangladesh, China stepped in to assist in the financial sphere. In April 2023, Bangladesh and Russia agreed²⁹⁵ to use yuan for payments on the Russian loan granted to Dhaka for the construction of the Rooppur NPP, utilizing China's Cross-Border Interbank Payment System (CIPS) as an alternative to SWIFT, from which Russia had been excluded. However, by June 2023, this channel had not been activated²⁹⁶ due to additional restrictions imposed by the United States on Russian companies.

A reciprocal favor and part of some undisclosed agreements between Russia and China may have been the sudden sale²⁹⁷ by Rosatom-affiliated entities of their shares in three Kazakh uranium deposits to Chinese companies at the end of 2024. The deal seems particularly unusual against the backdrop of Rosatom's recent, widely publicized, and proudly announced acquisition of a stake in Kazakhstan's Budenovskoye deposit, a purchase facilitated²⁹⁸ by Vladimir Putin.

The experience of close cooperation between Rosatom and the Chinese state corporation CNNC also opens up prospects for joint export projects in nuclear power plant construction. For example, it is easy to imagine a consortium of these companies submitting a proposal for the construction of Kazakhstan's first nuclear power plant. For Rosatom, such collaboration creates opportunities to participate in China's overseas projects in the Global South, especially given the continued multilateral pressure on Russia and Rosatom from Western countries.

In this context, the initiative²⁹⁹ to create a BRICS Nuclear Energy Platform seems like a natural development. This alliance, consisting of companies and professional nuclear communities, aims to support the advancement and implementation of nuclear technologies among BRICS countries (Brazil, Russia, India, China, and South Africa, with the acronym derived from their

²⁹⁴ TASS, June 14, 2024. The State Duma reported that the contractual deadlines for commissioning the Akkuyu NPP have not changed [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/21095889>

²⁹⁵ The Business Standard, April 13, 2023. Dhaka, Moscow agree to settle Rooppur payments in Chinese yuan. (Accessed: March 23, 2025.)
<https://www.tbsnews.net/economy/dhaka-moscow-agree-settle-rooppur-payments-chinese-yuan-616258>

²⁹⁶ The Daily Star, June 18, 2023. Rooppur loan repayment: US sanctions complicate payments in yuan. (Accessed: March 23, 2025.)
<https://www.thedailystar.net/news/bangladesh/news/rooppur-loan-repayment-us-sanctions-complicate-payment-yuan-3348861>

²⁹⁷ Bellona, February 3, 2025. Bellona Atomic Digest. November-December 2024 [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2025/02/03/nuclear-digest-11-12-24/#09p>

²⁹⁸ Bellona, February 3, 2025. Bellona Atomic Digest. November-December 2024 [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2025/02/03/nuclear-digest-11-12-24/#09p>

²⁹⁹ Bellona, November 25, 2024. Bellona Atomic Digest. October 2024 [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2024/11/25/nuclear-digest-10-24/#07p>

names, as well as Egypt, Iran, the United Arab Emirates, and Ethiopia, which joined the bloc and expanded it to BRICS+). The idea was discussed³⁰⁰ by the heads of major nuclear industry companies and organizations from BRICS countries a week before the BRICS summit in Kazan in October 2024. The specific structure and operational format of this alliance remain unclear, but it is evident that the cooperation between China and Russia could serve as its foundation. For Russia, such an initiative would provide greater flexibility and a more systematic approach to engaging with BRICS markets amid political pressure and confrontation with the West. However, it is also possible that China will play the leading role in this process.

India, Kudankulam NPP

General description

India is Russia's second-largest partner in the peaceful nuclear sector, after China. The main project in Russian-Indian bilateral relations is the Kudankulam Nuclear Power Plant in the state of Tamil Nadu in southern India. The plant is being built under the framework of an Intergovernmental Agreement signed in November 1988, with an additional agreement signed³⁰¹ on June 21, 1998.

Construction of the first phase, consisting of two VVER-1000 reactor units, began in 2002. Units 1 and 2 were commissioned in October 2013 and October 2016, respectively, with significant delays and cost overruns compared to the initial schedule.

According to a 2017 report³⁰² from the Comptroller and Auditor General of India (the equivalent of Russia's Accounts Chamber), the cost of the first phase of the Kudankulam Nuclear Power Plant by 2014 was \$3.7 billion³⁰³, of which approximately \$1.5 billion was provided as a loan from Russia. Regarding Indian projects (all phases of the Kudankulam NPP), Russia traditionally provides state loan³⁰⁴ not for the entire project, but only for the procurement and installation of Russian-made equipment, while construction work and the development of supporting infrastructure are the responsibility of the Indian side.

Construction of the second phase, with units 3 and 4 and VVER-1000 reactors, began in 2017. According to a statement³⁰⁵ by Indian Minister Jitendra Singh in 2015, the cost of building the

³⁰⁰ Strana Rosatom, October 28, 2024. Uniting countries and efforts: nuclear technologies discussed at the BRICS summit [in Russian]. (Accessed: March 23, 2025.)
<https://strana-rosatom.ru/2024/10/28/obedinenie-stran-i-usilij-atomnye-t/>

³⁰¹ ASE. Kudankulam Nuclear Power Plant (India) [in Russian]. (Accessed: March 23, 2025.)
<https://ase-ec.ru/about/projects/aes-kudankulam/>

³⁰² Auditor and Comptroller General of India, 2017. Kudankulam Nuclear Power Project, Units 1 and 2. (Accessed: March 23, 2025.)
https://cag.gov.in/uploads/download_audit_report/2017/Report_N%38_of_2017_-_Performance_Audit_on_Kudankulam_Nuclear_Power_Project_Units_I_and_II_Department_of_Atomic_Energy.pdf

³⁰³ Bellona, October 21, 2024. India, Russia May Enhance Nuclear Cooperation Despite Kudankulam NPP Difficulties [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2024/10/21/india-russia-nuclear/>

³⁰⁴ Kommersant, May 31, 2017. Russia has taken out a third state loan [in Russian]. (Accessed: March 23, 2025.)
<https://www.kommersant.ru/doc/3313375>

³⁰⁵ Oil and Capital, August 7, 2015. The cost of construction of the 2nd stage of the Kudankulam NPP will be 6.6 billion dollars [in Russian]. (Accessed: March 23, 2025.)
<https://oilcapital.ru/news/2015-08-07/stoimost-stroitelstva-2-y-ocheredi-aes-kudankulam-sostavit-6-6-mrd-dollarov-887997>

second phase of the plant will be 398.4 billion rupees, equivalent to \$6.6 billion. According to TASS³⁰⁶, \$3.4 billion of this will be covered by Russian loans.

According to a project report³⁰⁷ published in August 2024 by the Indian government, the second phase is 72.6% complete. However, the cost overruns on its construction have reached nearly 73%, and the timeline has exceeded the original schedule by 72 months. Construction of the third phase, with units 5 and 6, began in 2021. They are nearly a third complete and, according to the Indian government's report, have not encountered any cost overruns or delays.



The first phase of the Kudankulam NPP. Photo: Reetesh Chaurasia / Wikipedia

India has extensive experience in nuclear construction and in working on the first phase of the Kudankulam NPP, so the construction of the second and third phases of the plant

³⁰⁶ TASS, March 25, 2024. What is known about Russia's nuclear projects abroad [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/info/18916163>

³⁰⁷ Infrastructure and Project Monitoring Division, Ministry of Statistics and Programme Implementation, India, May 16, 2024. Kudankulam NPP Units 3 and 4 Project: Project Summary. (Accessed: March 23, 2025.)
https://web.archive.org/web/20240709170355/http://www.cspm.gov.in/ocmstemp/PROJ_SUMMARY?prcd=N02000028&stat=O

follows a similar scheme to projects in China. According to an agreement on construction³⁰⁸ The Indian side, represented by the Nuclear Power Corporation of India (NPCIL), handles all construction, installation, and commissioning of equipment, while Rosatom is responsible for project development, supply of core equipment, and technical support.

However, it is evident that the adoption of Russian technologies in India is not progressing as efficiently and quickly as it is in China (see below).

Key events 2023-2024

Unit 3 is in the highest state of readiness. According to Dmitry Savvin, Deputy Head of the Construction Department for Units 3-6 at the Kudankulam NPP, who made the estimate presumably in late August 2024 and published it in the September issue of Atomprom Vestnik magazine³⁰⁹, Unit 3 is approximately 70% ready. According to the Ministry of Statistics and Program Implementation of India³¹⁰, as of August 2024, Unit 3 is 75% ready³¹¹, Unit 4 is 71.2% ready, Unit 5 is 31% ready³¹², and Unit 6 is 27% ready³¹³.

By September 2024, the main construction work on Unit 3 was completed: the inner protective shell of the reactor building, the turbine building, and auxiliary structures have been erected. All main equipment of the primary circuit was installed in the reactor building, and in August, the welding of the main circulation pipeline was completed³¹⁴. Assembly of the turbine is ongoing.

On Unit 4, construction of the protective dome continues. In January 2024, the reactor pressure vessel was installed³¹⁵, and in June 2024, all steam generators³¹⁶ were mounted.

³⁰⁸ MFA of the Russian Federation, December 5, 2008. Agreement between the Government of the Russian Federation and the Government of the Republic of India on cooperation in the construction of additional power units of the nuclear power plant at the Kudankulam site, as well as in the construction of nuclear power plants according to Russian designs at new sites in the Republic of India [in Russian]. (Accessed: March 23, 2025.)

https://www.mid.ru/ru/foreign_policy/international_contracts/international_contracts/2_contract/45623/

³⁰⁹ Vestnik Atomproma, September 30, 2024. The Magnificent Six [in Russian]. (Accessed: March 23, 2025.)

<https://atomvestnik.ru/2024/09/30/velikolepnaja-shesterka/>

³¹⁰ Infrastructure and Project Monitoring Division, Ministry of Statistics and Programme Implementation, India, July 15, 2024. Kudankulam NPP Units 3 and 4 Project: Project Summary. (Accessed: March 23, 2025.)

https://web.archive.org/web/20241006065345/http://www.cspm.gov.in/ocmstemp/PROJ_SUMMARY?prcd=N02000028&stat=0

³¹¹ Infrastructure and Project Monitoring Division, Ministry of Statistics and Programme Implementation, India, July 15, 2024. Kudankulam NPP Units 3 and 4 Project: Project Summary. (Accessed: March 23, 2025.)

https://web.archive.org/web/20241006065345/http://www.cspm.gov.in/ocmstemp/PROJ_SUMMARY?prcd=N02000028&stat=0

³¹² Infrastructure and Project Monitoring Division, Ministry of Statistics and Programme Implementation of India, July 15, 2024. Kudankulam NPP Units 5 and 6 Project: Project Summary. (Accessed: March 23, 2025.)

https://web.archive.org/web/20241006070240/http://www.cspm.gov.in/ocmstemp/PROJ_SUMMARY?prcd=N02000029&stat=0

³¹³ Infrastructure and Project Monitoring Division, Ministry of Statistics and Programme Implementation of India, July 15, 2024. Kudankulam NPP Units 5 and 6 Project: Project Summary. (Accessed: March 23, 2025.)

https://web.archive.org/web/20241006070240/http://www.cspm.gov.in/ocmstemp/PROJ_SUMMARY?prcd=N02000029&stat=0

³¹⁴ ASE, August 7, 2023. Welding of the main circulation pipeline was completed at power unit № 3 of the Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)

<https://ase-ec.ru/for-journalists/news/2023/aug/na-energobloke-3-aes-kudankulam-zavershilas-svarka-glavnogo-tsirkulyatsionnogo-truboprovoda/>

³¹⁵ ASE, January 26, 2024. The reactor vessel of power unit № 4 was installed in the design position at the Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)

<https://ase-ec.ru/for-journalists/news/2024/jan/na-aes-kudankulam-v-proektnoe-polozhenie-ustanovlen-korpus-reaktora-energobloka-4-/>

³¹⁶ ASE, June 20, 2024. Steam generators installed at Unit 4 of Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)

<https://www.ase-ec.ru/for-journalists/news/2024/jun/na-bloke-4-aes-kudankulam-smontirovany-parogeneratory/>

On Unit 5, in July 2023, the core meltdown localization device was installed³¹⁷ in its design position, and preparations are underway for the installation of the reactor pressure vessel. On Unit 6, the construction of the turbine building walls has begun, and in the reactor section, preparations are being made for the installation of the core catcher.



