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To Central Asia With Energy

September saw several important events taking place in two Central Asian countries, Uzbekistan and Kyrgyzstan, to lay the foundation for Rosatom's projects in this region. Here is the latest news.

Uzbekistan

AtomStroyExport (ASE, Rosatom's engineering division) and the NPP Construction Directorate of Uzbekistan's Agency for Nuclear Energy Development (UzAtom) signed a protocol on the commencement of on-site works to build a small modular reactor (SMR) nuclear power plant in Uzbekistan. "The protocol signed today documents that the parties have met their regulatory and financial conditions precedent. Rosatom's engineering division is now moving ahead with drafting technical documents required to obtain an SMR site license and site survey permits," said Pavel Bezrukov, Director for NPP Construction Projects in Central Asia at ASE.

Preliminary work on the SMR project started in the summer of this year. In late August,

construction of a rotation camp began to accommodate on-site workers. International construction practice shows that a new town always attracts industrial and commercial companies, offering them new business opportunities.

The SMR plant to be built in Uzbekistan will be equipped with Russia's latest RITM-200N nuclear reactor. It is a water-cooled water-moderated installation, a modification of the time-proven RITM-200 naval reactor (reactors of this design operate successfully on nuclear icebreakers) for onshore deployment. RITM-200N will also be installed at a nuclear power plant currently under construction in Yakutia to become Russia's first onshore SMR.

Kyrgyzstan

Rosatom Service (part of Rosatom's electric power division), the Russian-Kyrgyz Development Fund (a development institution established by the governments of the two countries) and Alfa Oil (a leading Kyrgyz distributor of fuels, lubricants and other petroleum products) signed an investment agreement at the 4th Kyrgyz-Russian Economic Forum to build a 30 MW hydroelectric power plant (HPP) on the Chandalash River in the Jalal-Abad Region. The project is expected to be finished in three years.

"With support from the Ministry of Energy of the Kyrgyz Republic, we are going ahead with the construction of a facility that is of social and economic importance for the local communities. The Chandalash HPP will have a positive impact on the well-being of local residents and development of the national industry. The project will use Rosatom's advanced technology to ensure the hydro

power plant is built to the highest standards," said Vladimir Bredov, Deputy CEO for Project Management at Rosatom Service.

Rosatom Service will act as an EPC contractor: the company will manage the entire project, do the engineering part, procure equipment, and provide construction, installation and commissioning services. Local contractors are planned to be involved in the project to the maximum extent possible. The Russian-Kyrgyz Development Fund and Alfa Oil will act as investors and manage government relations.

As the forum was up and running, a capsule was laid near the village of Kok Moinok-Pervoye, Issyk-Kul Region, to mark the start of Rosatom's project to build a wind farm.

"Despite the skepticism, today we have stepped onto the path of achieving one of the UN Sustainable Development Goals. Although the Kyrgyz Republic is among the regions that have the greatest potential for renewable energy, we have not added wind, solar or biogas to our energy mix yet. We have more than 300 sunny days a year, and the power of local winds found its way into

folk legends," said Akylbek Zhaparov, Chairman of the Cabinet of Ministers and Head of the Presidential Office of Kyrgyzstan.

"I am thankful to the leadership of Kyrgyzstan and I am sure that our cooperation will but strengthen," said Grigory Nazarov, CEO at Rosatom Renewable Energy.

Wind measurements are underway at the site, with construction works scheduled to begin in 2025. The wind farm is planned to be commissioned by the end of 2026.

Kazakhstan will also have nuclear

In early October, Kazakhstan held a nationwide referendum on the construction of a nuclear power plant in the country. The majority (over 70%) of those who voted supported the government plans. Kazakhstan authorities are considering four reactor technology vendors, Rosatom included. An option to form an international consortium is also under consideration, according to President Kassym-Jomart Tokayev. Kazakhstan's first nuclear power plant is planned to become operational by 2035.

