



CONTENTS

[Back to contents](#)

ROSATOM NEWS

[Bolivian Lithium for Russia](#)

[Signed at SPIEF](#)

TRENDS

[Rosatom Puts Emphasis on Medicine](#)

REACTOR TECHNOLOGIES

[Fast, Sodium, and Upgraded](#)



Bolivian Lithium for Russia

In late June, Uranium One Group (a part of Rosatom) and the Bolivian state-run company Yacimientos de Litio Bolivianos (YLB) signed a framework agreement to build a lithium carbonate mining and production complex in Potosí Department, Bolivia. For Rosatom, which has embarked on ambitious plans to enter the lithium ion storage market segment, this represents the first large-scale overseas lithium mining project.

Tender

The agreement was signed following a direct lithium extraction (DLE) technology tender announced by YLB on April 30, 2021. More than 20 companies from different countries submitted bids for the tender. They received brines from Bolivia's well-known lithium salt deposits — Salar de Uyuni, Salar de Pastos Grandes and Salar de Coipasa — to demonstrate the capabilities of their extraction technology. Technical test reports were submitted to the tender committee to evaluate the efficiency of the DLE technologies for brines with different lithium and impurities content, as well as financial, economic, legal and environmental parameters of the projects planned.



ROSATOM NEWS

[Back to contents](#)

“The agreement we signed today paves the way for the implementation of an ambitious project. The application of advanced Russian technology will ensure the sustainable use of Bolivia’s natural wealth for the national development and the benefit of the Bolivian people,”

Jorge Alberto Roca Kauffman, President of Lithium One Bolivia (a Bolivian subsidiary of Uranium One), said at the ceremony.

Future project

The agreement signed with the Russian company stipulates the construction of a production facility with an annual capacity of 25,000 tons of lithium carbonate at the Salar de Pastos Grandes located in the Andes at an altitude of 4,600 meters above the sea level. The investments in the project will amount to USD 600 million. Its planned production capacity might be increased following the exploration activities.

“We share Bolivia’s interest in the prompt commissioning of the project’s first phase and the start of production. Additionally, Rosatom will provide training for qualified personnel for the facility,” said Rosatom’s Deputy Director General for Development and International Business Kirill Komarov.

Ongoing cooperation

The development of the Salar de Pastos Grandes is Rosatom’s second major project in Bolivia. The first project is the Nuclear Research and Technology Center (NRTC) in the city of El Alto. NRTC has already produced and delivered the first radiopharmaceuticals to Bolivian clinics. Its preclinical cyclotron facility will fully

The bidders demonstrated the specifics of their technology, including the sequence of process operations, equipment operation modes, process parameters, etc. The Russian technology demonstrated a 90% lithium recovery rate attributable to the use of a special sorbent. It does not employ any aggressive chemical compounds, with fresh water used for desorption. After lithium is extracted, the brine that still contains all other initial components is returned to the deposit. The Russian technology provides for water recycling, thereby minimizing water consumption and preserving the water balance of the deposit and surrounding areas. Finally, the technology is fully automated.

In June 2022, the main bidding phase was over. Six companies made it to the finals. YLB short-listed four of them: one from Russia, one from the US, and two from China. In January 2023, YLB signed a framework agreement with the Chinese consortium CBC, which includes CATL, BRUNP and CMOC, on the construction of a lithium carbonate production facility at the Salar de Uyuni and Salar de Coipasa. Negotiations continued with the bidders, resulting in YLB signing agreements with Uranium One Group and China’s CITIC Guoan.