Satellite image of the Kudankulam NPP site in summer 2024. On the top right are the two operating units № 1 and № 2. On the left are units № 3-№ 6 under construction. Source: Google Maps.

Regarding the overall infrastructure, the fresh fuel storage building for all four under-construction units has been completed, and the construction of hydraulic structures is nearing completion.

In September 2023, during the delivery of equipment to the Kudankulam NPP site in India, a barge carrying two steam generators for Units 5 and 6, each weighing 310 tons, detached from the tug and became grounded on rocks³¹⁸ near the station's quay. The steam generators

³¹⁷ Rosatom State Corporation, July 5, 2023. A melt localization device has been installed at power unit № 5 of the Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)

<https://rosatom.ru/journalist/news/na-energobloke-5-aes-kudankulam-ustanovleno-ustroystvo-lokalizatsii-raspplava/>

³¹⁸ Nuclear Engineering International, September 19, 2023. Steam generators destined for Kudankulam NPP stranded at sea on damaged barge. (Accessed: March 23, 2025.)

<https://www.neimagazine.com/news/newssteam-generators-for-kudankulam-npp-stranded-at-sea-on-damaged-barge-11157856>

were not successfully transferred from the barge to the shore until three weeks later³¹⁹. This logistical setback in the delivery of steam generators by local contractors may indicate the low quality of their services.

Sanctions and delays

As with the Chinese projects, there is no significant direct impact from Western sanctions on the Kudankulam NPP project in India.

In December 2023, Russia and India signed a protocol³²⁰ under which Russia postponed India's payment³²¹ of a debt related to the construction of the Kudankulam NPP, amounting to about \$54 million. However, it is difficult to say whether these delays are connected to sanctions on the Russian financial sector.

Overall, the implementation of the Kudankulam NPP project is not progressing very quickly, and delays in the project have been recorded even before 2022. These delays are likely related to difficulties on the Indian side of the project. For example, in 2019, the leadership of the Kudankulam NPP noted³²² the inability to meet its financial obligations, which led to delays in the construction of Units 3 and 4.

Slow project implementation and delays are recorded both by India's Ministry of Statistics in its reports³²³ and by comparing the pace of specific operations with other overseas Rosatom construction projects. For example, in July 2023, the core meltdown localization device was installed³²⁴ on Unit 5 at Kudankulam, two years after the first concrete was poured at the site. In comparison, in China, at the parallel construction of Unit 3 of the Xudapu NPP, the interval between these operations was only six months, and at other Rosatom overseas projects, this interval usually takes about a year.

It is notable that both the Russian and Indian sides acknowledge the need to accelerate construction. In February 2024, Alexey Likhachev visited³²⁵ the Kudankulam NPP and, during

³¹⁹ The Times of India, September 28, 2023. Steam generators salvaged from barge in Kudankulam. (Accessed: March 23, 2025.)
<https://timesofindia.indiatimes.com/city/madurai/steam-generators-salvaged-from-barge-in-kudankulam/articleshow/104003931.cms?from=mdr>

³²⁰ Official publication of legal acts, January 15, 2024. Protocol to the Agreement between the Union of Soviet Socialist Republics and the Republic of India on cooperation in the construction of a nuclear power plant in India dated November 20, 1988 and the Supplement thereto dated June 21, 1998, signed on December 26, 2023 [in Russian]. (Accessed: March 23, 2025.)
<http://publication.pravo.gov.ru/document/0001202401150001?index=1>

³²¹ RIA Novosti, January 15, 2024. Russia has delayed India's payment of debt on the Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)
https://ria.ru/20240115/aes-1921406782.html?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A//dzen.ru/news/search%3Ftext%3D

³²² DT Next, March 22, 2019. KKNPP Units 3, 4 delayed over unpaid dues, Tangedco owes nuke plant Rs 389 cr. (Accessed: March 23, 2025.)
<https://www.dtnext.in/tamilnadu/2019/03/22/kknpp-units-3-and-4-delayed-over-unpaid-dues-tangedco-owes-nuke-plant-rs-389-cr>

³²³ Infrastructure and Project Monitoring Division, Ministry of Statistics and Programme Implementation of India, July 15, 2024. Kudankulam NPP Units 3 and 4 Project: Project Summary. (Accessed: March 23, 2025.)
https://web.archive.org/web/20240930193648/http://www.cspm.gov.in/ocmstemp/PROJ_SUMMARY?prcd=N02000028&stat=0

³²⁴ Rosatom State Corporation, July 5, 2023. A melt localization device has been installed at power unit № 5 of the Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)
<https://web.archive.org/web/20240908064414/https://rosatom.ru/journalist/news/na-energobloke-5-aes-kudankulam-ustanovleno-ustroystvo-lokalizatsii-rasplava/>

³²⁵ Atom Media, February 8, 2024. Rosatom CEO Alexey Likhachev and India's Department of Atomic Energy Director Ajit Kumar Mohanty discussed cooperation prospects [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/02/08/glava-rosatoma-aleksej-lichachev-i-ruko/>

a meeting with the head of India's Department of Atomic Energy, Ajit Kumar Mohanty, discussed³²⁶ ways and means to speed up the current construction of Units 3-6.

Prospects

The "roadmap"³²⁷ for cooperation in nuclear energy between Russia and India, signed back in 2010, envisions the construction of a total of 12 Russian power units on Indian territory, including up to 8 units at the Kudankulam NPP site.

However, numerous visits by high-ranking officials from Russia and India to each other's countries in recent years have not resulted in the signing of new contracts for new nuclear power plants. Only in December 2023, during a visit³²⁸ to Moscow, did Indian Foreign Minister Subrahmanyam Jaishankar announce that several agreements were signed regarding future units of the Kudankulam nuclear project. However, the details of these agreements were not disclosed.

In May 2024, the Chairman of the Indian Atomic Energy Commission, Ajit Mohanty, visited Russia. He toured the Siberian Chemical Combine in Seversk, Tomsk region, where, accompanied by the head of Rosatom, he inspected the construction site of the experimental demonstration energy complex and the Brest-OD-300 reactor. Commenting on the visit, Alexey Likhachev stated³²⁹ that Rosatom is ready to expand cooperation with India in building large nuclear power plants at new sites in India, constructing small modular reactors, and developing both land-based and floating nuclear power plants based on these reactors. They also discussed collaboration in the nuclear fuel cycle and the non-energy applications of nuclear technologies.

During Indian Prime Minister Narendra Modi's visit to Russia in July 2024 and his meeting with Vladimir Putin, no new contracts were signed. New agreements may only emerge closer to the commissioning of the new unit at the Kudankulam nuclear plant. In July 2024, Rosatom announced³³⁰ that the launch of the third power unit at Kudankulam is scheduled for March 2026.

Nuclear fuel cooperation is already ongoing through the supply of fuel for the first phase of the Kudankulam nuclear plant. In July 2024, TVEL also announced³³¹ the start of the

³²⁶ Government of India, February 9, 2023. Press Release № 3/2024. (Accessed: March 23, 2025.)
<https://cdnbbsr.s3waas.gov.in/s35b8e4fd39d9786228649a8a8bec4e008/uploads/2024/02/20240216663524780.pdf>

³²⁷ RBC, March 12, 2010. Russia to build 12 nuclear power units in India [in Russian]. (Accessed: March 23, 2025.)
<https://www.rbc.ru/economics/12/03/2010/5704b6059a794714c9b520d1>

³²⁸ TASS, December 26, 2023. Russia and India signed agreements concerning future power units of the Kudankulam NPP [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/19632907>

³²⁹ Atom Media, May 23, 2024. Alexey Likhachev and Ajit Kumar Mohanty visited the construction site of the world's first fourth-generation energy complex [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/05/23/aleksej-lihachev-i-adzhit-kumar-mohanti/>

³³⁰ Rosatom [Telegram], July 8, 2024. Energy of Growth [in Russian]. (Accessed: March 23, 2025.)
<https://t.me/rosatomru/4080>

³³¹ Atom Media, July 31, 2024. Rosatom has begun implementing a contract for the supply of nuclear fuel for the power units of the second stage of the Kudankulam NPP (India) [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/07/31/rosatom-nachal-realizaciju-kontrakt/>

implementation of a contract for the supply of nuclear fuel for units 3 and 4 of the Kudankulam nuclear plant. According to their information, the contract covers the entire operational life of the units, starting with the initial loading of the reactor cores.

On August 13, 2024, The Times of India reported³³² that according to its source India and Russia are working on a deal worth 105 billion Indian rupees (over \$1.2 billion) for the supply of nuclear fuel (for the initial load and five subsequent reloads) and key components of the reactor cores for units 3 and 4 at the Kudankulam Nuclear Power Plant from 2025 to 2033. There are also discussions about the possibility of creating a joint venture with Rosatom for the production of nuclear fuel for the Kudankulam plant.

Russia-India nuclear cooperation extends beyond projects in these two countries. For example, Indian companies are participating in the construction of the Rooppur Nuclear Power Plant in Bangladesh, being built by Rosatom under a trilateral agreement³³³ signed in 2018. In particular, the Indian company Paharpur Cooling Towers is constructing³³⁴ all four cooling towers and two pumping stations for the Rooppur plant. These projects strengthen the ties between Russia and Rosatom and evidently lay the foundations for the substantive part of the BRICS Nuclear Energy Platform presented³³⁵ in the autumn of 2024, in which the nuclear sectors of Russia, China, and India are strengthening ties.

Bangladesh, Rooppur NPP

General description

An intergovernmental agreement³³⁶ on cooperation in the construction of Bangladesh's first nuclear power plant, the Rooppur NPP with two VVER-1200 units, was signed in November 2011. The agreement stipulates that Rosatom will provide turnkey construction of the plant, supply nuclear fuel for the entire operational period, and transport spent nuclear fuel back to Russia (see Article 8 of the agreement³³⁷).

On December 25, 2015, a general contract was signed for the construction of the Rooppur NPP.

³³² The Times of India, August 13, 2024: India, Russia eye Rs 10,000 crore nuclear fuel deal, local production. (Accessed: March 23, 2025.)
<https://timesofindia.indiatimes.com/india/india-russia-eye-rs-10k-crore-n-fuel-deal-local-production/articleshow/112476996.cms>

³³³ TASS, March 1, 2018. Russia, Bangladesh and India signed a memorandum on the construction of the Rooppur NPP [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/4999888>

³³⁴ TASS, July 19, 2024. Indian companies are also participating in the construction of the Rooppur NPP in Bangladesh [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/21313715>

³³⁵ Atom Media, October 17, 2024. Representatives of nuclear sector companies from BRICS countries supported the creation of the Nuclear Energy Platform [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/10/17/predstaviteli-kompanij-atomnogo-sek/>

³³⁶ MFA of the Russian Federation, November 2, 2011. Agreement between the Government of the Russian Federation and the Government of the People's Republic of Bangladesh on cooperation in the construction of a nuclear power plant in the territory of the People's Republic of Bangladesh [in Russian]. (Accessed: March 23, 2025.)
https://www.mid.ru/ru/foreign_policy/international_contracts/international_contracts/2_contract/44742/

³³⁷ MFA of the Russian Federation, November 2, 2011. Agreement between the Government of the Russian Federation and the Government of the People's Republic of Bangladesh on cooperation in the construction of a nuclear power plant in the territory of the People's Republic of Bangladesh [in Russian]. (Accessed: March 23, 2025.)
https://www.mid.ru/ru/foreign_policy/international_contracts/international_contracts/2_contract/44742/

Russia will also provide a loan of up to \$11.38 billion³³⁸, covering up to 90% of the project cost, which is estimated at \$12.65 billion³³⁹. The loan will be used by the Bangladeshi side between 2017 and 2024 (the projected construction period of the plant). Dhaka will repay the actual amount of the loan over 20 years in equal semi-annual payments³⁴⁰, on March 15 and September 15 each year, with the first payment due on March 15, 2027.

The first concrete for the first unit of the plant was poured on November 30, 2017³⁴¹, and for the second unit on July 14, 2018³⁴².

