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ROSATOM [360]

ROSATOM NEWSLETTER

01.

STORIES

A Growing Generation of Power Units
Rosatom Pushes for Year-Round NSR Operations
Quiz: What Do You Know About SMRs?

02.

TRENDS

Uranium: Shortage or Surplus?

03.

REGIONAL STORIES

Central Africa. Nuclear Partnership
Türkiye. Building a Green Ecosystem
Indonesia. Global HackAtom 2025: A Look Back

A Growing Generation of Power Units

In late April, preparations for achieving first criticality began at Rooppur Unit 1 in Bangladesh — a landmark event for the country, for Rosatom, and for the global nuclear community. Rosatom's power units are rising across the globe: the Russian nuclear corporation maintains its position as the world leader in overseas construction of nuclear power plants. Here is an overview of the latest developments at Rosatom's construction sites.

Rooppur NPP (Bangladesh)

In late April, nuclear fuel loading commenced at Unit 1, one of the key stages preceding initial criticality. "Today, Bangladesh has joined the ranks of nations using peaceful nuclear energy as a reliable source of sustainable development. Undoubtedly, the Rooppur NPP will become a crucial element of the country's energy system. This project is another important step for Rosatom in developing global nuclear energy and strengthening friendly relations with our international partners," noted Rosatom Director General Alexey Likhachev.

"The Rooppur NPP project is a symbol of Bangladesh's scientific progress, demonstrating the country's readiness and ability to responsibly and efficiently adopt advanced technologies," said Bangladesh Minister of Science and Technology Fakir Mahbub Anam.

The nuclear power plant will have two power units featuring VVER-1200 reactors.

El Dabaa NPP (Egypt)

In January, a steam turbine for Unit 1 and a polar crane bridge were delivered to Egypt. A retaining ring — the structure securing the reactor vessel — for the same unit followed in March. A pressurizer relief tank, part of the reactor's pressure compensation system, was also installed. Erection of the reactor building continues, with the installation of the fourth tier of the inner containment shell (ICS) and the reactor pit lining underway.

At Unit 2, concreting of the reactor building floor slab at elevation +0.100 and the foundation slab of the transport airlock trestle was completed in January. In February, a dry shield was installed for the reactor pit, and workers began concreting the fourth tier of the reactor building's ICS. In March, a bearing frame was installed.

At Unit 3, the first concreting stage for the first tier of the ICS was completed in February.

Four units with VVER-1200 reactors are being built at this nuclear power plant.

Akkuyu NPP (Türkiye)

At Unit 1, preparations are nearing completion for cold and hot functional tests using loaded dummy fuel assemblies. The key objective for this year is to transition to initial criticality and subsequent operational activities.

At Unit 2, hydro-accumulators for the passive core flooding system were installed in the reactor building in April. Each accumulator will be filled with an aqueous solution of boric acid, which will be automatically injected into the reactor core to cool it if pressure drops in the primary coolant circuit. Following this, the installation of the sixth tier and the dome of the ICS will commence.

In March, a retaining frame was installed in the reactor pit of Unit 4. The next step involves filling the reactor pit with special-grade concrete.

Four units with VVER-1200 reactors are being built at this nuclear power plant.

Paks NPP (Hungary)

At the construction site of Paks II Unit 5, workers began pouring concrete for the reactor building's basemat on February 5. As of that date, the unit is officially classified as "under construction" according to IAEA standards. Concreting will proceed continuously until the end of 2026. The basemat will require nearly 9,000 tonnes of reinforcing steel and 43,000 cubic meters of concrete mix. The work will be monitored at every stage to ensure its highest quality. The next stage will be the erection of inner and outer containment shells of the reactor building.

The design of the plant provides for two units with VVER-1200 reactors.

Kudankulam NPP (India)

In April, open-reactor flushing of the safety systems began at Unit 3. This process clears all pipelines of any debris remaining after installation and tests the operation of pumping units, process safety systems, and normal operation systems.

The nuclear power plant currently operates two units, with four more under construction, all featuring VVER-1000 reactors.

Uzbek NPP (Uzbekistan)

Concrete bedding was laid for the reactor building of the RITM-200N power unit to be built in the Jizzakh Region of Uzbekistan. Approximately 900 cubic meters of concrete mix were poured, preceded by the levelling of the foundation base and installation of the waterproofing and grounding systems. The next key milestone at the site — pouring first concrete for the reactor building basemat — is scheduled for June 2026.

The design of the plant provides for two units with VVER-1000 reactors and two units with RITM-200N small modular reactors.

Tianwan and Xudabao NPPs (China)

Construction of Tianwan Unit 7 and Xudabao Unit 3 is nearing completion. Chinese engineers are conducting pre-commissioning operations at these units. The next step will be the loading of nuclear fuel at Tianwan Unit 7.

Each of the plants will have two units with VVER-1200 reactors. The Tianwan NPP already operates four units with VVER-1000 reactors.

Nuclear plants in Russia

Rosatom is building two power units each at the Kursk and Leningrad NPP sites, as well as a unit with a BREST-OD-300 fast neutron reactor as part of the Proryv (*Breakthrough*) project. Preparations are underway for the official start of reactor construction at the Smolensk, Beloyarsk, and Primorye NPP sites, as well as the Yakutia small modular reactor plant.