Lithium Nearing Production

In mid-September, Uranium One Group (part of Rosatom) and the Bolivian state-run company Yacimientos de Litio Bolivianos (YLB, 'Bolivian Lithium Deposits') signed a contract in Bolivia's capital La Paz. The contract provides for Rosatom to build a lithium carbonate plant at the Salar de Uyuni (Uyuni Salt Flat) in the Potosí department. The new project adds to the expansion of mutually beneficial cooperation between the two countries.

Advantages of the technology

The contract provides for the production facility to be put in operation in the second half of 2025. Its capacity will be increased gradually to reach the rated output of 14,000 tonnes of lithium carbonate per year. The extraction plant will be located at an altitude of 3,650 meters above the sea level.

Lithium will be extracted from the brine using a Russian-designed direct lithium sorption (DLS) process, which proved to be effective and safe for the Bolivian salt flats. What makes the DSL process different is that it does not involve aggressive reagents. Instead, fresh water is used in a closed system. This means that wastewater is not discharged into the environment, but recycled continuously and reintroduced into the process. Having passed through the production cycle, the spent brine is virtually identical to the original natural brine in its chemical composition (except, of course, for the lithium extracted) and therefore has no impact on the ecosystems. This aspect is crucial for preservation and sustainability. Another fundamental difference between the Russian technology and the conventional evaporation process is that the former does not depend on weather conditions as it does not use evaporation ponds. Finally, the extraction process is fully automated.

Bolivian context

Bolivia pursues exponential growth of its lithium industry and deeper industrialization of the national economy. On this path, the country relies on the engineering solutions, accumulated expertise, production capabilities and technological know-how of Rosatom Group companies and other leading Russian manufacturers.

Uranium One Group seeks to expand ties with the local expert community as part of an agreement signed in 2023 with the Tomás Frías Autonomous University (UATF). The technical group established by the parties is engaged in fundamental scientific research and is tasked with the development and improvement of selective lithium extraction solutions for natural brines. This work involves faculty, researchers and students majoring in different fields of knowledge.

Apart from academic efforts, Uranium One Group and YLB launch humanitarian and charitable initiatives and hold regular events for local communities, trade unions, public organizations and educational institutions in Bolivia, raising public awareness of lithium projects and their role in improving the well-being of local residents.

When launched, the lithium projects will ensure a stream of regular tax income to the local and federal budgets, improve transportation and energy infrastructure, contribute to better training of local professionals, and give an impetus to the development of related businesses (including tourism) and culture of the Bolivian Altiplano. All of this will surely strengthen and expand the long-standing successful cooperation between the two countries, Uranium One Group believes.

Sectoral context

Rosatom is building an end-to-end technology chain, spanning from lithium mining

to high-tech lithium-based products. The Russian nuclear corporation participates in lithium mining projects in Russia and around the world. In Russia, this includes a joint project with MMC Norilsk Nickel to develop Kolmozerskoye, one of the world's largest lithium deposits located in the Murmansk Region. With geological surveys completed, the parties are analyzing technical and economic parameters of the project and working on the engineering design of the production facilities and infrastructure.

On the global scale, in addition to the lithium program in Bolivia, Rosatom is considering partnership opportunities in Mali. Speaking at this year's Russian Energy Week, Mali's Minister of Economy and Finance Alousséni Sanou said he intended to establish a strategic lithium mining partnership with Russia so that the country would be able to produce lithium-ion batteries within 6 to 7 years.

In addition, Rosatom is building two lithium-ion battery factories in Russia to deliver on its goal of establishing an end-to-end lithium supply chain. Some Rosatom Group companies are working on power and transportation applications of lithium-ion batteries. Rosatom is also among the world's leading manufacturers of high-purity metallic lithium.