Key events for 2023-2024

In March 2023, work on the first unit of the nuclear power plant was completed, including the concreting of the containment dome³⁴³ and the installation of the transportation lock³⁴⁴.

On July 17, 2023, the Bangladesh Nuclear Energy Regulatory Authority issued licenses³⁴⁵ for the handling, storage, and transportation of nuclear fuel to the operator of the Rooppur NPP.

On October 5, 2023, a ceremony was held at the construction site to mark the delivery of the first batch of nuclear fuel³⁴⁶. The event, held via video conference, was attended by Vladimir Putin, the Prime Minister of the People's Republic of Bangladesh Sheikh Hasina, and the Director-General of the IAEA Rafael Grossi.

³³⁸ RIA Novosti, January 13, 2017. Russia to allocate state loan for construction of Rooppur NPP in Bangladesh [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20170113/1485677764.html>

³³⁹ RIA Novosti, April 17, 2024. Bangladesh to pay Russia in yuan for nuclear power plant construction [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20230417/yuani-1865796647.html>

³⁴⁰ RIA Novosti, January 13, 2017. Russia to allocate state loan for construction of Rooppur NPP in Bangladesh [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20170113/1485677764.html>

³⁴¹ IAEA Power Reactor Information System (PRIS), March 22, 2025. Rooppur-1. (Accessed: March 23, 2025.) <https://pris.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=1078>

³⁴² IAEA Power Reactor Information System (PRIS), March 22, 2025. Rooppur-2. (Accessed: March 23, 2025.) <https://pris.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=1079>

³⁴³ ASE, March 9, 2023. Concreting of the outer containment shell at the first power unit of the Rooppur NPP was completed ahead of schedule [in Russian]. (Accessed: March 23, 2025.) <https://ase-ec.ru/for-journalists/news/2023/mar/na-pervom-energobloke-aes-ruppur-s-operezheniem-srokov-zaversheny-raboty-po-betonirovaniyu-naruzhnoy/>

³⁴⁴ ASE, March 3, 2023. Installation of transport lock completed at Rooppur NPP Unit 1 [in Russian]. (Accessed: March 23, 2025.) <https://ase-ec.ru/for-journalists/news/2023/mar/na-pervom-energobloke-aes-ruppur-zavershena-ustanovka-transportnogo-shlyuza/>

³⁴⁵ Rosatom State Corporation, July 17, 2023. License issued for delivery of nuclear fuel for Rooppur NPP [in Russian]. (Accessed: March 23, 2025.) <https://web.archive.org/web/20240618075039/https://www.rosatom.ru/journalist/news/vydana-liitsenziya-na-zavoz-yadernogo-topliva-dlya-aes-ruppur/>

³⁴⁶ Atom Media, October 5, 2023. The first batch of nuclear fuel was delivered to the Rooppur NPP in Bangladesh [in Russian]. (Accessed: March 23, 2025.) <https://atommedia.online/2023/10/05/na-aes-ruppur-v-bangladesh-dostavlen/>



Delivery of the first batch of nuclear fuel to the Rooppur NPP site. Source: Rosatom

On March 30, 2024, the hydraulic testing³⁴⁷ of the emergency core cooling system capacity was carried out at the first unit. This test is necessary for the final cleaning of all pipelines from remaining installation debris and to check the operation of the pump units, safety systems, and normal operation systems.

In July 2024, the preparation of the refueling machine for the loading of the simulation zone (163 simulators of fuel assemblies) was completed³⁴⁸ at Unit 1.

On October 21, it was reported that the reactor assembly³⁴⁹ at Unit 1 had been completed. The reactor assembly process included the installation of in-core components such as the shaft

³⁴⁷ Rooppur Horn [Telegram], March 30, 2024. The hydro-accumulator of the emergency core cooling system (ECCS) was flushed at the first power unit of the Rooppur NPP [in Russian]. (Accessed: March 23, 2025.)
https://t.me/rooppur_tube/2467

³⁴⁸ Rosenergoatom, July 26, 2024. Preparation of the refuelling machine for loading the simulation zone has been completed at the first power unit of the Rooppur NPP [in Russian]. (Accessed: March 23, 2025.)
<https://www.rosenergoatom.ru/zhurnalistam/news/46766/>

³⁴⁹ Atom Media, October 21, 2024. Assembly of the reactor has been completed at the first power unit of the Rooppur NPP (Bangladesh) [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/10/21/na-pervom-energobloke-aes-ruppur-ba/>

and baffle, loading of the fuel assembly simulators, installation of the protective tube block and upper block, and installation of the sensors for the start-up measurement system. The next stage is the hydraulic tests, during which the operability of the reactor plant equipment will be checked.

On December 18, Rosatom reported³⁵⁰ the completion of construction and installation works and the transition to the “final phase of preparation for the physical start-up of Unit 1” – the stage where the equipment and mechanisms will be tested, including the first start-up and testing of the main circulation pumps.

It should also be mentioned that Rosatom had hoped³⁵¹ to carry out the physical start-up of Unit 1 in December 2024 (this was mentioned³⁵² as early as August 2024), but this did not happen.

Sanctions and delays

The Rooppur NPP project has been accompanied in recent years by a number of news reports about the impact of financial and logistical sanctions and restrictions on Russian companies on the progress of the project. Additionally, delays have been caused by setbacks in the construction of supporting infrastructure.

Logistical restrictions. In December 2022, a shipment of materials for the nuclear power plant from Russia was not permitted³⁵³ to approach the maritime border of Bangladesh due to diplomatic pressure from the United States. The ship attempted to dock at the Indian port of Haldia to deliver the cargo, but was also denied there. Eventually, it returned to Russia with its cargo.

On February 13, 2023, the government of Bangladesh imposed restrictions³⁵⁴ on the entry of 69 Russian vessels into its territorial waters in accordance with US and EU sanctions. The ban applies to a wide range of vessels, including oil tankers and cargo ships operated by seven companies. In response to these events, the Rosatom press service reported³⁵⁵ that the construction of the Rooppur Nuclear Power Plant is proceeding on schedule, and that cargo deliveries are being organized via an alternative route. The Russian embassy in

³⁵⁰ Atom Media, December 18, 2024. The main construction and installation works have been completed at power unit № 1 of the Rooppur NPP (Bangladesh) [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/12/18/na-energobloke-1-aes-ruppur-bangla/>

³⁵¹ Interfax, January 27, 2024. Rosatom plans physical launches at NPPs in Bangladesh and India this year [in Russian]. (Accessed: March 23, 2025.)
<https://www.interfax.ru/russia/942270>

³⁵² TASS, August 13, 2024. Rooppur NPP in Bangladesh is preparing to launch the reactor of the first power unit [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/21595359>

³⁵³ New Age, December 29, 2022. Bangladesh bars Russian vessel under US sanctions from entering its territory. (Accessed: March 23, 2025.)
<https://www.newagebd.net/article/190263/bangladesh-bars-russian-vessel-under-us-sanction-from-entering-its-territory>

³⁵⁴ The Financial Express, February 13, 2023. Bangladesh bars entry of 69 russian ships after US, EU sanctions. (Accessed: March 23, 2025.)
<https://thefinancialexpress.com.bd/national/bangladesh-bars-entry-of-69-russian-ships-after-us-eu-sanctions>

³⁵⁵ TASS, February 14, 2023. Rosatom has found an alternative route for delivering cargo for the Rooppur NPP in Bangladesh [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/17048497>

Bangladesh confirmed³⁵⁶ the ban on the entry of 69 Russian vessels into the country's ports and also reported³⁵⁷ that in January-February, three ships successfully arrived at the port of Mongla for the delivery of cargo to the construction site of the power plant.

Unprepared infrastructure. On September 4, 2023, the Bangladeshi publication The Business Standard reported³⁵⁸ that sources from both the Bangladesh Atomic Energy Commission (BAEC) and the Power Grid Company of Bangladesh (PGCB) stated that even if the power plant itself is ready by July 2024, it is still uncertain whether the necessary infrastructure for transmitting electricity will be ready by that time. The implementation of the transmission line construction project is expected to take about two years, which means the transmission infrastructure may not be ready until 2025.

Financial sanctions. Meanwhile, due to U.S. financial sanctions, Bangladesh continues to face difficulties servicing the loan received from Russia for the construction of the Rooppur NPP.

On April 13, 2023, it was reported³⁵⁹ that Bangladesh and Russia had agreed to use Chinese yuan for payment settlements and interest on the Russian loan provided for the Rooppur NPP. It was expected that Bangladesh would be able to settle payments with Russia in yuan through Chinese banks, using the Chinese Interbank Payment System (CIPS). By that time, Bangladesh had owed \$318 million, a debt incurred after the cessation of loan payments in March 2022, following Russia's loss of access to the global payment system SWIFT due to Western sanctions.

³⁵⁶ RIA Novosti, February 15, 2023. Embassy in Dhaka confirms ban on port entry for 69 Russian ships [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20230215/bangladesh-1852077777.html?in=t>

³⁵⁷ RIA Novosti, February 15, 2023. Embassy: Rooppur NPP project in Bangladesh is on schedule [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20230215/aes-1852080406.html>

³⁵⁸ The Business Standard, September 4, 2023: Rooppur plant set to face major delay in commissioning. (Accessed: March 23, 2025.) <https://www.tbsnews.net/bangladesh/energy/rnpp-set-face-major-delay-commissioning-694422>

³⁵⁹ The Business Standard, April 13, 2023. Dhaka, Moscow agree to settle Rooppur payments in Chinese yuan. (Accessed: March 23, 2025.) <https://www.tbsnews.net/economy/dhaka-moscow-agree-settle-rooppur-payments-chinese-yuan-616258>



Rooppur Nuclear Power Plant, December 2023. Source: ASE

In September 2024, a source in Bangladesh's Ministry of Finance told³⁶⁰ The Business Standard that, despite having the funds to make loan payments, a method for making the transfers had still not been found. In June, Bangladesh requested Russia to find alternative transaction methods to settle overdue interest, commitment fees, and penalties for late payments, and instead of collecting contributions, to invest funds into new projects, the stock market, or purchase goods in Bangladesh. Russia was not satisfied with this option. By October 2024, around \$809 million had accumulated³⁶¹ in a dedicated account at the Bank of Bangladesh for payments to Russia, but a safe method for making the payments had still not been found.

³⁶⁰ The Business Standard, September 11, 2024. Rooppur power plant: Russia wants \$630m interest paid by 15 Sep. (Accessed: March 23, 2025.) <https://www.tbsnews.net/bangladesh/rooppur-power-plant-russia-wants-630m-interest-paid-15-sep-938446>

³⁶¹ The Daily Star, October 6, 2024. \$800m repayment to Russia in limbo. (Accessed: March 23, 2025.) <https://www.thedailystar.net/business/economy/news/800m-repayment-russia-limbo-3720551>

Since the spring of 2024, Bangladesh has been negotiating³⁶² with Russia, requesting a two-year extension for the loan period. The reasons for this request include the aftermath of the COVID-19 pandemic, international sanctions that have affected direct financial transactions between Bangladesh and Russia and complicated the import of equipment, and delays in the construction of the power transmission line³⁶³ necessary for the industrial operation of the nuclear power plant. All of this led to the plant not being commissioned by the end of 2024, when the loan agreement expired. According to The Business Standard³⁶⁴, as of August 2024, Russia had allocated only \$7.33 billion of the maximum possible loan amount of \$11.38 billion.

As of January 2025, negotiations for the loan extension, as well as finding payment options for the accumulated debt, have not been completed.

Prospects

On April 2, 2024 Likhachev, made a working visit³⁶⁵ to Bangladesh, where he met with the Prime Minister of Bangladesh, Sheikh Hasina. Hasina noted that the government of the Republic is interested in building additional nuclear reactors at the Rooppur site, should the opportunity arise. According to Likhachev, Bangladesh is interested in constructing two more reactors at the site of its first nuclear power plant and is also exploring the possibility of building a multipurpose high-power research reactor in Bangladesh, which could address tasks in the fields of science and nuclear medicine.

However, the main factor of uncertainty for Rosatom's future projects in Bangladesh is the change of government that occurred in mid-2024.

In July 2024, mass protests³⁶⁶ broke out in Bangladesh against the current government. During the suppression of the unrest, hundreds of people were killed, and Prime Minister Sheikh Hasina resigned and left the country. The President of Bangladesh dissolved the parliament. Nobel Peace Prize laureate Muhammad Yunus took the helm of the interim government.