ROSATOM NEWS

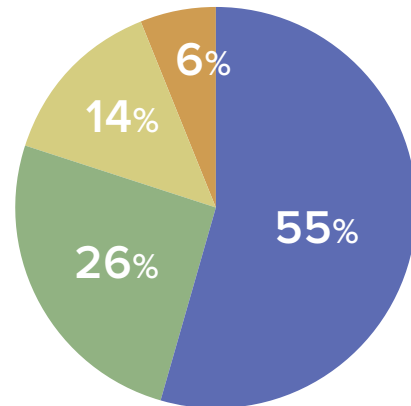
[Back to contents](#)

supply Bolivia with radiopharmaceuticals for medical purposes, ensuring over 5,000 diagnostic procedures per year. **“We are reliable partners as neither political difficulties nor pandemic obstacles have prevented us from constructing the Nuclear Research and Technology Center in accordance with our agreements,”** Rosatom Director General Alexey Likhachev commented.

Lithium for storage

Bolivian lithium is needed for the development of the energy storage sector. Rosatom plans to establish a vertical supply chain spanning from metals and mining to the production of energy storage systems for electric transportation and power generation needs. **“Why does Rosatom need lithium? We are and will be using it in our long production chain. We have already set up assembly operations in Russia to manufacture commercial and vehicle energy storage systems. The construction of an energy storage plant in Kaliningrad is unfolding, and there are many more plans to increase the production of storage systems and batteries, primarily for electric vehicles,”** Alexey Likhachev said.

WORLD'S LARGEST LITHIUM PRODUCERS



- 55% Australia
- 26% Chile
- 14% China
- 6% Argentina

Bolivia will also reap benefits from the new production facility. Despite being part of the so-called ‘lithium triangle’— formed by Bolivia, Argentina and Chile, which have large lithium reserves— and accounting for 21.4% of the world’s lithium, the country has not yet begun commercial-scale production of this metal.



Signed at SPIEF

Rosatom signed a number of agreements, which are of importance for both the company and Russia, at the Saint Petersburg International Economic Forum held in mid-June. Their diversity and number demonstrate international interest in the technology and solutions possessed by the Russian nuclear corporation.

Northern Sea Route

Among the most important was the agreement on cargo transportation and the development of Europe-Asia transport logistics with the global port operator, DP World. The document reinforces and expands the agreement signed on July 23, 2021 at the Arctic Days forum.

“This is the case when, figuratively speaking, we can kill two birds with one stone — in fact, two big bears — with one bullet, that is, with one budget investment.

Interesting facts

Export and import transportations via the Northern Sea Route have long ceased to exist on paper only and become a reality. On July 7, the container ship NEWNEW POLAR BEAR departed from Saint Petersburg for its maiden voyage to Asia. This is the first of the regular voyages launched by Hainan Yangpu Newnew Shipping Co. and the shipping agent Torgmoll.

NEWNEW POLAR BEAR, a higher ice class vessel, is carrying Russian-made goods, mostly those of timber processing companies based in Northwest Russia. Its estimated voyage time is about 28 days; the exact duration depends on ice conditions. Regardless, the voyage will be approximately one and a half times faster than traveling through the Suez Canal, which typically takes 45 to 50 days.

Rosatom’s Marine Operations Headquarters GlavSevmorput provides information and navigation support for the NSR voyages. When necessary, nuclear icebreakers escort the container ships.

In other words, we will establish the route eastwards in the interests of our companies and, at the same time, create favorable and attractive conditions for international transit,” Director General of Rosatom Alexey Likhachev commented on the event in an interview to Russia 24 TV channel.

DP World Chairman and CEO Sultan Ahmed bin Sulayem said that transport and logistics companies from the United Arab Emirates were interested in the cooperation with Rosatom. The reasons are clear. On the one hand, there are logistics disruptions between



ROSATOM NEWS

[Back to contents](#)

the West and the East as even the smallest faults in the operation of the Suez Canal lead to supply delays at the global level. On the other hand, no new routes except the NSR have been established over the past 60 years. Furthermore, the Northern Sea Route offers a number of significant advantages, as it reduces both the time and costs of cargo deliveries along the London-Tokyo sea lane.

Rosatom and Russia’s TSS Group have agreed to establish a joint venture that will secure international contracts for the construction of floating nuclear power units with a capacity of at least 100 MW and a service life of up to 60 years. The target markets are the Middle East, Southeast Asia and Africa. This is a framework agreement, with legally and financially binding documents to follow. It is expected that the floating power units will be commissioned in 2029–2036.