Apparently, the lithium business is taking up an increasingly larger share in Rosatom's business structure, and new local and international partnerships are nothing but logical in this context. The contract signed with the Bolivian company is therefore an important milestone in the Russian-Bolivian lithium program aimed at jointly establishing lithium production facilities in the country and building a long-term partnership based on mutual respect of interests. NL

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Making It Clean

Rosatom boasts long-acquired expertise in handling hazardous radioactive substances, including radioactive waste (RW) and spent nuclear fuel (SNF). The solutions and competencies developed over the years enable Rosatom to contribute to the remediation of legacy hazardous sites in Russia. The nuclear corporation also shares its unparalleled experience with other countries, implementing legacy management projects there. These activities logically fit into the nuclear industry goals of minimizing the negative impact on people and environment.

In Russia

Russia is one of the few countries that have a well-developed and ever-expanding infrastructure for RW and SNF management. Spent nuclear fuel is processed to extract fissile materials that will be reintroduced into the fuel cycle. Radioactive waste (anything that remains after extracting all useful substances) is rendered safe and sent for disposal.

The National Operator for Radioactive Waste Management (NORWM, part of Rosatom) builds and operates near-surface repositories for RW to be finally isolated from the ecosystem. One of the repositories was put in operation in Novouralsk, Sverdlovsk Region, in 2016. It was upgraded and expanded in

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2020 and is planned to remain operational until 2036. Similar near-surface repositories are being built in the Chelyabinsk and Tomsk regions.

NORWM is also building an underground research laboratory in the Nizhnekansky rock massif at a depth of 500 meters. Its primary objective will be to study the possibility of burying medium- and high-level radioactive waste in the deep geological formations of the massif.

In addition, Rosatom is engaged in the decommissioning and disposal of nuclear submarines and other nuclear- and radiation-hazardous marine vessels and facilities. One of the examples is the Lepse depot ship, which was used for refueling nuclear icebreakers in the 1960s-1980s. Rosatom removed spent nuclear fuel from the ship and cut its hull into the stern and bow sections. Properly packed, they are now stored in a long-term storage facility in Sayda Bay (Murmansk Region), along with other similar items.

The above are only some of Rosatom's activities in the nuclear back-end (decommissioning of nuclear- and radiation-hazardous facilities). Since Rosatom has extensive competencies in legacy management, the government has entrusted the nuclear corporation to lead decommissioning activities at other hazardous industrial facilities in Russia, not necessarily nuclear-related.

The first project in this field was the rehabilitation of landfill site near Chelyabinsk. The project was completed in 2021, and the air quality in Chelyabinsk has improved since then. The former landfill is now used to grow flowers for the city's lawns, so the project can serve as an example of the best eco practices.

Now Rosatom is rehabilitating a municipal landfill in Magnitogorsk.

Some of its legacy management projects are much more complex and far-reaching — these include rendering safe the Baikal Pulp and Paper Mill, UsolyeKhimProm chemical plant (both located in the Irkutsk Region), and an industrial waste landfill site in Krasny Bor (Leningrad Region). As for UsolyeKhimProm, Rosatom was hired by the government to deal with hazardous facilities at the former chemical production site. By now, more than 90% of all aboveground and underground structures on the site have been dismantled.

All these legacy projects in Russia are accompanied with the efforts to develop and adopt recycling solutions with the goal of reintroducing useful materials into economic circulation.

Russia considers spent nuclear fuel to be a resource, not waste. For over 45 years, Rosatom's subsidiary Mayak has been reprocessing spent nuclear fuel from various reactors to extract useful fissile materials and individual isotopes from it. Such materials can

be used, in particular, in a transition to the so-called 'closed' nuclear fuel cycle. For this purpose, an experimental power production facility is being built in Seversk to combine, for the first time ever, a nuclear power plant with a fast neutron reactor and fuel reprocessing facilities on a single site.

Today, all fissile materials extracted from spent nuclear fuel are already used to fabricate nuclear fuel for thermal reactors and the BN-800 fast reactor (installed at Unit 4 of the Beloyarsk NPP). The latter has been running entirely on recycled fuel and using no enriched uranium for over a year.