On August 15, Tuhid Hossain, the foreign affairs advisor to the interim government of Bangladesh, assured³⁶⁷ Russian Ambassador to Dhaka Alexander Mantytsky during a meeting that the Bangladeshi authorities would continue cooperation with Russia in areas of mutual interest, "... especially in the implementation of the Rooppur NPP project..."

³⁶² The Business Standard, April 26, 2024: Bangladesh seeks 2-year extension for Rooppur nuke plant loan repayments. (Accessed: March 23, 2025.)
<https://www.tbsnews.net/bangladesh/energy/bangladesh-seeks-2-year-extension-rooppur-nuke-plant-loan-repayments-836701>

³⁶³ Bellona, November 21, 2023. Bellona Atomic Digest. October 2023 [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2023/11/21/atomic-digest-11-23/#09p>

³⁶⁴ The Business Standard, December 5, 2024. Russia to get Rooppur loan payments via Sonali bank account. (Accessed: March 23, 2025.)
<https://www.tbsnews.net/economy/banking/russia-get-rooppur-loan-payments-sonali-bank-account-1010526>

³⁶⁵ Atom Media, April 2, 2024. Rosatom CEO Alexey Likhachev held a working meeting with Prime Minister of the People's Republic of Bangladesh Sheikh Hasina [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/04/02/glava-rosatoma-aleksej-lihachev-prove/>

³⁶⁶ BBC Russian Service, August 8, 2024. Bangladesh temporarily led by Nobel laureate Muhammad Yunus after coup [in Russian]. (Accessed: March 23, 2025.)
<https://www.bbc.com/russian/articles/cdd74jp03mdo>

³⁶⁷ BSS News, August 15, 2024. Bangladesh assures Russia of continuing its cooperation: Tuhid. (Accessed: March 23, 2025.)
<https://www.bssnews.net/news/204063>

However, the investigation into the violations and abuses of the previous government also touched upon the country's first nuclear power plant project. In December, the national anti-corruption commission launched an investigation into allegations of corruption, embezzlement, and money laundering related to the Rooppur nuclear power plant project. The commission's report stated that the ousted Prime Minister Sheikh Hasina³⁶⁸, her son, and her niece had embezzled \$5 billion from the inflated project cost of \$12.65 billion. Rosatom called³⁶⁹ the allegations of theft related to the project false and expressed its readiness to "defend its reputation" in court.

It remains unclear how this investigation and the ongoing political crisis in the country will impact Rosatom's future projects and plans for building new nuclear reactors in Bangladesh.

Iran, Bushehr NPP

General description

On August 25, 1992, Russia and Iran signed two agreements³⁷⁰ – one on cooperation in the peaceful use of nuclear energy and another on the continuation of the construction of the Iranian nuclear power plant near the city of Bushehr in the south of the country. This construction had been initiated in 1975 by the German consortium Kraftwerk Union and was interrupted in 1979 following the onset of the Islamic Revolution. The agreement also provided for³⁷¹ the supply of fuel for the entire operational life of the plant.

In 1995, contracts were signed for the completion and reconstruction of the first unit of the nuclear power plant with a VVER-1000 reactor, as well as for the supply of fuel for the first 10 years of its operation. Subsequently, amendments were made to the agreements regarding the removal of spent nuclear fuel to Russia. In September 2011, the unit was first connected to the grid³⁷². Two years later, it entered commercial operation and was officially handed over to Iran.

In November 2014, a contract was signed for the construction of the second phase of the nuclear power plant, consisting of two units with VVER-1000 reactors (the second unit of the German project is not suitable for completion and is subject to dismantling). The cost of their construction amounted to about \$10 billion³⁷³, with financial support provided by the Iranian customer, the Nuclear Power Production and Development Company of Iran (NPPD). The general contractor is Atomstroyexport.

³⁶⁸ Bellona, August 25, 2023. Bellona Atomic Digest. July 2024 [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2024/08/25/nuclear-digest-07-24/#09p>

³⁶⁹ TASS, December 24, 2024. Rosatom called reports from Bangladesh about corruption at the Rooppur NPP false [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/22758003>

³⁷⁰ TASS, March 25, 2024. What is known about Russia's nuclear projects abroad [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/info/18916163>

³⁷¹ PIR Center, August 8, 2022. Bushehr Nuclear Power Plant [in Russian]. (Accessed: March 23, 2025.)
<https://pircenter.org/2022/08/08/busherskaja-atomnaja-jelektrostantsija/>

³⁷² IAEA Power Reactor Information System (PRIS), March 22, 2025. Bushehr-1. (Accessed: March 23, 2025.)
<https://pris.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=310>

³⁷³ TASS, March 25, 2024. What is known about Russia's nuclear projects abroad [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/info/18916163>

Construction work at the site began in 2017, and in the autumn of 2019, the first concrete was poured for the second unit of the Bushehr Nuclear Power Plant. At the end of 2021, in an interview with RIA Novosti, the Vice President of Iran and Head of the Atomic Energy Organization of Iran, Mohammad Eslami, stated³⁷⁴ that soil reinforcement was underway at Unit 3 in preparation for the foundation concreting.

In addition, Moscow supplies Tehran with the nuclear fuel required for the operation of the first reactor unit and is committed³⁷⁵ to transporting it back to Russia for reprocessing.

Key events of 2023-2024

In September 2024, as part of the parallel program of the IAEA General Conference in Vienna, Iran outlined³⁷⁶ its plans for the development of its peaceful nuclear program and reported on the progress at the Bushehr Nuclear Power Plant. It was announced that preparations for the installation of the core catcher were underway, with the reactor vessel installation planned for about 30 months later (i.e., in 2027), and the physical commissioning of the unit scheduled for 55 months thereafter, which would be in 2029. The pouring of the first concrete for the third unit was planned to be completed by the end of 2024.

Rosatom head Likhachev confirmed³⁷⁷ that that he expected the installation of the core catcher on the second unit and the pouring of concrete for the third unit to be completed by the end of 2024.

However, there has been no news about the pouring of the first concrete for the third unit. The core catcher was reportedly only installed in February 2025³⁷⁸.

Sanctions and Delays

It seems that delays in the Bushehr nuclear power plant project began long before 2022 and are only minimally related to the sanctions imposed on Russia in recent years. At least in terms of various technological and financial restrictions imposed by the West, both Iran and Russia are equally affected.

Another distinctive feature of the ongoing construction of the second phase of the Bushehr nuclear power plant is that it is being carried out without the involvement of Russian loans and is entirely financed by the Iranian side³⁷⁹. The project is estimated to cost nearly \$10 billion.

³⁷⁴ RIA Novosti, October 25, 2023. Iran has begun construction of the new Karoun nuclear power plant [in Russian]. (Accessed: March 23, 2025.)
<https://ria.ru/20231025/aes-1905108058.html>

³⁷⁵ TASS, November 11, 2014. Iran and Russia signed a package of agreements on the construction of eight nuclear power plant units [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/politika/1564819>

³⁷⁶ World Nuclear News, September 27, 2024. Iran outlines nuclear energy plans, including first concrete for Bushehr 3 this year. (Accessed: March 23, 2025.)
<https://www.world-nuclear-news.org/articles/iran-aims-for-first-concrete-for-bushehr-3-by-end-of-year>

³⁷⁷ TASS, September 30, 2024. A "melt trap" will be installed at the second unit of the Bushehr NPP in Iran as early as 2024 [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/22002671>

³⁷⁸ Eghtesad news, February 16, 2025. Detailed information about important equipment installed at Bushehr NPP Unit 2 [in Persian]. (Accessed: March 23, 2025.)
<https://www.eghtesadnews.com/مشروبات-هنگام-دانش-بصن-مهم-تاز-یه-ج-ت-نای-یز-ج-61/704591-د-ن-اس-ر-ی-اس-ر-اب-خ-اش-خ-ب>

³⁷⁹ Kommersant, September 6, 2016. Rosatom begins construction of Bushehr-2 NPP [in Russian]. (Accessed: March 23, 2025.)
<https://www.kommersant.ru/doc/3082547>

In June 2021, the head of the Atomic Energy Organization of Iran (AEOI), Ali Akbar Salehi, stated³⁸⁰: “At the moment, we owe Russia 500 million euros [for the work on the construction of the Bushehr-2 nuclear power plant]. As for the Bushehr-1 nuclear plant, which is currently generating electricity, we have not yet paid the Russian side for the fuel for it.” Salehi added that “the country is in a unique financial situation at present.”

In May 2023, Russian Deputy Prime Minister Alexander Novak reported³⁸¹ that Russia and Iran had resolved the outstanding debt issues related to the construction of the Bushehr nuclear power plant. The debt had been reduced³⁸², and the project was continuing as planned. Novak also mentioned that discussions were underway regarding future financing mechanisms for the project, which could involve various currencies, budgetary or commercial loans. In 2022, Novak had stated that Iran had made partial payments toward the debt for the Bushehr project at the end of 2021 and the beginning of 2022.



Bushehr Nuclear Power Plant. The first operating power unit of the plant is visible at the top left with a white dome. At the bottom right is the site with two new units. Satellite image from Google Maps in 2024.

³⁸⁰ TASS, June 26, 2021. Iran owes Russia €500 million for construction of Bushehr NPP [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/11762063>

³⁸¹ TASS, May 17, 2023. Russia and Iran have resolved issues regarding debt to Rosatom for the construction of the Bushehr NPP [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/17772273>

³⁸² AtomInfo, May 17, 2003. Iran Reduces Debt to Rosatom for Construction of Bushehr Nuclear Power Plant [in Russian]. (Accessed: March 23, 2025.)
<http://atominfo.ru/newsz06/a0376.htm>

According to the Iranian publication Eghtesad News³⁸³, due to significant delays in 2020–2021, the project was severely behind the original schedule. According to the initial timeline, the pouring of concrete for the third unit was supposed to begin 18 months after the second unit (i.e., in 2021). The launch of the second unit, originally planned for 2025, has now been postponed to 2029, while the third unit's launch is now set for 2031.

On January 17, 2025, during the visit of Iranian President Masoud Pezeshkian to Moscow, Vladimir Putin commented³⁸⁴ on the progress of the construction of the second phase of the Bushehr nuclear power plant. "Yes, things are being shifted forward a little, and this is related to calculations, payments, there are no secrets from anyone here. However, the work is underway, it is moving forward. Thousands of people are already working at these sites. And about 80% of the construction work is being carried out by local companies. This is a large, serious job. It is moving forward," said Putin.

Prospects

During the meeting between the leaders of Iran and Russia on January 17, 2025, it was noted³⁸⁵ that the two sides discussed the possibilities of constructing additional nuclear reactors in Iran. According to agreements³⁸⁶ signed in 2014, alongside contracts for the construction of two new units at the Bushehr nuclear power plant, the parties are considering the possibility of building two more units at this site, as well as an additional four reactors at other locations.

Nuclear fuel for the Iranian nuclear power plants throughout the entire operational life of the new reactors will be produced in Russia³⁸⁷, and the spent nuclear fuel will be returned to Russia for reprocessing and storage.

In total, Iran aims³⁸⁸ to have a nuclear capacity of 20 GW by 2040. If all plans for the construction of up to 8 new Russian reactors (in addition to the existing first reactor at the Bushehr nuclear power plant) are realized, Russia's contribution to Iran's nuclear program will account for nearly half of this capacity.

Currently, in addition to the Bushehr nuclear power plant site, construction has begun on two new nuclear power plants in Iran. In December 2022³⁸⁹, work started on the construction of a 300 MW nuclear reactor at the site in Darkhovin, on the Karun River in the Khuzestan province, based on an Iranian project (Karun Nuclear Power Plant).