Photo by: ASE JSC, Akkuyu Nuclear JSC, Rosatom State Corporation

Rosatom Pushes for Year-Round NSR Operations

Amid disruptions to international cargo shipments via southern routes, the use of alternative options like the Northern Sea Route (NSR) is becoming increasingly relevant. A growing number of international players are expressing interest in shipping via the NSR. As the infrastructure operator for the route, Rosatom is stepping up efforts to ensure year-round voyages.

The oil market — and the logistics market more broadly — has been in a state of continuous turmoil since February of this year. Many shipments have been blocked, and there are significant risks associated with shipping through the Bab-el-Mandeb Strait. The memory of the 2021 transport collapse, caused by a container ship running aground in the Suez Canal, is also still fresh. All these developments are forcing shippers and logistics companies to seek alternative transport routes between Europe and Asia. Options include sailing around Africa or using overland railway networks. But there is another alternative: the Northern Sea Route.

“More and more nations and companies start thinking beyond the speed and cost of transportation — the safety and resilience of transport routes and logistics chains, which are less susceptible to crises, military conflicts, and other external risks, are becoming the decisive factor. Russia can offer the world such solutions,” Russian President Vladimir Putin said in a video address to the first International Transport and Logistics Forum (ITLF) held in St. Petersburg in early April this year.

The primary advantage of the NSR is the shorter transit time (roughly 20 days) for the shipping lanes between East Asia and Western Europe. For comparison, the route via the Suez Canal takes 30–35 days, while sailing around Africa takes 40–45 days.

Year-Round Navigation Is Just Around the Corner

The short navigation season used to be a major challenge for NSR traffic, but this issue has been actively addressed in recent years. This year, ice conditions in the Kara Sea are more severe than a year ago. “Despite this, seasonal navigation in the western sector of the NSR is operating almost exactly on schedule, much like a regular bus service,” Vladimir Panov, Rosatom’s Special Representative for Arctic Development, said at the ITLF.

Experimental ultra-early and ultra-late voyages have been conducted under the escort of Atomflot's nuclear icebreakers. "We have significantly expanded the navigation period in the eastern sector of the NSR, relying on the experience and capabilities of Christophe de Margerie-class gas carriers and icebreakers," Sergey Frank, Chairman of the NSR Shipping Council, stated at the forum.

"We have put icebreakers on standby duty to ensure the safe passage of vessels, including non-ice-class ships. Perhaps the development of the eastern part of the NSR and the transition to year-round navigation will happen even earlier than we anticipate," Vladimir Panov noted.

Test voyages will take place as early as this year. In 2026, Sovcomflot expects to take delivery of two more Arc7 ice-class LNG carriers that will operate year-round along the entire NSR. "This will happen for the first time in human history. We plan to organize a year-round service during the 2026–2027 navigation season," Sovcomflot CEO Igor Tonkovidov said at the ITLF. By 2028–2030, the transit interval for high ice-class vessels on the NSR could be reduced to 12 hours, Sergey Frank believes.

Icebreakers will be the key to ensuring year-round navigation. Currently, there are eight nuclear-powered icebreakers operating in the Arctic. Four of these are new multi-purpose Project 22220 icebreakers. Three more icebreakers of this design (Chukotka, Leningrad, and Stalingrad) are currently under construction. Rossiya, the lead icebreaker of Project 10510 series, is also being built. It is designed specifically for year-round navigation on the NSR and will be the most powerful icebreaker in the world.

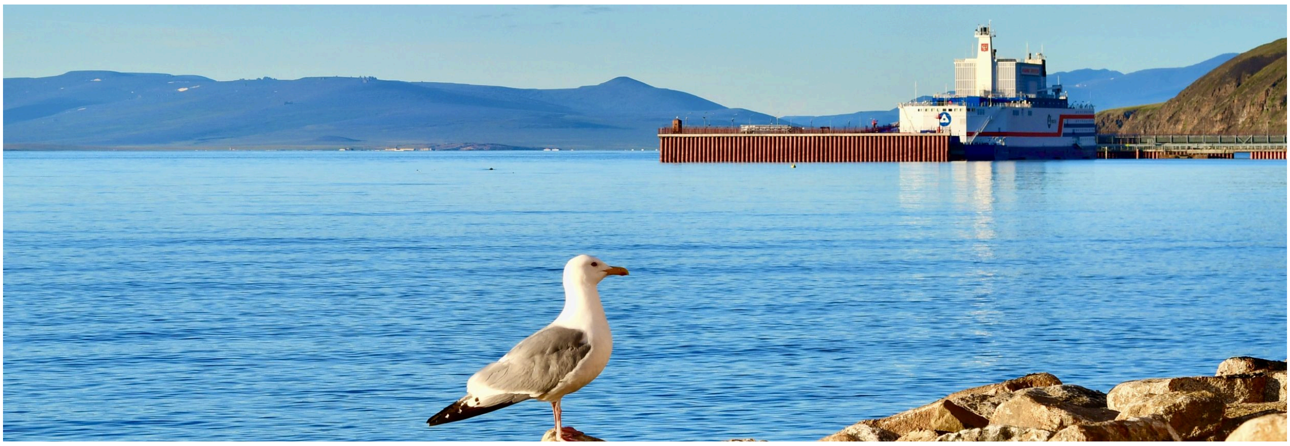
International interest in the NSR is growing. Chinese companies have been conducting container voyages for several years and are scaling up cargo volumes. Last year, a transit voyage from China to Western Europe was completed via the NSR for the first time. There is immense interest in the route from other countries in East and South Asia as well. Negotiations are currently underway with one of these countries for an inaugural container voyage, tentatively scheduled for this September.