Meanwhile, Rosatom continues to improve solutions and expand reprocessing capacities for spent nuclear fuel from thermal neutron reactors: the second section of an experimental facility is about to be launched at the Mining and Chemical Plant in Zheleznogorsk to test and pilot commercial solutions and equipment for SNF reprocessing.

As part of the circular economy approach in non-nuclear sectors, seven eco technology parks are being built to process Hazard Class I and II wastes and recycle useful components extracted from them. One of these plants will recycle lithium-ion batteries, another will recycle mercury waste (e. g., lamps), and so on.

Overseas

Rosatom supports legacy management initiatives in other countries by rendering safe nuclear- and radiation-hazardous facilities. These initiatives are governed by the CIS Uranium Mining Site Rehabilitation Program (in effect until the end of 2024) and include, among others, the reclamation by Rosatom of four uranium tailing dumps and a dumping ground of the beneficiation plant at the Taboshar mining site near Istiklol, Tajikistan. According to the monitoring data from the Chemical, Biological, Radiation and Nuclear Safety Agency of Tajikistan's National Academy of Sciences, background radiation at the rehabilitated sites has dropped to natural levels. Tailing dumps in the Sughd region of the country will be rehabilitated next. After 2024, rehabilitation projects will be governed by a new intergovernmental agreement.

Rosatom's technical solutions make it possible to both render the old tailing dumps safe and secure a positive transnational effect from remediation activities. For example, the solutions employed to prevent radioactive leaks from tailing dumps have improved safety of the Central Asian rivers flowing through several countries, which has a positive effect on the environment of the entire region.

Rosatom is also discussing cooperation opportunities for the management of radioactive and industrial hazardous waste with Belarusian colleagues. In particular, the parties plan to launch a joint initiative to rehabilitate a pesticide dump site near the town of Gorodok, Belarus.

"Sustainability is one of Rosatom's priorities in its cooperation with foreign countries. We strive to jointly solve existing environmental problems and also develop technology and solutions that will prevent similar problems in the future," Andrey Nikipelov, Deputy Director General for Power Engineering and Industrial Solutions at Rosatom, said with confidence. NL

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Nuclear Trendsetter

Russian nuclear scientists and power engineers are recognized globally as leaders in their field. Working in close contact with its partners, Russian nuclear companies are improving current technologies and enabling technologies of the future. These trends were outlined by Alexey Likhachev, Director General of Rosatom, in his speeches at the IAEA General Conference and the Russian Energy Week.

Past and present

Starting his speech at the IAEA General Conference, which took place in Vienna in mid-September, Alexey Likhachev reminded the audience of how nuclear power was born: "Seventy years ago, the world passed a watershed mark as the first-ever nuclear power plant was put in operation in the Soviet city of Obninsk." The Soviet Union was also one of the founding fathers of the IAEA, and Russia as its legal successor continues to support the agency's activities by providing expert knowledge and finance, Alexey Likhachev noted.

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For the seven decades that passed, Russia has strengthened and improved its leadership in the field of nuclear energy. Among the 2023 landmarks are the commissioning of the Belarusian NPP, first concrete pouring at El Dabaa Unit 4 in Egypt, nuclear fuel delivery to the Rooppur NPP in Bangladesh, and installation of a research reactor vessel at the Nuclear Research and Technology Center in Bolivia. Rosatom continues building nuclear power plants in Turkey, Hungary and Iran, and provides assistance in the construction of Chinese and Indian nuclear stations.

In Russia, Kursk II Unit 1 is planned to achieve its first criticality by the end of the year. First concrete was poured for the foundation of Unit 3 at Leningrad II. Engineering surveys were completed at Smolensk II, and workers are now proceeding with on-site activities.

Rosatom is also building Europe's largest radiopharmaceutical factory in Obninsk and working to expand Russia's nuclear-powered icebreaker fleet as a new icebreaker, Leningrad, has been laid down recently.