³⁸³ Eghtesad news, February 6, 2025. Bushehr NPP Unit 2 successfully equipped [in Persian]. (Accessed: March 23, 2025.) <https://www.eghtesadnews.com/دش-ماچن-استی-قیف-سوم-اب-ر-ش-وب-هاگور-ین-مورد-د-ح-ا-و-زی-ه-جت-61-702829-ادن-اس-ری-اس-ر-اب-خ-اش-خ-ب>

³⁸⁴ RIA Novosti, January 17, 2025. Putin comments on construction of two units of Bushehr NPP [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20250117/putin-1994249249.html>

³⁸⁵ RIA Novosti, January 17, 2025. Moscow and Tehran discuss construction of new nuclear power units in Iran [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20250117/putin-1994252375.html>

³⁸⁶ TASS, November 11, 2014. Iran and Russia signed a package of agreements on the construction of eight nuclear power plant units [in Russian]. (Accessed: March 23, 2025.) <https://tass.ru/politika/1564819>

³⁸⁷ TASS, November 11, 2014. Iran and Russia signed a package of agreements on the construction of eight nuclear power plant units [in Russian]. (Accessed: March 23, 2025.) <https://tass.ru/politika/1564819>

³⁸⁸ World Nuclear News, September 27, 2024. Iran outlines nuclear energy plans, including first concrete for Bushehr 3 this year. (Accessed: March 23, 2025.) <https://www.world-nuclear-news.org/articles/iran-aims-for-first-concrete-for-bushehr-3-by-end-of-year>

³⁸⁹ World Nuclear News, August 7, 2023. AEOI chief outlines Iranian nuclear energy targets. (Accessed: March 23, 2025.) <https://www.world-nuclear-news.org/articles/aeoi-head-outlines-iranian-nuclear-targets>

On February 1, 2024, a ceremony was held³⁹⁰ to mark the beginning of work at the site in the Hormozgan province, where the Sirik Nuclear Power Plant (named after the nearby city of Sirik) is planned to be built. The plant will consist of four III+ generation reactors, each with a capacity of 1,250 MW. According to Mohammad Eslami, head of the Atomic Energy Organization of Iran (AEOI), the project will involve an investment of \$15 billion³⁹¹. He also stated that the project will be implemented by local specialists³⁹².

Details about the project under which these power units will be built, and whether it will be an Iranian or foreign project, have not been specified. Russia has also not officially commented on the commencement of construction of this NPP. Information about the Sirik and Karun NPPs is also absent³⁹³ from the IAEA database, which could indicate that the work on these sites is currently limited to site preparation.

However, the Iranian press, specifically the publication IRNA, reported in February 2024³⁹⁴ that the construction of the Sirik NPP will be financed through Iranian government funds, a Russian credit line, and external sources of financing. According to the publication, construction work began after the visit of the President of Iran to Russia [the most recent visit was in December 2023³⁹⁵ – note by Bellona], where agreements were reached on the allocation of the necessary credit line for the project. The publication also reports that the construction and operation of the Sirik NPP will be carried out in cooperation with international contractors.

Thus, although there is no official information on the level of Russia's involvement in this project, it cannot be ruled out. It is possible that the Sirik NPP is the second "Russian" site in Iran, a possibility that is allowed by the agreements³⁹⁶ signed in 2014. This is especially likely given that the declared capacity of the units at this NPP (according to different sources, "at least 1200 MW" or exactly "1250 MW") and their classification as Generation III+ units closely match the capacity and description of Russian VVER-1200 (1200 MW) and VVER-TOI (1250 MW) reactors, which Russia is already building both domestically and abroad, and offers to potential clients.

³⁹⁰ World Nuclear News, February 2, 2024. Iran announces start of work at new plant site. (Accessed: March 23, 2025.)
<https://www.world-nuclear-news.org/articles/iran-announces-start-of-work-at-new-plant-site>

³⁹¹ World Nuclear News, February 2, 2024. Iran announces start of work at new plant site. (Accessed: March 23, 2025.)
<https://www.world-nuclear-news.org/articles/iran-announces-start-of-work-at-new-plant-site>

³⁹² Islamic Republic News Agency, February 1, 2024. New Sirik NPP to be built by local experts [in Russian]. (Accessed: March 23, 2025.)
<https://ru.irna.ir/news/85373248>

³⁹³ IAEA Power Reactor Information System (PRIS), March 22, 2025. Iran, Islamic Republic of. (Accessed: March 23, 2025.)
<https://pris.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=IR>

³⁹⁴ Islamic Republic News Agency, February 1, 2024. Construction of Iran's nuclear power plant begins in Sirik [in Persian]. (Accessed: March 23, 2025.)
<https://www.irna.ir/news/85372493/دش-زاغ-اکیری-س-رد-زمره-ناری-ای-مت-ا-گوری-ن-ی-ار-ج-است-ای-لم-ع>

³⁹⁵ Vedomosti, December 8, 2023. What Putin Talked to Raisi About for Five Hours in the Kremlin [in Russian]. (Accessed: March 23, 2025.)
<https://www.vedomosti.ru/politics/articles/2023/12/08/1009990-o-chem-putin-pyat-chasov-govoril>

³⁹⁶ TASS, November 11, 2014. Iran and Russia signed a package of agreements on the construction of eight nuclear power plant units [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/politika/1564819>

Projects in Latin America

According to Rosatom representatives³⁹⁷, the company is considering the possibility of building small nuclear reactors in Chile, El Salvador, and Argentina. However, all these projects are still far from being concrete.

In March 2023, Rosatom signed³⁹⁸ an intergovernmental agreement with Nicaragua on cooperation in the field of non-energy applications of nuclear technologies for peaceful purposes. In March 2024, a roadmap for the construction of a nuclear medicine center in the country was signed with a department of Nicaragua's Ministry of Health.

According to Rosatom representatives³⁹⁹, the company also supplies enriched uranium for the Mexican nuclear power plant. However, at present, Rosatom's largest nuclear projects in the region are concentrated in Bolivia and Brazil. The company's Latin American office, Rosatom Latin America, is located in Rio de Janeiro, Brazil.

Bolivia

In 2016, an agreement⁴⁰⁰ was signed for Rosatom to construct the Nuclear Research and Technology Center (NRTC) in Bolivia. The center, featuring a Russian research nuclear reactor with a capacity of 200 kW, was initially expected to be completed by 2019, with an estimated cost of \$300 million⁴⁰¹. However, actual construction only began in 2021.

The 200 kW pool-type research reactor will be one of three key components of the NRTC. In addition to the reactor, the center includes⁴⁰² a cyclotron complex for producing radiopharmaceuticals for clinical research and a multipurpose irradiation center for agricultural product processing, both of which have already been put into operation, according to Rosatom⁴⁰³.

³⁹⁷ TASS, July 22, 2024. Rosatom may build nuclear reactors in Chile, El Salvador and Argentina [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/21422601>

³⁹⁸ RAOS, March 29, 2023. Russia and Nicaragua signed an agreement on cooperation in the field of non-energy use of nuclear technologies [in Russian]. (Accessed: March 23, 2025.)
<https://rusatom-overseas.com/ru/media/news/rossiya-i-nikaragua-podpisali-soglasenie-o-sotrudnichestve-v-sfere-neenergeticheskogo-ispolzovaniya.html>

³⁹⁹ Strana Rosatom, July 22, 2024. Opening up Latin America: Ivan Dybov on the importance of the region for Rosatom [in Russian]. (Accessed: March 23, 2025.)
<https://strana-rosatom.ru/2024/07/22/otkryt-latinskuju-ameriku-ivan-dybov/>

⁴⁰⁰ REIN, August 13, 2016. Rosatom and the Bolivian Atomic Energy Agency signed contracts for the project to build a Nuclear Research and Technology Center in the country [in Russian]. (Accessed: March 23, 2025.)
[https://rusatom-energy.ru/media/rosatom-news/rosatom-i-agentstvo-po-atomnoj-energii-bolivii-podpisali-kontrakty-po-proektu-sooruzheniya-v-strane-/](https://rusatom-energy.ru/media/rosatom-news/rosatom-i-agentstvo-po-atomnoj-energii-bolivii-podpisali-kontrakty-po-proektu-sooruzheniya-v-strane/)

⁴⁰¹ Latin American Center for Investigative Journalism (CLIP), August 7, 2023. Rosatom, Russia's nuclear agency, and its information strategy to win bids in Latin America. (Accessed: March 23, 2025.)
<https://www.elclip.org/rosatom-rusia-elecciones-bolivia-nicaragua/?lang=en>

⁴⁰² Bolivian Atomic Energy Agency. Goal [in Spanish]. (Accessed: March 23, 2025.)
https://aben.gob.bo/index.php/informacion_institucional/-OBJETIVO.1406.html

⁴⁰³ Rosatom State Corporation, March 13, 2023. Radiopharmaceutical production complex built by Rosatom starts medical supplies to Bolivian clinics. (Accessed: March 23, 2025.)
<https://www.rosatom.ru/en/press-centre/news/radiopharmaceuticals-production-complex-built-by-rosatom-starts-medical-supplies-to-bolivian-clinics/>

On August 13, 2023, the reactor vessel for the research nuclear reactor was delivered⁴⁰⁴ to Brazil. The Bolivian Agency for Nuclear Energy (ABEN) expected to complete the vessel's installation by the end of the year and planned the reactor's final commissioning for 2025.

In October 2024, the Novosibirsk Chemical Concentrates Plant (NZHK) of Rosatom produced the first nuclear fuel⁴⁰⁵ for the initial loading of Bolivia's research reactor. The fuel delivery is scheduled for 2025.

In addition to implementing the CNIRT project, Rosatom, through its mining subsidiary Uranium One Group, signed a framework agreement⁴⁰⁶ with the Bolivian state company YLB (Bolivian Lithium Deposits) in July 2023, followed by a contract⁴⁰⁷ in September 2024 for the development of a lithium deposit in Bolivia. Investments in the project are expected to amount to approximately \$600 million. The launch of the first industrial facility is planned for the second half of 2025, with a phased expansion of production capacity to reach an annual output of up to 14,000 tons of lithium carbonate.

Brazil

In December 2022, Internexco GmbH, a subsidiary of Techsnabexport (part of Rosatom), and the Brazilian state company Industrias Nucleares do Brasil (INB) signed a contract⁴⁰⁸ for the supply of enriched uranium to fully meet the fuel needs of Brazil's only nuclear power plant, Angra, for the period 2023–2027.

Under the contract⁴⁰⁹, Internexco will supply Brazil with 330 tons of uranium hexafluoride and carry out uranium enrichment totaling more than 1 million SWU, with a contract value exceeding \$140 million.

The contract was awarded through an open international tender, which concluded in August 2022. It marks Rosatom's first long-term contract with Brazil for the supply of enriched uranium products.

In May 2023, Rosatom also signed⁴¹⁰ a contract with INB for the supply of natural uranium to Brazil. Additionally, in 2023, a five-year contract⁴¹¹ was signed with Brazil for the supply of medical products by the Isotope association (part of Rosatom).

⁴⁰⁴ Luis Alberto Arce Catacora [Twitter], August 13, 2023 [in Spanish].
<https://x.com/LuchoXBolivia/status/1690736526756315136>

⁴⁰⁵ JSC TVEL, October 28, 2024. Rosatom has manufactured nuclear fuel for the first time for a research reactor in Bolivia [in Russian]. (Accessed: March 23, 2025.)
https://www.tvcl.ru/press-center/news/?ELEMENT_ID=13919

⁴⁰⁶ Techsnabexport, June 30, 2023. Rosatom company and YLB sign cooperation agreement in lithium mining and production in Bolivia [in Russian]. (Accessed: March 23, 2025.)