Clean energy

NovaWind (Rosatom’s wind power division) signed a memorandum with the Ministry of Electric Power of Myanmar and the Myanmar-based Primus Advanced

Technologies Ltd to begin feasibility studies for the construction of wind farms with a total capacity of 172 MW. The studies will include wind measurements and preparation of design documents for a 116 MW wind capacity in the Minhla Township and 56 MW in the Mindon Township. **“We partner with Rosatom to supply electric power from the wind farms to the national grid and benefit the people of Myanmar with the joint investments of our two companies,”** Managing Director of Primus Advanced Technologies Kyaw Hla Win said.

A similar memorandum was signed between NovaWind, the Ministry of Electric Power of Myanmar and the local company Zeya & Associates. The memorandum pertains to the construction of a 200 MW wind farm near the towns of Kyaukpadaung and Nyaung-U in the Mandalay Region (Central Myanmar). **“Today we are signing two memoranda that will make the first step to unlock the huge development potential of wind power projects. I very much appreciate the support provided by the Myanmar Ministry of Electric Power. The country will receive a clean energy source that, in turn, will create an industrial cluster with new jobs and professions,”** NovaWind CEO Grigoriy Nazarov said at the signing ceremony.

Rusatom International Network and the Mongolian company Dayan Deerkh Energy signed a strategic agreement on the cooperation in nuclear, hydro and wind energy. The agreement also mentions non-energy projects in the field of nuclear medicine, composite materials and digital solutions for the urban infrastructure. As Dayan Deerkh Energy CEO Byambaa Munkhbaatar noted, extensive cooperation with the Russian partners who have world-leading competencies will contribute to





ROSATOM NEWS

[Back to contents](#)

solving the comprehensive task of national development under Mongolia's New Renaissance Policy.

For more details on the agreement with Zeya & Associates on healthcare projects, see our article 'Rosatom Puts Emphasis on Medicine'.

Overall, Rosatom signed some three dozen different agreements with Russian and foreign partners at SPIEF. **“International relations have never been easy, but this has not prevented the nuclear power industry from moving forward. The pressure has increased recently and become immense, and our partners are forced to choose solutions that are less effective and more**

expensive. But look, nuclear power in China and India is demonstrating an outstripping growth rate. New countries are embarking on nuclear programs. Myanmar, Kyrgyzstan, and Sri Lanka are willing to reach agreements on the construction of energy facilities with us later this year. We will continue working, we will strengthen relations with those for whom national interests are more important than political directives [...] The global nuclear family continues to live and work together, offering new products that make the planet cleaner,” Rosatom's Director General summarized. 🗣️

[To the beginning of the section](#)



Fast, Sodium, and Upgraded

Large sodium-cooled reactors are yet another type of reactor technology that Rosatom is focusing on. Nuclear engineering company OKBM Afrikantov is currently developing BN-1200M, a sodium-cooled reactor, to be installed at Beloyarsk Unit 5, which will contribute to closing the nuclear fuel cycle.

BN-1200M is an upgraded reactor of the BN fast neutron series. Cooled with sodium, it

will have an electrical capacity of 1,200 MW and a thermal capacity of 2,800 MW. It has a four-loop design with a symmetric layout of the loops. Oxide and nitride fuels are being considered for the use in BN-1200M. According to Alexander Ugryumov, Senior Vice President for Research and Development at TVEL (a part of Rosatom), the dense MUPN (mixed uranium-plutonium nitride) fuel is currently the priority.

BN-1200M taps into many years of Rosatom's expertise in the development and operation of fast breeder reactors. The BN-1200M design uses the time-proven solutions from BN-600 and BN-800 reactors. BN-600 is also used to validate the use of structural



REACTOR TECHNOLOGIES

[Back to contents](#)



materials and fuel under the design operating conditions.