"Having established Obninsk Tech, a global center for nuclear education, we have raised the nuclear staff training to a fundamentally new level. Its infrastructure is sufficient to hold up to 10,000 people for a scientific conference, an educational event or a youth gathering," Alexey Likhachev said.

Key trends

Speaking at the IAEA General Conference, Alexey Likhachev outlined two trends that will define the development of the global nuclear industry in the 21st century and are evolving in Russia.

Closing the nuclear fuel cycle is the most important of them. In Russia, Rosatom is building a Generation IV integrated power production facility as part of its flagship Proryv (Russian for 'breakthrough') Project. The facility will comprise a power unit with a 300 MW lead-cooled fast neutron reactor BREST, and on-site modules for the reprocessing of spent fuel and fabrication of fresh fuel. When completed, this will be the first-ever facility operating in a 'closed' nuclear fuel cycle. "It is a comprehensive solution that will make it possible to repeatedly use spent nuclear fuel. This approach will eliminate all the issues related to spent fuel management, making nuclear more sustainable and providing an almost limitless source of nuclear fuel," Alexey Likhachev pointed out.

Not long ago, fuel assemblies containing minor actinides were loaded into BN-800, a fast neutron reactor operating at the Beloyarsk NPP, to burn these most hazardous radionuclides. The project to build an even larger fast neutron reactor, BN-1200, obtained a positive opinion from environmental regulatory bodies.

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As noted by the chief of Rosatom, the Russian initiatives to shape a nuclear industry of the future attract increasingly more international interest. Last year, Rosatom and China signed a comprehensive long-term cooperation program for fast neutron reactors and closing the nuclear fuel cycle. In May this year, representatives of India visited the Proryv Project site.

The other trend is small-scale power generation. This is where Rosatom is setting the tone, too. Another four floating nuclear power units are under construction today, and all of them are more powerful than the world's only floating nuclear power plant, Akademik Lomonosov. The work is underway to build Russia's first onshore SMR nuclear power plant with RITM-200N reactors.

Alexey Likhachev also mentioned the consistent approach followed by the IAEA with respect to small-scale nuclear generation, including its efforts under the SMR Platform and within the SMR Regulators Forum.

In May, Rosatom and Uzbekistan signed the world's first export contract for the construction of a nuclear power plant consisting of six small modular reactors. The work is about to begin to set up infrastructure for the yet-to-be-built SMR plant. The Russian nuclear corporation also provides assistance to its Uzbek colleagues in establishing a regulatory framework for the nuclear industry.

Speaking later at the Russian Energy Week (REW) international forum, Azim Akhmedkhadzhaev, Director of Uzbekistan's Ministry of Energy Agency for Nuclear Energy Development, said that the country had opted for nuclear energy in a strive to provide the growing population and national economy with a reliable and sustainable source of power. He said Tashkent favored small-scale generation for its greater flexibility and lower demand for water, and chose Rosatom because its offer was the best among other vendors'.

Export of technological sovereignty

As a trendsetter for the global nuclear industry, Rosatom readily exports technological sovereignty to other countries. This was mentioned by Russian President Vladimir Putin at the Russian Energy Week. "Russia is ready to help its partners strengthen their technological sovereignty in the energy sector by establishing end-to-end research and supply chains. This is how partnerships are growing to promote peaceful uses of nuclear energy: Rosatom's building nuclear stations abroad goes hand in hand with the education of local personnel, with the training of engineers, workers and managers for the new facilities. In fact, we do not just build a nuclear plant but, as they say at Rosatom, establish a new sector of energy and economy for our partners," Vladimir Putin said.

Alexey Likhachev developed this idea in his speech at the REW. First, construction of

a nuclear power plant extends far beyond erecting a power generation facility into establishing a new industry in the host country, spanning from staff training, with school students involved, to decommissioning. Such partnerships last for a period of 100 years, he emphasized. Second, the nuclear corporation strives to increase local content in its international projects as much as possible. Local content, i. e. the share of goods and services supplied by local contractors qualified by Rosatom and national regulators, is always higher than that specified in the documents. Third, when the plant is in operation, Rosatom hires local maintenance companies and spare parts suppliers.