<https://www.tenex.ru/media-center/news/kompaniya-rosatoma-i-ylb-podpisali-soglashenie-o-sotrudnichestve-v-oblasti-dobychi-i-proizvodstva-li/>

⁴⁰⁷ Atom Media, September 11, 2024. Rosatom and YLB strengthen cooperation in industrial development of lithium [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/09/11/kompaniya-rosatoma-i-ylb-ukreplyajut-sotr/>

⁴⁰⁸ Techsnabexport, December 6, 2022. Rosatom to Supply Uranium Products to Latin America [in Russian]. (Accessed: March 23, 2025.)
<https://www.tenex.ru/media-center/news/rosatom-postavit-uranovuyu-produktsiyu-v-latinskuyu-ameriku/>

⁴⁰⁹ TASS, October 29, 2022. Rosatom to supply Brazil with raw materials for nuclear power plants [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/16191831>

⁴¹⁰ Rosatom State Corporation, May 5, 2023. Rosatom took part in the international conference Nuclear Trade and Technology Exchange in Brazil [in Russian]. (Accessed: March 23, 2025.)
<https://web.archive.org/web/20240521125606/https://rosatom.ru/journalist/news/rosatom-prinyal-uchastie-v-mezhdunarodnoy-konferentsii-nuclear-trade-and-technology-exchange-v-brazi/>

⁴¹¹ Rosatom State Corporation, January 22, 2024. Rosatom increased annual exports of isotope products by 15% [in Russian]. (Accessed: March 23, 2025.)
<https://rosatom.ru/journalist/news/rosatom-na-15-uvlichil-godovoy-eksport-postavok-izotopnyy-produktsii/>

Projects in Central and Southern African countries

In July 2023, Russia hosted the Russia-Africa Forum in Moscow, during which two intergovernmental agreements on cooperation in the peaceful use of nuclear energy were signed with Burundi⁴¹² and Zimbabwe⁴¹³. These agreements include the development of legal regulations in the field of nuclear and radiation safety, conducting fundamental and applied research in the peaceful use of nuclear energy, the production of radioisotopes and their use in industry, medicine, and agriculture, cooperation in the application of radiation technologies and nuclear medicine, as well as the training and preparation of specialists for the nuclear industry.

In October 2023, during the 6th Russian Energy Week Forum in Moscow, Rosatom signed memorandums of understanding on cooperation in the peaceful use of nuclear energy with Burkina Faso⁴¹⁴ and Mali⁴¹⁵. In March 2024, these agreements were further developed when roadmaps were signed⁴¹⁶ at the Atomexpo-2024 forum in Sochi, covering three areas: human resources development, nuclear infrastructure, and fostering a positive attitude towards nuclear energy in these African countries. Three months later, in June 2024, during the St. Petersburg International Economic Forum (SPIEF-2024), memorandums were signed⁴¹⁷ with Burkina Faso in these areas. Similar memorandums with Mali were signed in July 2024 during a visit to the country by a Rosatom delegation⁴¹⁸ and a meeting with the President of Mali. According to Rosatom, the meeting discussed plans for constructing a small nuclear power plant in the country, as well as projects in geological exploration and solar energy generation.

Cooperation with Ethiopia advanced a little further in December 2024, when Rosatom and the Ethiopian Ministry of Innovation and Technology signed a contract⁴¹⁹ for a technical and economic feasibility study (TEO) for the construction of a Nuclear Science and Technology

⁴¹² Rosatom State Corporation, July 27, 2023. Russia and Burundi signed an intergovernmental agreement on cooperation in the field of peaceful uses of nuclear energy [in Russian]. (Accessed: March 23, 2025.)
<https://web.archive.org/web/20231010121313/https://rosatom.ru/journalist/arkhiv-novostey/rossiya-i-burundi-podpisali-mezhpravsovlashenie-o-sotrudnichestve-v-oblasti-ispolzovaniya-atomnoy-er/>

⁴¹³ Rosatom State Corporation, July 27, 2023. Russia and Zimbabwe signed an intergovernmental agreement on cooperation in the field of peaceful uses of nuclear energy [in Russian]. (Accessed: March 23, 2025.)
<https://web.archive.org/web/20240908074442/https://rosatom.ru/journalist/news/rossiya-i-zimbabwe-podpisali-mezhpravsovlashenie-o-sotrudnichestve-v-oblasti-ispolzovaniya-atomnoy-e/>

⁴¹⁴ Rosatom State Corporation, October 13, 2023. Russia and Burkina Faso signed a Memorandum of Understanding on cooperation in the field of peaceful uses of atomic energy [in Russian]. (Accessed: March 23, 2025.)
<https://web.archive.org/web/20240224171540/https://www.rosatom.ru/journalist/arkhiv-novostey/rossiya-i-burkina-faso-podpisali-memorandum-o-vzaimoponimanii-po-sotrudnichestvu-v-oblasti-ispolzova/>

⁴¹⁵ Interfax, October 13, 2023. Russia and Mali agree to cooperate in the peaceful use of nuclear energy [in Russian]. (Accessed: March 23, 2025.)
<https://www.interfax.ru/russia/925830>

⁴¹⁶ Strana Rosatom, March 29, 2024. Cooperation record: over 70 agreements signed at Atomexpo-2024 [in Russian]. (Accessed: March 23, 2025.)
<https://strana-rosatom.ru/2024/03/29/rekord-sotrudnichestva-na-atomeksp/>

⁴¹⁷ Atom Media, June 5, 2024. Rosatom and Burkina Faso begin cooperation in a number of areas of preparation for the development of nuclear technologies [in Russian]. (Accessed: March 23, 2025.)
<https://atommedia.online/2024/06/05/rosatom-i-burkina-faso-nachinajut-sotru/>

⁴¹⁸ TASS, July 3, 2024. Rosatom and Mali discuss project to build low-power nuclear power plants [in Russian]. (Accessed: March 23, 2025.)
<https://tass.ru/ekonomika/21265867>

⁴¹⁹ Strana Rosatom, December 4, 2024. Rosatom may build a nuclear science and technology center in Ethiopia [in Russian]. (Accessed: March 23, 2025.)
<https://strana-rosatom.ru/2024/12/04/rosatom-mozhet-postroit-centr-yader/>

Center (NSTC). This was preceded by the signing⁴²⁰ of a roadmap for 2023–2025 in the summer of 2023, aimed at developing Russian–Ethiopian cooperation in the peaceful use of nuclear energy. The roadmap includes, in addition to the NSTC, the exploration of opportunities for constructing either a large or small nuclear power plant.

Rosatom also has extensive plans and projects for mineral extraction on the African continent.

In Tanzania, uranium extraction is planned to begin in the coming years at the Nyota deposit as part of the “Mkuju River” project, with a resource reserve of 152 million tons of ore. In the summer of 2023, Rosatom announced⁴²¹ that during the pilot industrial operation phase, 5 tons of “yellowcake” will be extracted, with the project expected to reach an annual capacity of 3,000 tons. The corporation also noted that the pilot plant is expected to be completed and put into operation by 2023. However, there have been no updates on the commencement of extraction so far.

In Namibia, Rosatom plans to begin uranium extraction in 2029 as part of the “Wings” project, which is being implemented through its subsidiary Headspring Investments (part of the Uranium One group). According to Rosatom⁴²², exploration work is expected to be completed by 2026, with uranium extraction set to begin in 2029 and last for more than 25 years. The estimated investment in the project is up to \$500 million, with an annual production target of 3,000 tons of uranium.

The situation in Niger remains unpredictable and unstable. In the summer of 2023, a coup took place, with a military junta coming to power. The junta severed military agreements with the USA and France and suspended uranium exports. Niger accounts for about 5% of global uranium production⁴²³, and its uranium exports covered up to 25% of the European Union’s uranium needs until 2022.

At the same time, the military junta has relatively good relations with Russia. In March 2024, a delegation from Niger even attended⁴²⁴ the Atomexpo forum in Sochi for the first time, organized with the support of Rosatom.

On June 3, 2024, Bloomberg, citing anonymous informed sources (both from Moscow and the West), reported⁴²⁵ that Russia was seeking to take control of uranium assets in Niger that

⁴²⁰ Rosatom State Corporation, July 28, 2023. Russia and Ethiopia begin cooperation in the field of peaceful atom [in Russian]. (Accessed: March 23, 2025.) <https://web.archive.org/web/20240618083807/https://www.rosatom.ru/journalist/arkhiv-novostey/rossiya-i-efiopiya-nachinayut-sotrudnichestvo-v-oblasti-mirnogo-atoma/>

⁴²¹ RIA Novosti, July 19, 2023. Rosatom plans to start uranium mining in Tanzania in 2023–2025 [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20230719/rosatom-1884971501.html>

⁴²² RIA Novosti, July 19, 2023. Rosatom plans to start uranium mining in Namibia in 2029 [in Russian]. (Accessed: March 23, 2025.) <https://ria.ru/20230719/uran-1884970829.html>

⁴²³ World Nuclear Association, July 23, 2024. Uranium in Niger. (Accessed: March 23, 2025.) <https://world-nuclear.org/information-library/country-profiles/countries-g-n/niger>

⁴²⁴ Atom Media, March 25, 2024. The XIII International Forum “ATOMEXPO–2024” has opened [in Russian]. (Accessed: March 23, 2025.) <https://atommedia.online/2024/03/25/otkritie-foruma/>

⁴²⁵ Bloomberg, June 3, 2024. Russia is said to seek French-held uranium assets in Niger. (Accessed: March 23, 2025.) <https://www.bloomberg.com/news/articles/2024-06-03/russia-said-to-seek-takeover-of-france-s-uranium-assets-in-niger>

belong to the French state company Orano. However, Rosatom denied this information⁴²⁶, stating that it had no plans to acquire Orano's assets. Orano also stated⁴²⁷ that they were unaware of any discussions between Russia and Niger regarding this matter.

Projects in Asian countries

In addition to large nuclear power plant projects in China, India, and Bangladesh, Rosatom has projects with other Asian countries.

For many years, Rosatom has been a supplier of enriched uranium to South Korea, delivering between 150 and 250 tons annually, according to an analysis by Bellona based on data from the international trade service Comtrade⁴²⁸. Since 2022, South Korea has been one of the four largest buyers of Russian uranium, along with the USA, France, and China.

Rosatom has also begun⁴²⁹ updating its agreements with Vietnam regarding the construction of the Ninh Thuan-1 nuclear power plant, work on which was suspended in 2016. The decision to return to the issue of building the Ninh Thuan-1 NPP was made during a visit of Russian Prime Minister Mikhail Mishustin and a Russian delegation to Hanoi in January 2025.

In 2010, Vietnam signed an intergovernmental agreement with Russia for the construction of the Ninh Thuan-1 nuclear power plant with two reactors with a total capacity of 2.4 GW. It was expected that Russia would provide a loan of \$8 billion to Vietnam for this project. The plan was for construction to begin in 2017 and be completed by 2023-2024. However, in November 2016, the National Assembly of Vietnam approved⁴³⁰ the decision to abandon building an NPP in partnership with Russia due to a shortage of funds.

Conclusions and forecasts for Chapter 3

Rosatom is carrying out its major international projects in the Global South. These include the 19 NPP units under construction (in China, India, Turkey, Egypt, Bangladesh, and Iran), research reactor and nuclear center projects (in Bolivia, with negotiations ongoing in Nicaragua), and uranium mining projects (in Namibia and Tanzania), as well as lithium projects (in Bolivia). Furthermore, most of the export nuclear power plant projects include contracts for the supply of nuclear fuel for the entire life cycle, followed by the transportation of spent

⁴²⁶ TASS, June 4, 2024. Rosatom denies information about its intention to buy Orano's uranium mining assets in Niger [in Russian]. (Accessed: March 23, 2025.) <https://tass.ru/ekonomika/20991835>

⁴²⁷ Nuclear Engineering International, June 7, 2024. Rosatom denies reports of plans to acquire French uranium assets in Niger. (Accessed: March 23, 2025.) <https://www.neimagazine.com/news/rosatom-denies-reports-of-plans-to-acquire-french-uranium-assets-in-niger>

⁴²⁸ UN Comtrade Database. (Accessed: March 23, 2025.) <https://comtradeplus.un.org/>

⁴²⁹ Vedomosti, January 15, 2025. Rosatom Updates Ninh Thuan-1 NPP Construction Project in Vietnam [in Russian]. (Accessed: March 23, 2025.) <https://www.vedomosti.ru/business/news/2025/01/15/1086282-rosatom-aktualiziruet-proekt-aes-ninthuan-1-vo-vetname>

⁴³⁰ Vedomosti, November 22, 2016. Vietnam has abandoned nuclear power plants in favor of investing in infrastructure [in Russian]. (Accessed: March 23, 2025.) <https://www.vedomosti.ru/business/news/2016/11/22/666462-vietnam-aes>

fuel back to Russia for reprocessing and storage. Rosatom also supplies enriched uranium for fuel fabrication in countries such as China, Brazil, and South Korea.

Most of the Global South countries where Rosatom is implementing its projects are classified by Russia as “friendly countries,”⁴³¹ which are seen as allies in the current geopolitical context. In 2023, out of Rosatom’s foreign revenue of 16.2 billion dollars, more than 12 billion dollars came from the markets of these “friendly nations”⁴³².