BN-1200M meets the latest, more stringent requirements to safety systems and controls for beyond-design-basis accidents, and incorporates the most advanced technical solutions. These include, for example, a hydraulically suspended absorber rod for passive shutdown system and a device designed to hold and cool molten fuel inside the reactor vessel in the event of a core meltdown accident.

The safety of the reactor is also enhanced by placing the systems and equipment containing radioactive sodium inside the reactor tank. The autonomous heat exchangers of the emergency heat removal system, which are also installed inside the tank, along with the natural coolant circulation through the circuits, contribute to reducing the likelihood of severe damage to the core. The capacity of the BN-1200 in-vessel storage has been increased in order to unload fuel assemblies from the reactor directly into the spent fuel pool, eliminating the need for a sodium drum.

Compared to the BN-600 and BN-800, the power density of the BN-1200 core is almost twice as low, which significantly extends the refueling interval. The use of larger fuel rods and fuel assemblies, mixed uranium-plutonium fuel, and new structural steels with increased radiation resistance ensures deeper burnup and reduced consumption of fuel assemblies. The use of expansion bellows to compensate for thermal expansion of the pipes has led to a reduction in their length. With the implementation of these new technical solutions, the length of sodium systems has been reduced considerably; radioactive sodium leaks and contact with air have been eliminated.

“The adopted technical solutions, such as passive safety systems and the use of self-protection properties inherent in the sodium coolant, make the reactor as safe as there will be no need to evacuate people in the event of any technically possible accidents,” says Sergey Shepelev, Chief Designer of BN reactors at OKBM Afrikantov.

The design of the reactor also incorporates solutions that will make BN-1200M more cost-efficient. The weight and production costs of its systems and components have been reduced through the modifications in the secondary circuit main circulation pump and the fuel loading system, replacement of sectional modules with large-size modules in the steam generators, and improvements in the emergency heat removal system and the primary-circuit cold trap. In-depth improvements in the reactor unit layout, streamlined construction solutions, and an optimized master plan will reduce the volume of construction work.

As a result, the estimated costs of capital construction, and, accordingly, electricity



REACTOR TECHNOLOGIES

[Back to contents](#)

generation, will decrease, thus making the reactor competitive with other power generation units currently under development or in use.

“The BN-1200M project follows Russia’s nuclear power development strategy, which involves creating a two-component nuclear power system based on the new generation of fast and thermal reactors. It will ensure a continuous supply of fuel, improve spent fuel and radioactive waste management, and facilitate a zero-carbon transition,” Sergey Shepelev commented.


Due to its physical properties, the fast neutron reactor can be operated on different plutonium isotopes extracted from the spent fuel of both fast and thermal neutron reactors. It can also ‘burn’ minor actinides to produce fresh plutonium for fuel and fabricate desirable isotopes.

The service life of the BN-1200M reactor unit is at least 60 years. As Sergey Shepelev notes, there is potential to extend its lifespan to 80 years, increase the utilization factor from 0.9 to 0.91, extend the service life of steam generators from 30 to 60 years, and lengthen the refueling interval.

It is expected that the project’s financials will be approved in 2023, followed by public hearings. The next step will involve obtaining approval from the national expert panel Glavgosexpertiza and securing a site license

TVEL is Rosatom’s fuel division and one of the world’s largest suppliers of nuclear fuel. TVEL is a monopoly supplier of nuclear fuel to all power, marine and research reactors in Russia. The company fuels nuclear power plants in 15 countries, or every sixth power reactor in the world.

from the federal regulator Rostekhnadzor. This will be followed by the development of engineering design documents, which will be also reviewed by Glavgosexpertiza. The task for 2026 is to obtain a construction license. The first concrete pouring is scheduled for 2027, with capital construction works and delivery of long-lead equipment to be completed by 2030. The plan for 2031 is to obtain an operating license, bring the reactor to criticality and then to power.

“We have accumulated extensive experience in the sodium fast technology. The existing facilities — the BOR-60 research reactor and the commercial BN-600 and BN-800 power reactors – operate efficiently. I believe we are ready to commercialize the sodium fast technology and maintain Russia’s leading position in this field,” Sergey Shepelev concluded. 