This year's cargo traffic is 15% above previous records, Rosatom Director General Alexey Likhachev reported at the ITLF. He also expressed hope that the figure would surpass the 40-million-tonne mark this year.

Photo by: FSUE Atomflot, United Shipbuilding Corporation, Rosatom State Corporation

Quiz: What Do You Know About SMRs?

Small modular reactors (SMRs) are one of Rosatom's flagship offerings. This comes as no surprise, given that the Russian nuclear corporation is the first and, so far, the only company in history to have built a floating nuclear power plant. And, of course, this is not Rosatom's only SMR project. Let's test your knowledge of Russian small modular reactors.



1. What is the name of the world's only operating floating nuclear power plant (FNPP)?

a) Arktika
b) Sevmorput
c) Akademik Lomonosov
d) Arctic Circle
e) North Wind

2. What type of reactor is installed on this FNPP?

a) VVER-1000
b) RBMK-1000
c) BN-800
d) KLT-40S
e) RITM-200

3. What is the nominal electric power of the two reactors on this FNPP?

a) 30 MW
b) 50 MW
c) 70 MW
d) 85 MW
e) 100 MW

4. What geographical term is used in the name of the 10 MW reactor plant currently being developed by Rosatom?

a) Reef
b) Shelf
c) Island
d) Beach
e) Cape

5. Rosatom's flagship small modular reactor is the RITM-200. Where have these reactors already accumulated over 400 reactor-years of operation?

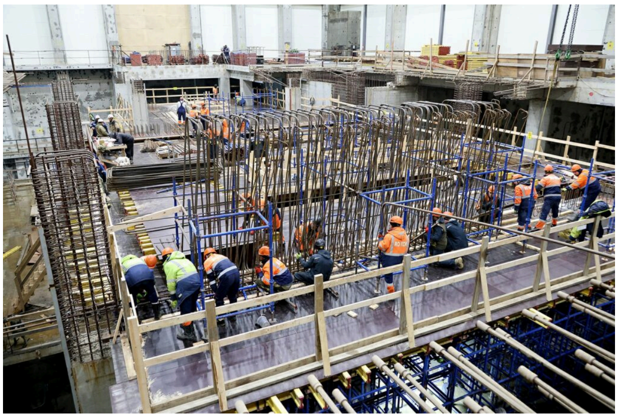
a) At research centers
b) On nuclear submarines
c) At the Bilibino Nuclear Power Plant
d) On the latest nuclear power icebreakers
e) They have not accumulated that much time yet

6. How many RITM-200N reactor units will Rosatom build in Uzbekistan?

a) 2
b) 3
c) 4
d) 0
e) 8

7. How often do RITM-200S reactors designed for floating power units need refueling?

a) Annually
b) Once every 2 years
c) Once every 3 years
d) Once every 5 years
e) Once every 10 years



8. Which of the following coolants is NOT being considered for SMR designs developed by Rosatom?

a) Heavy water
b) Lead-bismuth
c) Helium
d) Light water
e) Lead

9. What type of reactor is used in the BREST-OD-300 project, which falls under the IAEA's classification for small modular reactors?

a) Pressurized water reactor (PWR/VVER)
b) Boiling water reactor (BWR)
c) High-temperature gas-cooled reactor (HTGR)
d) Sodium-cooled fast neutron reactor
e) Lead-cooled fast neutron reactor

10. Which advantage of SMRs is particularly important for consumers in isolated and hard-to-reach areas?

a) High degree of factory prefabrication
b) Compact footprint
c) Zero emissions
d) Stable generation and resilience to climate and weather fluctuations
e) All of the above

Correct answers:

1. **Akademik Lomonosov.** The Akademik Lomonosov is the world's only operating floating nuclear power plant. It is moored in the port of Pevek, Russia's northernmost city, located above the Arctic Circle in a permafrost zone. Named after the great Russian scientist, Academician Mikhail Lomonosov, the plant was first connected to the grid on December 19, 2019.

2. **KLT-40S.** Two KLT-40S pressurized water reactors are installed on board the Akademik Lomonosov. They represent the continuation and evolution of the KLT reactor line used on the Sevmorput LASH carrier, and the KLT-40M reactors installed on the Taymyr and Vaygach nuclear icebreakers.

3. **70 MW.** Under nominal conditions, two KLT-40S reactors can supply 70 MW of electricity to the onshore grid and up to 50 Gcal/h of thermal energy for heating district water. This is enough to provide electricity for a population of about 100,000 people.

4. **Shelf.** Rosatom is developing the Shelf-M design, a small modular reactor plant (around 10 MW) intended for power supply to remote areas, including offshore platforms and coastal facilities.

5. **On the latest nuclear-powered icebreakers.** All the latest Project 22220 nuclear icebreakers are equipped with RITM-200 reactors. Their design has proven highly efficient and safe at every stage of its lifecycle.