Among Russia’s “unfriendly countries”⁴³³ in the Global South, Rosatom maintains ties with South Korea, to which it supplies enriched uranium, just as it does to its main “enemies” in the Kremlin’s view – the USA and the EU. South Korean state companies are also involved as major subcontractors in the Egyptian El Dabaa nuclear power plant project. However, NATO member countries such as Turkey and Hungary, where Rosatom is carrying out nuclear power plant construction projects, are not considered unfriendly by Russian authorities.

It is evident that this balance of power has not emerged in the past 2-3 years but much earlier. Nuclear power plant construction projects, which are often the largest intergovernmental projects between Russia and the customer country (this is also true for most other nuclear power projects, including those in the West), involve long-term and large-scale cooperation between countries and could not have emerged without a certain level of confidence in stable and relatively favorable political relations between these nations.

Therefore, the recent deterioration of relations between Russia and Western countries has had little impact on Rosatom’s largest foreign projects, as they are not being implemented in the EU or the USA. Especially since even Rosatom’s nuclear fuel projects with Western countries have been weakly affected by official sanctions.

However, Western sanctions on Russia, particularly targeting its financial system and transportation infrastructure, have impacted Rosatom’s foreign projects in friendly countries.

Rosatom is carrying out its largest projects – nuclear power plant construction – under several schemes:

- Almost full financing through Russian state loans (e.g., the Rooppur nuclear power plant in Bangladesh, the El Dabaa nuclear power plant in Egypt). These projects are potentially the most vulnerable to pressure on international financial operations with Russia.
- The BOO (Build-Own-Operate) model, where Rosatom remains the owner and operator of the plant (e.g., the Akkuyu nuclear power plant in Turkey).
- Projects financed by the customer (e.g., China, India, and partly Iran), where the majority of

⁴³¹ Government of the Russian Federation, September 20, 2023. Order of September 20, 2023 № 2530-r [in Russian]. (Accessed: March 23, 2025.) <http://static.government.ru/media/files/poYm9h7cdAtDOA3cLrou3zAf0tYpIShV.pdf>

⁴³² Rosatom State Corporation, 2023. Public report. Part 2. Business development report [in Russian]. (Accessed: March 23, 2025.) https://www.report.rosatom.ru/go/rosatom/go_rosatom_2023/app/rosatom_2023_2.pdf

⁴³³ TASS, September 20, 2024. Mishustin approved a list of countries imposing destructive attitudes [in Russian]. (Accessed: March 23, 2025.) <https://tass.ru/politika/21919173>

the financing is provided by the host country. These projects have a high level of localization and involvement of the local nuclear industry.

The third scheme, especially in China and India, proves to be the least sensitive to Western sanctions on Russia as a whole. At the same time, such projects cannot be fully considered purely Russian, which is evident in the differing dynamics of project development in China and India. These projects and this level of interaction largely involve the transfer of Russian technologies, the relocation of industries (including in the nuclear fuel sector), and the growth of the technological capabilities of the host countries.

On the one hand, this could lead to the growth of nuclear cooperation in the future (attempts at this are already seen within the BRICS+ countries) and even the emergence of Russian-Chinese and Russian-Indian joint nuclear proposals for third-party countries. On the other hand, it could lead to greater competition for Rosatom in foreign markets from the growing nuclear industries of its allies.

Both scenarios are not mutually exclusive, and both will be more likely in the future as more sanctions pressure is placed on the Russian economy and Rosatom. Such pressure will reduce Russia's ability to make generous credit offers and fully independent implementation of foreign nuclear projects (especially without cooperation with Western suppliers), which will weaken the competitive advantages of purely Russian proposals in new markets.

Overall, despite the sanctions and geopolitical challenges, Rosatom maintains strong positions in the Global South, developing strategic projects and securing long-term presence in key markets. However, we may assume that Russian nuclear exports for nuclear power plant construction will increasingly develop in cooperation with China. In this regard, the upcoming selection results for developers of new nuclear power plants in Kazakhstan and Turkey may be telling.

Conclusion

In the present report, Bellona has provided an overview and shared its opinion on the activities, engagement, and some of the results of the functioning of the Russian state corporation Rosatom in 2023–2024. During this period, the corporation's activities were determined by geopolitical and internal Russian conditions, as well as transnational economic and political relations, international sanctions, and other circumstances caused by the war Russia unleashed in Ukraine. As for the internal political and economic conditions in Russia, we may say that they were quite favorable for Rosatom. According to official sources, the domestic nuclear energy sector appears stable and not particularly susceptible to any adverse effects caused by the war.

Russia actively uses its nuclear agency for political purposes, often compromising economic interests, which is why Rosatom's foreign projects are often more motivated by political intentions than economic ones. It is no secret that the "BOO" (Build-Own-Operate) model of nuclear power plant construction, which Rosatom actively offers, puts the country commissioning such a project into long-term and deep economic and technological dependence. As a result, many countries, understanding the goals of Russian nuclear business, try to seek alternative partners to avoid political motivation and dependence. A striking example of this was the nuclear energy summit, which for the first time in history took place in March 2024 in Brussels. High-ranking representatives from 30 countries and the European Union attended the summit. This was the first time a nuclear energy summit was organized with the participation of heads of state, providing them with an opportunity to express their views on the role of nuclear technologies and their stance on their use. Russia was probably not invited to the summit due to the unwillingness to welcome it to the event and the current reluctance to cooperate in the nuclear field. While the Russian aggression in Ukraine was not discussed at the summit, participants actively emphasized the importance of "resisting the politicization of the peaceful use of nuclear energy." The head of the IAEA, Grossi, reiterated⁴³⁴ that nuclear energy should not be a political pawn. On the one hand, it is clear that the political use of nuclear energy, as exemplified by Rosatom, is unacceptable. On the other hand, "maneuvering" between political realities and energy possibilities is becoming difficult and, as shown by the war in Ukraine, sometimes even impossible. Therefore, much

⁴³⁴ IAEAvideo [Youtube], March 21, 2024. Livestream of Nuclear Energy Summit 2024. (Accessed: March 23, 2025.)
https://youtu.be/5XtS88WdlLM?list=PLCsYX9QVCDTFP_kFCBTQAUD42_Ld1obq3&t=16256

attention at the summit was given to how supply chains in the nuclear energy sector could be altered to reduce dependence on nuclear fuel and other supplies from Russia. This issue was of particular concern to the United States, where, in March 2024, a law was passed⁴³⁵ allocating \$2.7 billion⁴³⁶ to fund the domestic production of nuclear fuel in the U.S., which had previously been the largest buyer of enriched Russian uranium.

Rosatom is discussing plans to expand nuclear energy in Russian regions where nuclear power plants are not yet present. There has been active discussion to the effect that by 2065, Rosatom would have to shut down 35 of its Russian reactors and build new ones. Starting from 2045, these new reactors are expected to contribute at least 25% of the country's electricity balance from nuclear power, as instructed by President Putin. According to Rosatom's calculations, the last reactor (out of the 35 to be decommissioned) will need to be decommissioned by 2093, with a "green meadow" left in its place⁴³⁷. The fund for decommissioning, which is replenished by contributions from operating reactors, is expected to need around 2,060 billion rubles for the decommissioning of all 35 reactors, excluding the costs of managing spent nuclear fuel (SNF) and radioactive waste, as well as the costs of extending the service life of RBMK reactors⁴³⁸. However, according to the managing company of the fund, a funding shortfall of 1,844 billion rubles is expected in 2093⁴³⁹. Given that Rosenergoatom is considering extending the operation⁴⁴⁰ of the Kola Nuclear Power Plant until 2038 and postponing the decommissioning of the third and fourth reactors at the Leningrad Nuclear Power Plant from 2025 to 2030, the introduction of new capacity faces difficulties. While it's hard to list all the reasons, the main challenges likely lie in the economic area. It seems that Rosatom does not have enough resources to simultaneously implement large domestic plans for increasing capacity and actively carry out major foreign nuclear construction projects.

During the wartime period under consideration, Rosatom is constructing 19 NPP units abroad, in the Global South (China with four reactors, India with four reactors, Turkey with four reactors, Egypt with four reactors, Bangladesh with two reactors, and Iran with one reactor) and preparing to start construction on two reactors in Europe at the Paks II NPP in Hungary⁴⁴¹. These projects are described in detail in Chapter 3 of the report. In addition, Rosatom is

⁴³⁵ U.S. Department of Energy, March 14, 2024. FY2024 Spending Bill Fuels Historic Push for U.S. Advanced Reactors. (Accessed: March 23, 2025.)
<https://www.energy.gov/ne/articles/fy2024-spending-bill-fuels-historic-push-us-advanced-reactors>

⁴³⁶ United States Congress, August 3, 2024. Consolidated Appropriations Act, 2024. (Accessed: March 23, 2025.)
<https://www.congress.gov/bill/118th-congress/house-bill/4366/text>

⁴³⁷ Bellona, April 26, 2024. Bellona Atomic Digest. March 2024 [in Russian]. (Accessed: March 23, 2025.)
<https://ru.bellona.org/2024/04/26/nuclear-digest-02-24/>

⁴³⁸ Strana Rosatom, December 7, 2023. A set of questions: how much time, effort and money will it take to decommission a nuclear power plant [in Russian]. (Accessed: March 23, 2025.)
<https://strana-rosatom.ru/2023/12/07/blok-voprosov-skolko-vremeni-sil-i-s/>

⁴³⁹ ATOMEXPO-2024. (Accessed: March 23, 2025.)
<https://2024.atomexpo.ru/en>

⁴⁴⁰ Atomic Energy 2.0, June 13, 2024. Rosatom is considering the possibility of extending the operation of the Kola NPP and NPPs with RBMK reactors [in Russian]. (Accessed: March 23, 2025.)
<https://www.atomic-energy.ru/news/2024/06/13/146664>

⁴⁴¹ Rosatom State Corporation. Nuclear power plants under construction [in Russian]. (Accessed: March 23, 2025.)
<https://www.rosatom.ru/production/design/stroyashchiesya-aes/>

actively striving to enter projects related to the construction of nuclear power plants, uranium mining, personnel training, the creation of scientific centers, and other activities in Southern and Asian countries of the former USSR, such as Kazakhstan, Armenia, and Uzbekistan, as well as in several African states, including Ghana, Tanzania, Niger, Zimbabwe, Namibia, and Ethiopia⁴⁴².

Rosatom maintains a leading position in the nuclear energy market of the Global South, carrying out projects for the construction of nuclear power plants, uranium mining, and nuclear fuel supply, particularly in countries that finance projects independently, such as China and India. At the same time, its presence in the West is shrinking: the Paks II nuclear power plant project in Hungary remains outside the scope of sanctions but faces delays, while the dependence of the EU and the US on Russian nuclear fuel and enriched uranium is gradually decreasing. By 2030, fuel supplies to the EU may be reduced by 60%, and enrichment services may decrease threefold (more details on this are provided in Chapter 2). Under these conditions, Rosatom will be forced to strengthen cooperation with China and India, which may lead either to joint projects in new markets or to increased competition with these countries.

Rosatom is actively expanding into non-nuclear businesses that were previously uncharacteristic for it. Primarily, this concerns the expansion, during the wartime period, of the Northern Sea Route Directorate, which is a Rosatom structure overseeing and coordinating the work of FSUE Atomflot, FSUE Hydrographic Enterprise, and all their subordinate organizations. The Northern Sea Route Directorate has become the key developer of the infrastructure development plan for the route and the directorate responsible for organizing vessel navigation, developing port infrastructure, including energy facilities, establishing a maritime safety system within the Northern Sea Route, and managing navigation and hydrographic operations. Apparently, for Russia, the development of the Northern Sea Route is not only an economic and national security task but also a large-scale political objective⁴⁴³.