[To the beginning of the section](#)



Rosatom Puts Emphasis on Medicine

In the April issue of Rosatom Newsletter, we discussed Rosatom's activities in nuclear medicine, specifically the start of radiopharmaceuticals deliveries from the Bolivian Center for Nuclear Research and Technology. Recent months saw a number of events suggesting a steady trend: Rosatom, a Top 3 global supplier of radioisotopes, is consistently working towards a leading position in the global nuclear medicine and medical equipment market.

Deliveries

Expanding the geography of supplies and the range of medical isotopes and associated radiopharmaceuticals is one of Rosatom's primary business development strategies. Rosatom's subsidiary Izotop, which supplies isotope products to 50 countries, is working to expand its footprint in the CIS and Asian markets. **"In terms of quality and range of radiopharmaceuticals, we are in line with global trends, competing closely with other global industry leaders,"** says Igor Obrubov, CEO of Rusatom Healthcare and Chief of Rosatom's Healthcare Technologies division.

In their turn, companies from those countries show great interest in the capabilities of the Russian nuclear corporation in radionuclide



TRENDS

[Back to contents](#)

diagnostics and therapy, especially target therapy. Here are a few examples.

In late June, Izotop won an international tender from the Belarusian company Belpharmacia for the supply of technetium-99m generators, outcompeting other European manufacturers of such generators.

Technetium-99m is the most sought-after medical isotope used in over 80% of SPECT (single photon emission computed tomography) diagnostic procedures in oncology, cardiology, neuroendocrine and other diseases.

According to the contract, in August 2023 through July 2024, Izotop will supply Belarus with more than 900 technetium-99m generators of varying activity levels, produced at the Karpov Research Institute of Physics and Chemistry. The deliveries will fully meet the needs of Belarusian medical institutions for technetium-99m generators.

“We are proud to have won the opportunity for the first time in a long while to supply Russian-made technetium generators to the Republic of Belarus. This will increase sales of high-tech products and bring the cooperation between our countries to a new level,” says Maxim Kushnarev, CEO of Izotop.

As Igor Obrubov informed, representatives of the Healthcare Technologies division and their Belarusian colleagues hold meetings almost every month. These contacts have resulted in an agreement for the supply of equipment for medical centers, regular round table seminars for doctors on the application of radiopharmaceuticals, and obtaining official registration for medical devices. Intensive efforts are underway to

expand cooperation on multifunctional irradiation centers. Besides, some Belarusian manufacturers have been using Russian facilities to sterilize their products.

In July, Izotop made the first shipment of germanium-68/gallium-68 (Ge-68/Ga-68) generators manufactured by Tsyklotron to Esente Healthcare, an Indian distributor of medical products. Gallium-68 is used in nuclear medicine to diagnose a wide range of cancers by PET scanning. Over 100,000 diagnostic procedures are performed every year worldwide using this isotope.

The new contract with the Indian company provides for 40 Ge-68/Ga-68 generators to be supplied to India within a year. **“Deliveries of germanium-68/gallium-68 generators open up new opportunities for the expansion of Rosatom’s presence in the Indian nuclear medicine market,”** says Anton Shargin, Deputy CEO for Commercial Affairs at Izotop.

The Russian nuclear corporation also puts much effort in promoting its nuclear medicine products at specialized exhibitions and forums. In our April issue we reported on Rosatom’s participation in the 12th International Symposium on Targeted Alpha





TRENDS

[Back to contents](#)

Therapy in Cape Town, South Africa. In June, Rosatom presented its healthcare product line at the 2nd Pan-African Exhibition and Conference Africa Health ExCon 2023 held in Cairo, the capital of Egypt. Speaking at the conference, Irina Svyato, PhD in Chemistry, presented 16 medical devices developed by Rosatom and 11 radiopharmaceuticals offered by the Russian nuclear corporation for diagnostics, treatment, and theranostics (a combination of therapy and diagnostics) of cancerous and cardiovascular diseases. Among other products, Rosatom's booth at the exhibition featured, a linear particle accelerator, Onyx, a brachytherapy device Brachyum, and cyclotron units.