"At a certain stage, starting from seven to eight units in operation, it becomes economically feasible for the country to have its local fuel technology. We also benefit from this as we always optimize production costs. Sourcing goods and services locally is the case when duty coincides with intent," Alexey Likhachev said. He also added that establishing a nuclear industry in another country made the Russian nuclear industry stronger. "The more technological sovereignty you export, the stronger, more sovereign and more independent you become. Exporting our sought-after Generation III solutions, we spend no less effort on showcasing the capabilities of Generation IV technology. This is absolutely a win-win story," Rosatom chief concluded.

Russia's New Nuclear and Energy Technologies national project provides for five federal programs to be implemented in the country in 2025–2030 in order to stimulate the development of new generation technologies. These are 'Seriality of Large and Small Nuclear Power Plants', 'New Nuclear Power Engineering', 'Experimental Stands for Closing the Nuclear Fuel Cycle', 'Thermonuclear Engineering Technologies', and 'Special Materials and Technologies for Nuclear Power Engineering'. The goal of these programs is to consolidate Russia's global leadership in the nuclear field. "Our leadership is global now. This is evident from how much work is done by our leading company, Rosatom," Vladimir Putin said at the REW.

International cooperation

Russia's leading role is recognized by the international nuclear community. "As IAEA head Rafael Grossi said, Russia cannot be left out of the development of nuclear energy — it is impossible without Russia," IAEA Deputy Director General Mikhail Chudakov told the Newsletter. "International cooperation is the most important thing in the nuclear power industry. This can be seen from the IAEA, the World Association of Nuclear Operators, and the Nuclear Harmonization and Standardization Initiative that harmonizes regulatory approaches to accelerate the deployment of

small modular reactors. Of course, Russia is present everywhere and hosts colleagues, for example, at the Rosatom Technical Academy. The number of events organized by Rosatom in Russia has not decreased this year. Russia remains an active participant in each of the IAEA events and working groups. Yes, there have been attempts to make Russian speakers at conferences less visible, but we are improving this situation so that it is happening less and less often."

Rosatom executives had a number of meetings with representatives of other countries at the REW. Alexey Likhachev met with Nyan Tun, Union Minister of Electric Power of Myanmar, to discuss the progress of the project to build an SMR plant in the country and cooperation in the field of wind power generation. It should be recalled that Rosatom Renewable Energy (then Novawind), the Ministry of Electric Power of Myanmar and Myanmar-based company Zeya & Associates signed a memorandum of understanding for the construction of a 200 MW wind farm in the country. The signing took place at the St. Petersburg International Economic Forum in June last year.

Alexey Likhachev and Belarusian Minister of Energy Alexey Kushnarenko discussed the maintenance of the Belarusian NPP, nuclear fuel supplies and joint projects in the nuclear fuel cycle, as well as new non-nuclear initiatives aimed at ensuring the technological sovereignty of the Union State of Russia and Belarus.

Nenad Popović, Serbian minister in charge of international cooperation, and Alexey Likhachev discussed non-energy applications of nuclear technology and training of nuclear and related personnel at Russian universities. The parties intend to join forces in delivering nuclear energy projects if Serbia lifts the legislative ban on officials to discuss the construction of nuclear generation and nuclear fuel facilities in the country. The possibility of lifting these restrictions is being considered.

In addition, Rosatom's Deputy Director General for International Relations Nikolai Spassky met with a Malian delegation headed by Minister of Economy and Finance Alousséni Sanou. Present at the meeting were Minister of Energy and Water Bintou Camara, Minister of Transport and Infrastructure Madina Sissoko Dembélé, and Minister of Mines Amadou Keita. The parties discussed the construction of solar farms in the country, geological exploration and expansion of cooperation, and agreed to continue close contacts. The Malian party accepted Nikolai Spassky's invitation to visit a Russian nuclear power plant by the end of the year. NL

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Safety as Top Priority

In early October, the installation of a core melt trap, also known as a core catcher, began at El Dabaa Unit 3 under construction in Egypt. This is one of this year's milestones in the construction process.