Rosatom has intensified discussions and consultations on the extraction and use of rare and rare earth materials (RM and REM). In March at the AtomExpo 2024⁴⁴⁴ last year, attention was drawn to the fact that RM and REM are crucial today for renewable energy, nuclear energy, radio electronics, space, aviation, metallurgy, and other modern technologies. Russia's share in the RM and REM market is less than 1%, while China holds 70%, the US 24%, and the remaining 5–6% comes from new players such as Myanmar, Vietnam, Thailand, and others. In terms of RM and REM reserves, Russia ranks second in the world, with 18 explored deposits that, for various reasons, are not yet fully developed, and seventh in extraction. However, at the same time, Russia produces almost no RM and REM. Currently, Russia lacks a full technological chain from extraction to processing due to the absence of an industrial-scale

⁴⁴² Rosatom Newsletter, February 28, 2024. Africa's nuclear future [in Russian]. (Accessed: March 23, 2025.)
<https://rosatomnewsletter.com/ru/2024/02/28/nuclear-future-for-africa/>

⁴⁴³ Atomic Energy 2.0. Northern Sea Route Directorate of the Rosatom State Corporation [in Russian]. (Accessed: March 23, 2025.)
<https://www.atomic-energy.ru/SMP-Rosatom>

⁴⁴⁴ ATOMEXPO-2024. (Accessed: March 23, 2025.)
<https://2024.atomexpo.ru/en>

separation production technology. RM and REM consumption in Russia was around 1,300 tons in 2022, about 2,200 tons in 2023, and is projected to reach 3,000 tons by 2050.

The mining division of Rosatom (Atomredmetzoloto) manages RM and REM assets owned by the corporation under various conditions and in different ownership shares with other companies. The division operates enterprises in five regions of Russia: Murmansk, Kurgan, Tomsk, Perm, and Moscow regions. Rosatom's enterprises are focused on increasing production in the lithium, titanium, and magnetic REM groups. By 2030, Rosatom aims to fully meet the domestic demand for RM and REM, effectively taking control of nearly the entire Russian production and market for these resources. A key point emphasized by representatives of the Russian government, the Federation Council, and Rosatom is that by 2030, Russia must achieve technological sovereignty in RM and REM extraction and production. The ongoing war has significantly accelerated the development of this sector.

Rosatom's growing involvement in non-nuclear sectors within its areas of operation is particularly noteworthy. The company Rosatom Infrastructure Solutions has significantly expanded its business opportunities, especially after integrating the energy company Quadra into its structure at the end of 2022. Quadra operates in over 200 cities across 16 regions of Russia, implementing projects in urban management digitalization, urban environments, transport, housing and utilities, and other sectors⁴⁴⁵. Additionally, through its management company for Priority Development Territories (Atom-TOR), Rosatom has actively taken control of various small and medium-sized enterprises operating in restricted and semi-restricted administrative-territorial formations within its areas of presence⁴⁴⁶.

It is difficult to list all the non-nuclear products that Rosatom has started producing as part of its import substitution program during the period of restricted foreign supplies. However, it should be noted that nearly every major division of Rosatom is now manufacturing a significant range of non-nuclear products. These range from chemical, metallurgical, and other high-tech products to basic household equipment for various purposes⁴⁴⁷.

Rosatom's involvement in the war against Ukraine is not limited to its presence at the ZNPP.

Rosatom is also a weapons developer, and not only in the nuclear field. At the recent Future Technologies Forum, Rosatom's Director General proudly showcased new developments to Putin, including the ballistic tip for the Oreshnik missile, which can withstand temperatures exceeding four thousand degrees⁴⁴⁸.

⁴⁴⁵ Atomic Energy 2.0. Quadra [in Russian]. (Accessed: March 23, 2025.)
<https://www.atomic-energy.ru/kvadra>

⁴⁴⁶ Atomic Energy 2.0. Atom-TOR [in Russian]. (Accessed: March 23, 2025.)
<https://www.atomic-energy.ru/Atom-TOR>

⁴⁴⁷ Atomic Energy 2.0. Non-nuclear products [in Russian]. (Accessed: March 23, 2025.)
<https://www.atomic-energy.ru/non-nuclear-goods>

⁴⁴⁸ TASS-Science, February 1, 2025. Putin was shown the material of the Oreshnik tip, which can withstand the heat of the Sun [in Russian]. (Accessed: March 23, 2025.)
<https://nauka.tass.ru/nauka/23213463>

Rosatom is actively engaged in various activities on Novaya Zemlya, including both civilian and military projects. On the civilian side, it is involved in mineral resource development at the Pavlovskoye deposit. On the military side, Rosatom has been conducting non-nuclear tests of nuclear weapons and participating in the development and testing of the Burevestnik cruise missile with a nuclear propulsion system. In February 2023⁴⁴⁹, coinciding with Russia's suspension of the Strategic Arms Reduction Treaty with the United States, Vladimir Putin instructed the Ministry of Defense and Rosatom to prepare for nuclear weapons testing. In August⁴⁵⁰, Defense Minister Shoigu and Rosatom head Likhachev visited the Novaya Zemlya test site, followed by a meeting with Putin. Bellona believes that the increased activity on Novaya Zemlya, along with Russia's withdrawal of its ratification of the Comprehensive Nuclear-Test-Ban Treaty, represents further steps toward nuclear escalation.

As for Rosatom's business performance during the period under review, we may say that the war has hardly created any economic or financial difficulties for the corporation's enterprises and organizations. This conclusion follows from official reports. The domestic economic and political landscape has remained favorable for Rosatom due to support from the Russian president, the government, and regional administrations.

Rosatom's revenue under International Financial Reporting Standards (IFRS) has increased each year during the war, reaching 2,572.0 billion rubles in 2023 (compared to 1,766.4 billion rubles in 2022). At the same time, over the past two years, electricity generation at nuclear power plants – the core product determining Rosatom's revenue – has been declining. In 2023, generation amounted to 217.4 billion kWh, while in 2024, it dropped to 214 billion kWh. This suggests that the increase in IFRS revenue in 2023–2024 was driven by a rise in nuclear fuel exports to China and other countries, as well as the expansion of new business sectors. For instance, revenue from non-nuclear products in 2023 amounted to 1,100.4 billion rubles, a 58% increase from 2022 (697.5 billion rubles). Figures for 2024 are not yet available⁴⁵¹. New business areas include wind energy, nuclear medicine, digital products, infrastructure solutions, additive manufacturing and energy storage, industrial automation and electrical engineering, environmental solutions, and others.

Rosatom receives maximum support for stabilizing its economy and finances from legislative and executive authorities. In May 2024, the Russian State Duma passed a bill⁴⁵² granting Rosatom the right to issue bonds. This decision allows Rosatom to move into the investment-grade category of borrowers on the financial market, which helps reduce interest rates for industry organizations on loans secured by the state corporation's guarantee. According to

⁴⁴⁹ Bellona, March 13, 2023. Bellona Atomic Digest. February 2023 [in Russian]. (Accessed: March 23, 2025.)
<https://bellona.ru/2023/03/13/atomic-digest-02-23>

⁴⁵⁰ The Barents Observer, August 12, 2023. Accusing the West of waging a proxy war on Russia, Shoigu went to a nuclear test site in the Arctic [in Russian]. (Accessed: March 23, 2025.)
<https://thebarentsobserver.com/ru/bezopasnost/2023/08/obviniv-zapad-v-vedenii-oposredovannoy-voiny-s-rossiyei-shoigu-otpravilsya-na>

⁴⁵¹ Rosatom State Corporation, 2023. Public report. Part 2. Business development report [in Russian]. (Accessed: March 23, 2025.)
https://www.report.rosatom.ru/go/rosatom/go_rosatom_2023/app/rosatom_2023_2.pdf

⁴⁵² Legislative Support System, July 8, 2024. Bill № 594961-8. On Amendments to the Federal Law "On the State Atomic Energy Corporation Rosatom (on clarifying certain powers of the State Corporation Rosatom)" [in Russian]. (Accessed: March 23, 2025.)
<https://sozd.duma.gov.ru/bill/594961-8>

the bill, decisions on the placement of bonds, as well as approval of the bond program, will be made by Rosatom's supervisory board.

It should also be noted that compared to other Russian energy companies Rosatom has been almost unaffected by international sanctions. The reason for this is that sanctions that could have had a real impact on the corporation's finances were not initially imposed on Rosatom's enterprises. Sanctions partially affected Rosatom's overseas construction projects, but the countries and companies interested in continuing the projects found ways to secure financing and the necessary equipment, so the projects continued, although sometimes with delays.

Rosatom "skillfully" exploited the political division of countries into "friendly" and "unfriendly" ones, as well as opposition within the European Union that was interested in continuing economic and technological contracts with Rosatom. In addition, old contracts remained in place, and despite the war they were not canceled. The Global South market needed and will continue to need the services of Russia's nuclear agency, so it remained open to Rosatom. Thus, the "leaky" sanctions regime hardly affected Rosatom, and judging by the current geopolitical developments, it is likely to remain this way in the future.

Bellona has taken a particular interest in the informational and socio-environmental field in which Rosatom operates, having worked in this sphere for over 30 years. During the war, information about Rosatom's operations and business processes has become increasingly official in tone and, in many respects, promotional. Reports on achievements, cultural and sporting events, museum openings, and other educational initiatives have multiplied. It appears that Rosatom's communications department, which oversees all press services of the nuclear agency, has adjusted its information policy to restrict the dissemination of sensitive facts and opinions about Rosatom. These restrictions likely stem from various reasons, including unfavorable trends triggered by the war. Following the closure of active public environmental organizations in Russia, such as Bellona, Greenpeace, Ecodefense, and several others, independent information about Rosatom's activities has almost entirely disappeared, even from social media. Individual activists and organizations such as the Russian Social-Ecological Union (RSoES), if they address Rosatom-related topics at all, do so with extreme caution, staying within the boundaries set by official or state-controlled media. At present, it seems that no professional and active public organization remains in Russia capable of engaging in a fearless and open, competent dialogue with Rosatom.

Public councils related to the activities of the nuclear agency (such as the Rosatom Public Council, Rostekhnadzor Public Council, the Commission on Ecology of the Public Chamber, and others) are now predominantly filled with active supporters and enthusiasts of the current government. A striking example is the deputy chairman of the Rosatom Public Council, former hockey player Fetisov⁴⁵³, who plays in the night hockey league of the president and openly states that Putin changed his life for the better⁴⁵⁴. Therefore, it is not surprising that the public

⁴⁵³ Sport24, January 29, 2025. Fetisov said that Putin changed his destiny [in Russian]. (Accessed: March 23, 2025.)
<https://sport24.ru/hockey/news-721871-fetisov-rasskazal-chto-putin-izmenil-yego-sudbu>

⁴⁵⁴ Forbes, May 19, 2015. Putin's League: Who does the Russian president play hockey with?
<https://www.forbes.ru/sobytiya-photogallery/vlast/288643-liga-putina-s-kem-igraet-v-khokkei-prezident-rossii>

council has lost interest in the issues that concern the public's concerns about their safety, although the potential danger of nuclear technologies has not disappeared.

It should be noted that there has been a decline in interest from the Public Council and even from relevant Rosatom structures regarding the issues of the "nuclear legacy," both the accumulated and the one being generated as a result of the decommissioning of nuclear facilities, including old nuclear power plants. The Rosatom subsidiary, ROSRAO, which was responsible for managing the nuclear legacy, has almost completely switched to dealing with the disposal of hazardous non-nuclear waste. It is difficult to say what Rosatom's plans are for the decommissioning and securing of flooded nuclear and radiation-hazardous sites in the Arctic seas, former nuclear test sites, as well as the nuclear and radioactive materials accumulating in various organizations.

When considering the main assessments, conclusions, and forecasts made by Bellona in its previous overview reports on Rosatom's operations at the start of the war⁴⁵⁵, we can say that they remain valid today. There have been changes in some figures, which were always of dubious accuracy, and in specific forecasts, but the key strategic assessments are still valid at present.

If we disregard the Zaporizhzhia NPP, which is clearly a "burdensome asset" for Rosatom, the nuclear agency is, by and large, in no worse a position than it was before the war, especially in terms of its operations within Russia. On the international stage, Rosatom have certainly been pushed out of Western markets and some projects, but probably sees this as a geopolitical dilemma – a temporary situation that will change, even if this takes some time.

⁴⁵⁵ Bellona, 2023. Rosatom during the war in Ukraine: how the militarization of the Russian nuclear giant took place [in Russian]. (Accessed: March 23, 2025.) https://network.bellona.org/content/uploads/sites/4/2023/12/2023_MIL_ROSATOM.pdf

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