6. **Two units.** In March of this year, Rosatom and Uzatom signed an addendum to their contract, introducing a new, integrated configuration for the country's first nuclear power plant. It will comprise two large power units with VVER-1000 reactors and two small modular reactor (SMR) units with RITM-200N reactors, each with a capacity of 55 MW. When the nuclear plant operates at full capacity, it will generate around 17.2 billion kWh per year, covering up to 14% of Uzbekistan's total power consumption.

7. **Once every five years.** The reactor will be able to operate for up to five years without refueling. No nuclear fuel handling is planned at the plant site; all such operations will take place at a specialized facility.

8. **Heavy water.** Rosatom is developing SMRs that use light water, lead, lead-bismuth, and helium as coolants, but not heavy water.

9. **Lead-cooled fast neutron reactor.** The BREST-OD-300 is an innovative fast neutron reactor that uses lead as a primary coolant. The design implements the inherent safety concept and a closed nuclear fuel cycle.

10. **All of the above.** SMRs offer several major advantages over conventional nuclear power plants: a high degree of factory prefabrication, a compact footprint, zero harmful atmospheric emissions, and a stable energy supply. Power generation at such plants does not depend on the climate or season.

Photo by: Engineering Division of Rosatom State Corporation, Floating Nuclear Thermal Power Plant, JSC SKhK, Wikipedia

Uranium: Shortage or Surplus?

The key question asked by all stakeholders is whether the uranium mining industry can meet the needs of a growing nuclear reactor fleet. There is no definitive answer right now: uranium resources are abundant, but production may lag behind demand.

The reference scenario published by the World Nuclear Association (WNA) for reactor fleet growth assumes a capacity doubling from the current 372 GW to 449 GW by 2030 and to 746 GW by 2040, representing an average annual growth rate of 5.3%. Compared to the 2023 forecast, an additional 60 GW of new builds is expected by 2040, primarily in East and South Asia and in newcomer countries. The growing reactor fleet will trigger increased demand for natural uranium as the primary raw material for nuclear fuel. In the WNA reference scenario, this rises from the current 67,000 tonnes to over 150,000 tonnes per year by 2040. To evaluate the supply-demand balance for natural uranium, several demand-side factors must be considered.

Resources remain stagnant

According to the 2024 edition of *Uranium: Resources, Production and Demand* (the Red Book, published biennially by the IAEA and OECD/NEA), identified in-situ uranium resources total over 10.7 million tonnes. Recoverable resources, factoring in mining and processing losses, exceed 7.9 million tonnes.

Identified in-situ uranium resources total over 10.7 million tonnes.

At first glance, these resources are sufficient for the future needs of nuclear power units for the next 50 years. However, uranium resources with a recovery cost below USD 80/kg are shrinking, currently making up only about a quarter of total resources. And while overall global uranium reserves grew by 28%, resources in the

Resources in the < USD 40/kgU category have also decreased. Following a reassessment of resources in Uzbekistan and Brazil by 103,000 tonnes, this category dropped by 20%. Resources with the highest recovery cost (< USD 260/kg) grew by 2% due to the inclusion of new or previously unaccounted resources in Cameroon, Egypt, India, Pakistan, and Saudi Arabia, but fell by almost the same amount due to Orano's reassessment of the Imouraren deposit in Niger and Bakouma in the Central African Republic. As a result, total identified resources remained virtually unchanged, increasing by just 0.2%.

Among uranium mining companies, Rosatom leads in total explored resources thanks to assets in Russia, Kazakhstan, Tanzania, and Namibia. It is followed by Kazakhstan's Kazatomprom, France's Orano, Canada's Cameco, and China's CNNC and CGN. Kazatomprom has the largest resources with a recovery cost of less than USD 80/kgU. Rosatom ranks second, followed by Cameco, CNNC, CGN, and Orano.

Among uranium mining companies, Rosatom leads in total explored resources.

Production on the rise

Remaining the world leader in uranium production, Kazatomprom is ramping up output. While Kazakhstan produced 21,109 tonnes of uranium in 2023, the figure reached a record 25,839 tonnes in 2025, up 11% from 2024. In 2026, production is targeted at 27,500–29,000 tonnes of uranium.

This production growth is linked to the Budenovskoye deposit (blocks 6 and 7) reaching its design capacity of 6,000 tonnes per year. In 2025, Kazatomprom launched pilot operations at the Inkai-3 project, which holds 83,100 tonnes of uranium reserves. The pilot phase is slated to last four years. Commercial operation is scheduled to begin in 2030–2032, reaching a design capacity of 4,000 tonnes of uranium per year.

In 2025, amendments to the Subsoil Code were adopted, ensuring Kazatomprom's share in new subsoil use contracts will be at least 75%, and 90% for contract extensions. Starting in 2026, mineral extraction tax rates will vary depending on actual annual output under each subsoil use agreement and the prevailing spot price of uranium.

In Canada, two underground mines — McArthur River and Cigar Lake — were operating in 2025. In mid-2025, Orano's Canadian subsidiary began extracting uranium at the McClean Lake mine using SABRE (Surface Access Borehole Resource Extraction) technology. According to McClean Lake co-owner Denison Mines, 250 tonnes of uranium were produced in 2025.