Amged El-Wakeel, Chairman of the Board at the Egyptian Nuclear Power Plants Authority (NPPA), attended the ceremony.

"Egypt sees nuclear safety and security as a priority. The core melt trap belongs to the critical safety systems of El Dabaa NPP, which testifies to the highest level of nuclear safety and reliability of the nuclear plant operation," Amged El-Wakeel said.

The 'core catcher' was installed using a heavy crane with a lifting capacity of 2,000 tonnes. Alexey Kononenko, Vice President of ASE and Director of El Dabaa Construction Project, stressed that the installation had begun in full accordance with the schedule. "This would not have been possible without all-round cooperation between the Egyptian

customer and the general contractor. I would like to express my deep gratitude to everyone who made efforts to achieve this milestone of our joint project," Alexey Kononenko said.

The core melt trap is a long-lead piece of equipment. It consists of several components weighing a total of 480 tonnes (its body alone weighs 155 tonnes). The cargo with the core catcher components was delivered to the seaport of the El Dabaa construction site in mid-summer.

In late September, El Dabaa Unit 2 entered another important phase as workers started erecting an inner containment shell (ICS) of the reactor building. The ICS erection is a complex multistage process that lasts about 15 hours and involves a heavy crane with a lifting capacity of 1,350 tonnes.

"Installing the inner containment shell is a labor-intensive process, which underlies safe operation of the nuclear power plant in the future," Alexey Kononenko noted.

The inner containment shell consists of six tiers, the first of which includes 12 pre-assembled structural sections. The weight of each section ranges from 60 to 80 tonnes. The sections are manufactured at the El Dabaa construction yard by a subcontractor.

From Russia to Egypt

Russian nuclear companies continue to manufacture the necessary equipment for the Egyptian nuclear power plant.

In late September, Atommash, a Volgodonsk-based production facility of Rosatom's mechanical engineering division, proceeded with manufacturing a reactor pressure vessel (RPV) for El Dabaa Unit 2. Steel billets for the RPV were cast at the St. Petersburg-based metallurgical plant of the mechanical engineering division and delivered to the production site in Volgodonsk. This is where the RPV parts will be assembled together.

Meanwhile, the work is going on to manufacture reactor equipment for El Dabaa Unit 1.

PetrozavodskMash, a mechanical engineering plant in Karelia, is manufacturing casings for the reactor coolant pumps that ensure coolant circulation in the reactor's primary circuit. In addition to the pump casings, the plant will manufacture clad pipes, primary coolant pipeline assemblies, and a pressurizer.

In total, the production sites of Rosatom's mechanical engineering division will manufacture and ship about 12,500 tonnes of different products for El Dabaa. This includes nuclear reactors with internals and heads, sets of steam generators, reactor coolant pump casings, primary coolant pipes, active and passive safety systems, and pressurizers.

On September 28, Russia celebrated the Nuclear Industry Workers' Day. On the eve of

the professional holiday of nuclear workers, steelmakers of AEM SpetsStal (part of Rosatom's mechanical engineering division) cast the 'first' steel for the reactor pressure vessel of El Dabaa Unit 4. They made 192 tonnes of steel that will be used to manufacture a part of the VVER-1200 reactor pressure vessel. The steel was produced in a powerful furnace that is capable of smelting 120 tonnes of metal in 2–3 hours. After casting, the steel was sent for out-of-furnace treatment and then to a vacuum chamber, in which it spent two days to cool down to 550–650 degrees Celsius. NL

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Akkuyu 1 Hits Homestretch

Unit 1 of the Akkuyu NPP is being prepared for the pre-commissioning operations, which include a wide range of works. We have collected the latest news from the construction site of Turkey's first nuclear power plant.