Tianox, a device for nitric oxide therapy in adults and children, including newborns, garnered significant interest among the exhibition visitors. Rusatom RDS and the Egyptian company, Med Pharma Group signed an agreement on the scientific and technical cooperation and deployment of Tianox devices and nitrogen monoxide treatment procedures in Egyptian medical institutions.

Agreements

A number of agreements recently concluded by Rosatom lay the foundation for the launch of specific projects.

A memorandum of understanding was signed between Rusatom Healthcare and Myanmar's Zeya & Associates Co. during the Saint Petersburg International Economic Forum. The document provides for the joint development of non-energy nuclear technologies in healthcare, particularly in establishing multi-functional irradiation centers in Myanmar. **“Nuclear medicine**

is an essential element of the healthcare industry. With advanced technology and accurate diagnostics, it helps doctors devise more effective treatment plans for patients, improving their quality of life. The importance of nuclear medicine will continue to grow in the future,” Zeya Thura Mon, President of Zeya & Associates Co., pointed out.

“Rosatom approaches healthcare tasks as consistently as possible. Its offering includes a wide range of isotope solutions, production of radiopharmaceuticals and high-tech medical equipment, irradiation of medical devices and foodstuffs, and proprietary medical infrastructure facilities,” Igor Obrubov said.

At the recent Eurasian Intergovernmental Council and the CIS Council of Heads of Governments, Rosatom Director General Alexey Likhachev and Kyrgyzstan Prime Minister Akylbek Zhaparov signed a memorandum of cooperation. This memorandum between Rosatom and the Kyrgyzstan Ministry of Health in the application of nuclear technologies in healthcare. As agreed upon, the parties will



TRENDS

[Back to contents](#)



join their efforts to develop high-tech medical projects in Kyrgyzstan. In particular, the memorandum outlines the establishment of a radiopharmaceutical repository and a molecular imaging center at the National Oncology and Hematology Center.

“We are pleased to have the opportunity to work with Kyrgyz partners on innovative technologies that make a significant contribution to improving the quality of life in our countries. Our efforts in this area include the production of radiopharmaceuticals, supply of high-tech medical equipment, creation of new medical infrastructure facilities, and staff training,” Alexey Likhachev said.

Uzbekistan and Rosatom reached an agreement to establish a chain of radionuclide therapy and diagnostics centers in the country. Among other things, Rosatom will replace an outdated cyclotron facility that was built back in the Soviet times.

Another agreement was reached with Armenia to establish a nuclear medicine center in Yerevan. However, it is possible that

the center will become multi-disciplinary providing not only nuclear diagnostics but also chemotherapy services and perform surgical operations.

In Bangladesh, Rosatom is upgrading equipment in an irradiation center, with negotiations underway to construct another irradiation center from scratch.

Talks are also underway with Nicaragua to establish nuclear medicine and irradiation centers as part of a non-energy nuclear technology application agreement signed this March. **“We have a successful case in Bolivia. Moreover, Latin American countries lean towards us because we are more understandable to them. This is why they are ready to hold a dialog with us on the deployment and application of our products in their countries,”** Igor Obruchov comments.

Kazakhstan is also interested in joining efforts with Rosatom to develop medical facilities, purchase radiopharmaceuticals and establish irradiation centers. **“Kazakhstan is willing to use the entire line of our products. Before finalizing the configuration of a project, we carefully analyze patient flows and incidence rates, assess qualifications of doctors, identify training needs, and evaluate the current regulatory framework, to determine whether it has to be supplemented or adjusted. Projects are always multifaceted, there are no simple ones. We are building a business that will be profitable and needed by everyone and that no one but Rosatom will be able to build,”** Igor Obruchov assured. ^{NL}

[To the beginning of the section](#)