In Namibia, output from three mines (Husab, Rössing, and Langer Heinrich) reached 7,332 tonnes in 2024 (12% of global production). Over the past seven years, Husab and Rössing have maintained stable production levels, producing 4,437 tonnes and 2,205 tonnes of uranium respectively in 2024. The Langer Heinrich mine produced 690 tonnes of uranium in 2024, and about 1,540 tonnes in 2025.

Uzbekistan has been ramping up production over the last few years. The preliminary target for 2025 is 6,000 tonnes of uranium. By 2030, the country plans to produce over 7,000 tonnes annually. According to an SRK Consulting report, Navoiuran's mineral resource base as of January 1, 2025 stood at about 116,000 tonnes of uranium. However, none of its 40 deposits hold resources exceeding 10,000 tonnes of uranium, with the largest deposits ranging from 4,000 to 9,000 tonnes in resources.

In Australia, production in 2025 is expected to be slightly higher than in 2024. BHP's Olympic Dam mine steadily produces around 3,000–3,400 tonnes of uranium per year. The 2025 calendar year was no exception, with production hitting 3,479 tonnes.

In Russia, uranium production in 2024 amounted to 2,738 tonnes. Rosatom's mining subsidiaries met their production targets by 100%. "Rosatom is secured with its own mineral resource base for decades to come and holds leading positions in the global uranium market," Rosatom Director General Alexey Likhachev told the *Strana Rosatom* newspaper.

In China, preliminary data indicates uranium production of about 2,200 tonnes. In 2025, China mined uranium at four sites (three using in-situ recovery and one underground mine). Operations at three underground mines were suspended due to high production costs. According to China National Nuclear Corp. (CNNC), pilot uranium production began in 2025 at the new National Uranium No. 1 mine in the Ordos Basin. The facility's design capacity is 1,000 tonnes of uranium per year.

Looming closures

Production growth without successful exploration and expansion of the resource base will lead to the closure of operating mines between 2030 and the late 2040s. This primarily applies to the deposits that were brought online in the early 2000s.

Given this prospect, uranium producers have recently taken steps to develop new resources. Rosatom is one of them. “Our key task is to expand the uranium resource base to meet the needs of the Russian nuclear power industry. We have already reached an agreement with the Federal Agency for Mineral Resources and the Ministry of Natural Resources and Environment to set up a working group on developing the resource base. In 2026, we will complete the bulk of capital work at the Shirondukuyskoye deposit, enabling the extraction of about 400 tonnes of uranium starting in 2028. We will begin tunneling work at Mine No. 6 at the Priargunsky Industrial Mining and Chemical Union (PIMCU). We will make every effort to bring the Elkon project out of hibernation,” Victor Svyatetsky, First Deputy CEO and Administrative Director of Rosatom Nedra, told the *Vestnik Atomproma* magazine.

Kazatomprom is another example. In January 2025, the company announced in its updated 2025–2034 development strategy that it aims to replenish and efficiently utilize its mineral resource base through exploration and operational optimization.

Thus, in the long term, the winners will be those uranium mining companies that best secure reserves for their mines.

Industry hurdles

Production growth, the commissioning of new capacities, and even exploration activities are often hindered by economic, regulatory, social, and other issues. These increase the time and costs required to prepare new sites.

One of the key problems is inflation. Prices for equipment, diesel fuel, electricity, and sulfuric acid are rising, as are personnel costs. In addition, interest rates have gone up, making bank financing harder and more expensive to obtain.

Sometimes, a lack of workers, equipment, or chemicals becomes an issue. For instance, the restart of Canada’s McArthur River mine was slowed by challenges in hiring qualified personnel and restarting equipment after years of being idled. In Kazakhstan, production dipped due to a shortage of sulfuric acid and delays in building auxiliary infrastructure.

Complex regulatory procedures also pose obstacles to startups. In some countries, the permitting process can take over a decade. Companies are forced to update feasibility studies and postpone final investment decisions. Opposition from local communities can lead to the cancellation of a mine project, as happened with the Jabiluka deposit in Australia.

Politics plays a role, too. The most striking example here is the transition of mines in Niger under state control and the ensuing disputes with France’s Orano.

Some takeaways

Over the coming decades, most of the raw material needs of the global nuclear power industry will be met by primary natural uranium mining. According to WNA estimates, this demand will amount to 150,000 tonnes by 2040. However, production from all identified sources will only reach up to 70,000 tonnes by that time. At operating mines, production will be halved due to resource depletion, dropping from the current 60,200 tonnes to 29,500 tonnes. The launch of previously mothballed, under-construction, and planned new mines will offset retiring capacities, but only partially — up to 50,000 tonnes. Bringing prospective mines online starting in 2030 could add another 20,000 tonnes by 2040, but their future remains risky and uncertain. Supplies from identified secondary sources between 2024 and 2040 will add roughly another 5,000 tonnes of uranium.

Thus, despite there being sufficient uranium resources “in the ground,” demand for uranium could exceed supply from identified sources by 75,000 tonnes in 2040. This demand is expected to be met by supplies from so-called “unspecified sources.” These include unaccounted secondary sources, as well as idled mines and undeveloped deposits for which companies do not yet have articulated plans.

Given this state of affairs, tremendous efforts in geological exploration, the deployment of cutting-edge mining technologies, increased investment, and an improved regulatory environment will be required to bring new uranium assets into the nuclear fuel cycle.

Rosatom’s position

The resource base evolution shows that inexpensive uranium on the global market is running out. The growth of the global reactor fleet will occur against the backdrop of the retirement of major low-cost uranium projects and a reduction in secondary sources. Against this backdrop, Rosatom finds itself in a highly advantageous position: the Russian nuclear corporation possesses a high-quality uranium resource base both in Russia and abroad. It is capable of ensuring long-term uranium production growth and meeting the needs of the corporation’s nuclear fuel cycle.

Concurrently, Rosatom is developing Generation IV energy systems that will not require natural uranium. The coordination of all activity fields related to the nuclear fuel cycle is now overseen by the “Uranium Council,” Rosatom Director General Alexey Likhachev told the *Strana Rosatom* newspaper. “Expanding our product line, creating Generation IV energy systems that are independent of the resource base, and undertaking large-scale construction of power units domestically and abroad will require new approaches to managing the entire nuclear fuel cycle of a two-component nuclear energy system featuring both thermal and fast neutron reactors. A Nuclear Fuel Cycle Committee has been established to coordinate this work. It includes practically all top-level executives of the nuclear corporation. The committee will act as a kind of ‘Uranium Council,’ determining strategy and tactics in this crucial area,” Alexey Likhachev emphasized.

Rosatom will expand its capacities in enrichment, fuel fabrication, and spent fuel reprocessing, and will shape a national uranium program. This program aims to reduce the specific consumption of natural uranium via closed nuclear fuel cycle technologies while simultaneously expanding the resource base to increase the share of nuclear generation.

Photo by: JSC NAC Kazatomprom, Paladin Energy, Wikipedia

Nuclear Partnership

Ryan Collyer, CEO of Rosatom Central and Southern Africa, spoke to Modern Diplomacy about the transition from dialogue to delivery of nuclear projects on the continent. In the interview, he explained how to change the public perception of nuclear energy and emphasized Russia's readiness to support the nuclear ambitions of African countries.

Speaking about nuclear-related expectations for the upcoming Russia-Africa Summit, I would note that a strong foundation has been built in recent years through agreements, feasibility discussions, and partnerships. The 2026 summit will allow us to transition from dialogue to tangible progress. The focus will shift to the project implementation readiness, which includes regulatory development, personnel training, financing models, and localization strategies. Furthermore, we also expect to see more structured cooperation in areas like small modular reactors, which are particularly relevant for African power grids, as well as stronger emphasis on education and training partnerships.

Safety first

We cannot rewrite history, and we should not try to. The accidents at the Chernobyl and Fukushima nuclear power plants shaped public perception for a reason. The starting point is respect for those concerns, not dismissal. However, people often overlook the lessons the nuclear industry has learned from these events. The Chernobyl accident fundamentally reshaped the entire philosophy of nuclear safety, leading to a complete rethinking of reactor designs and emergency response. Independent regulatory bodies were strengthened, safety responsibilities between operators and regulators were clearly delineated, and safety culture became not just a principle, but a legal requirement.

Modern reactors are designed to be safe even under the most improbable scenarios. They are now equipped with multi-layered "defense-in-depth" systems, core melt traps, and passive safety mechanisms that rely on natural physical processes rather than human intervention.

However, these facts alone are not enough to change public perception of nuclear power. Public trust is built on experience and transparency. That is precisely why our approach in Africa is deliberately open. We do everything we can to ensure that students, young professionals, and journalists can visit nuclear facilities and research centers and learn about personnel training programs. When people see how systems operate and how seriously safety is taken, their attitude toward nuclear energy changes.

Radiation technologies are not only about clean and sustainable energy. They are about the diagnosis and treatment of diseases, food security, educational development, and high-skilled employment. We strive to help people see the tangible benefits of nuclear technologies in their daily lives.

Russia's readiness to support Africa's nuclear ambitions

Africa's priorities are clear: energy security, economic development, and local capacity building. Russia is interested in long-term partnerships with the countries of the continent.

Ethiopia, for example, is focusing on long-term energy security and industrialization. Despite having a well-developed hydropower sector, the country recognizes the need to diversify its energy sources and is ready to take a major step toward nuclear energy.

Rwanda is taking a different approach, with an emphasis on innovation and the speed of its deployment. The country is showing strong interest in small and flexible nuclear technologies, alongside active use of nuclear science in healthcare and agriculture.

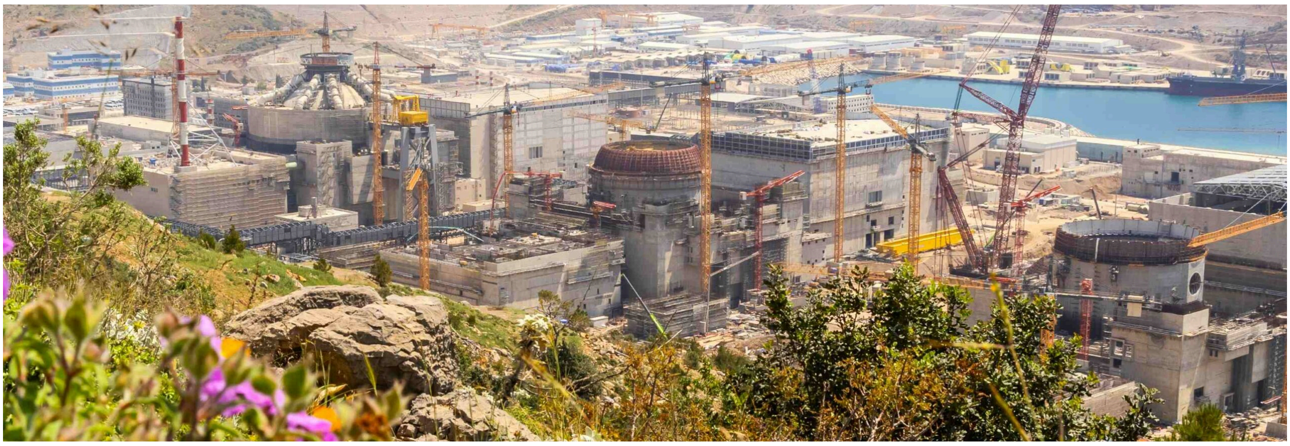
Then there is Namibia, a major uranium producer. Partnerships will help this country connect resources to technology, skills, and future energy applications.

Rosatom knows how to adapt to the strategies of individual countries. This means that cooperation with us will foster not only energy development but also long-term technological progress. Rosatom is capable of delivering the entire nuclear value chain, from reactor technologies and fuel supplies to waste management solutions, including reprocessing, as well as human capital development. This comprehensive capability is what allows us to deliver nuclear projects all over the world.

Photo by: The Roscongress Foundation, ASE JSC

Building a Green Ecosystem

Construction of the Akkuyu NPP is in full swing. Once all four units are commissioned, the plant will cover up to 10% of Türkiye's electricity needs and prevent the emission of about 18 million tonnes of CO2 equivalent annually. Akkuyu will enhance Türkiye's energy resilience and help achieve its climate goals.



In May, Türkiye's Nuclear Regulatory Authority (NDK) Board granted Akkuyu Nuclear JSC a pre-commissioning permit for the second unit of the Akkuyu Nuclear Power Plant. The document formalizes the interaction procedures with the NDK during the upcoming pre-commissioning phase: all operations will be subject to monitoring and approval by the Turkish nuclear watchdog. As part of the application, Akkuyu Nuclear JSC submitted a set of documents to the regulator detailing the stages of the unit's entry into service, related plant processes, and the operating personnel training program. The application documents totaled more than 22,000 pages.

In late April, all components of the passive heat removal system (PHRS) were installed on the dome of the reactor building at Akkuyu Unit 1, comprising a total of about 90 equipment items and structures.

"This is the result of well-coordinated professional work over many months and a key stage in preparing the power unit for initial criticality. The PHRS is one of the numerous safety systems installed at advanced power units featuring VVER-1200 reactors. This system operates relying on natural physical processes that do not require a power supply or operator intervention," noted Sergey Butskikh, CEO of Akkuyu Nuclear JSC. The PHRS is designed to continuously remove heat from the reactor core and release into the atmosphere in the event of a power supply failure.

Also in April, Rosatom Director General Alexey Likhachev visited the Akkuyu NPP construction site. He reiterated that the key objective for the current year is to transition to initial criticality and subsequent operational activities at Unit 1.

"Currently, there is a great deal of interest from Turkish companies in entering the project. This is linked to the opportunity to participate in electricity generation and earn a profit. We have begun substantive discussions with several Turkish companies regarding the terms of their participation in the share capital — this is serious, extensive work. It is extremely important for us to have partners in Türkiye both during the construction stage and throughout the entire lifecycle of the nuclear plant, which can reach 100 years," Alexey Likhachev said.

The Rosatom chief held a working meeting with the management of Akkuyu Nuclear JSC and the project's main contractors. He also visited the residential quarters for plant employees and their families, located 50 km from the construction site and currently under construction. The first section, comprising 48 residential buildings, a school, a kindergarten, and other social infrastructure facilities, is being prepared for commissioning.

"People — our employees, Russian and Turkish nationals — are, of course, the key asset of any project. Preparations are currently underway for residents to move into the nuclear host town designed for 8,000 people. It incorporates the best housing practices, as well as extensive municipal and social infrastructure," Alexey Likhachev emphasized.

Sustainable development as a priority

Social initiatives and comprehensive development of the host region are among Rosatom's top priorities. In its operations, the Russian nuclear corporation is guided by its commitment to the 17 UN Sustainable Development Goals (SDGs), paying special attention to contributing to six of them: Affordable and Clean Energy; Decent Work and Economic Growth; Industry, Innovation and Infrastructure; Responsible Consumption and Production; Climate Action; and Partnerships for the Goals.

Once all four units are commissioned, the plant will prevent the emission of about 18 million tonnes of CO_2 equivalent annually by replacing hydrocarbon-based generation. This accounts for approximately 3.2% of Türkiye's annual greenhouse gas emissions.

The Akkuyu NPP's contribution to Türkiye's low-carbon development was discussed at the 11th Istanbul Carbon Summit, held in May. Rosatom acted as a partner of the event and participated in the summit's business program.

In 2025, Türkiye adopted its first climate law, establishing a legal framework for reducing greenhouse gas emissions, developing a national carbon market, climate financing, and green taxonomy. The role of nuclear energy takes on special significance under these conditions, Rosatom's Chief Sustainability Officer Polina Lion pointed out in her speech. The carbon footprint of the Akkuyu NPP project across its entire lifecycle is less than 4 grams of CO_2-eq per kWh, one of the lowest figures among modern electricity sources.

"It is important to consider all technologies capable of delivering a real reduction in greenhouse gas emissions while simultaneously supporting the reliability of power supply. Nuclear energy meets these criteria: it provides a stable generation of low-carbon electricity, operates independently of weather conditions, and can become an important part of Türkiye's path to carbon neutrality by 2053," Polina Lion emphasized.

According to her, nuclear power plants create a green ecosystem that both ensures climate efficiency and lays the groundwork for comfortable living conditions for several generations to come thanks to their contribution to infrastructure and industrial development and through employment opportunities for the local population.

Photo by: Akkuyu Nuclear JSC

Global HackAtom 2025: A Look Back

Indonesian students took second place in the final of the Global HackAtom international championship held in 2025. In just 24 hours, they proposed an unexpected solution to support astronaut health using nuclear technologies. In an exclusive interview, the five-member team with the unusual name Tahu Sumedang (Fried Tofu) shared their experience of the final and the opportunities this victory unlocked for them.

What does your team's name mean?

Frederick Suhamdy: In Indonesia, the phrase "Tahu Sumedang" means "fried tofu." It is a common snack sold by street vendors, especially in Sumedang, the area where our campus is located. We thought this name would be catchy and fun. We wanted to represent our homeland, Indonesia, and its rich culinary culture.

How was the team formed?

Fathi Ghifari: We are all from the same institution, Padjadjaran University. Of course, finding an idea for a project without arguing is like watching a movie without a main character. Each of the five of us looked for the best idea, and then we discussed them to make a final decision.

National stages were held before the final in Moscow. Was the competition tough?

Marsha Aziza Wardhana: I don't remember exactly how many teams participated in the national stage of HackAtom, but I remember our reaction very well when we first saw the list of finalists: "No, we have to forget about winning." We were all second- and third-year undergraduate students, and we had to go head-to-head with graduate students and seniors. It was a truly challenging competition.

What language did you speak during the final? Did you have any difficulties translating technical terms?

Richard Kurniawan: Within the team, we communicated in our native Indonesian, of course. With other Global HackAtom participants and the jury, we spoke English. Fortunately, we had no problems translating technical terms, because we primarily use English in our major.

Your project is one of the most human-centric: you proposed a concept of using nuclear technologies to maintain biological rhythms during space flights. Could you tell us more about it?

Marsha Aziza Wardhana: It all started with a seminar by Russian cosmonaut Anton Shkaplerov. He mentioned that astronauts are prone to depression and the feeling of isolation. So, at first, we wanted to invent something to improve astronauts' mental health. Later, our mentor told us that all of the astronauts' problems — cardiovascular risks, compromised immunity, or even mood instability — could share a common pathomechanism: the misalignment of the circadian rhythm, or biological clock. That is how the idea for our project was born.

The jury included representatives from Rosatom and engineering universities. Which questions from the experts were the most difficult for you, and which ones did you like?

Marsha Aziza Wardhana: The most difficult ones were about financial planning and future plans. None of us had a solid background in economics or management, so the financial part was a bit tough. But I really liked the questions about our project: what isotope we were going to use, what principles we relied on, and how our solution differed from what is currently used on the International Space Station (ISS) to regulate astronauts' circadian rhythms.

The final brought together more than 50 participants from 10 countries. Did you feel a spirit of international scientific camaraderie?

Frederick Suhamdy: When I met the teams from other countries, I was nervous: it was my first experience communicating with international students. I was very curious to learn about their cultures and projects.

Krisi Nohan: We had fierce competition, but we still managed to make friends. Thanks to the events organized by Rosatom, we bonded with people from different countries. Personally, I became friends with the team from Kazakhstan, and we still keep in touch.

When the results were announced and you realized you were among the winners, how did you feel?

Fathi Ghifari: Amazing. Unbelievable. It felt like a dream!

If you had to describe Global HackAtom in three words, what would they be?

Fathi Ghifari: Memorable, fascinating, inspiring.

The final was dedicated to space exploration using nuclear technologies. What do you think this will look like in the foreseeable future?

Frederick Suhamdy: I am optimistic. I think the integration of nuclear technologies into spacecraft will happen in the next 50 years, as atoms are among the best options for power generation in terms of efficiency and environmental impact. As a future doctor, I hope to contribute to space exploration by ensuring the health and safety of astronauts.

What does winning Global HackAtom mean to you in the context of your future?

Fathi Ghifari: Many of us on the team are interested in developing our careers in the nuclear field. We hope that in the future we can contribute to the development of nuclear medicine in Indonesia.

Marsha Aziza Wardhana: Winning HackAtom 2025 gives me the confidence to consider nuclear and aerospace medicine as my potential majors in the future. One of our team members, Frederick Suhamdy, has even started thinking about practicing medicine in Russia.

Photo by: Rosatom International Network, ANO Energy of the Future