In late September, Rosatom Director General Alexey Likhachev visited the Akkuyu construction site. He inspected the progress of the works at the key facilities of the first power unit.

"We are at the final stage of preparations for the pre-commissioning operations at the first unit of the Akkuyu NPP, so the on-site works are being carried out as fast as possible, with the most efforts and resources concentrated on the facilities needed to prepare Unit 1 for commissioning. Its systems and equipment are being gradually made ready for operation and checked thoroughly for compliance with the design parameters," said Akkuyu Nuclear CEO Sergey Butskikh. According to him, workers will have to carry out another key operation in the turbine building by the end of the year, which is the installation of the jacking gear for the turbine. This will be the final point in the assembly of the turbine, meaning that the

turbine unit and all of its auxiliary systems are ready for testing.

Unit 1

In mid-October, the last of the two low-pressure rotors was installed in the turbine building of Unit 1.

The installation was supervised by an engineer representing the manufacturer. The rotor is one of the key components of the turbine: superheated steam produced in the reactor steam generators from desalinated water is supplied to the rotor blades under high pressure. Energy from compressed and heated steam causes the rotor to rotate, being converted into mechanical energy and then transferred to the turbine generator producing electric current. The rotor assembly weighs 255 tonnes.

"The rotor was mounted using an overhead crane. Installation of the rotor is a technically complex operation that requires high precision. The operation was successful, and now all the key large-size components of the turbine unit at Akkuyu Unit 1 are in their design position," said Sergey Butskikh, CEO of Akkuyu Nuclear.

In early October, the workers finished the assembly and installation of four electric motors of the reactor coolant pumps. Each electric motor weighs 58.3 tonnes and is about 6 meters high. They will circulate coolant (desalinated water) in the primary circuit and ensure heat removal from the reactor core.

In late September, the builders installed a dome of the outer containment shell (OCS) in its design position. It is the last section of the OCS; its installation lasted six hours and was carried out using the world's most powerful

crawler crane. The dome weighs 147.6 tonnes and has a diameter of 34.7 meters.

The latest Russian-designed power units with VVER-1200 reactors are equipped with a double (inner and outer) containment system. It ensures the maximum level of safety of the nuclear power plant and gives more strength to the reactor building. The outer containment shell is capable of withstanding magnitude 9 earthquakes, hurricanes of up to 60 m/s, tsunamis and shock waves of up to 10 meters high.

Other news from the site

In mid-September, the 2,500 cu m water intake bucket of Akkuyu's first onshore pumping station was filled with water. It will ensure a continuous supply of cooling water for the nuclear plant facilities.

Also in mid-September, two emergency core cooling system (ECCS) tanks were installed in their design position at Akkuyu Unit 2. Each tank is a high-pressure cylinder-shaped vessel made of steel and having two elliptical bot-

toms. One tank weighs around 80 tonnes and can hold 60 cubic meters of liquid.

"The emergency core cooling system has four tanks containing an emergency stock of aqueous boric acid solution. Being a neutron absorber, it is used for flooding the reactor core, thus ensuring safety in an emergency situation," Sergey Butskikh explained.

Construction and beyond

Rosatom was the main partner of the 18th International Congress and Expo Energy Is Future (EIF) 2024 held in Istanbul in mid-September, EIF is one of Turkey's largest exhibition events covering the energy cluster of the Middle East and North Africa.

Speaking at the opening of the Congress, Akkuyu Nuclear Board Chairman Anton Dedusenko emphasized the role of nuclear power in addressing the energy agenda of the country. "The Akkuyu NPP project is an excellent example of the investment, social and economic effect that nuclear energy produces on a country. The nuclear station promotes sustainable growth of the national GDP, creates thousands of new jobs, stimulates the development of high-tech industries, and changes people's lives for the better," he noted.

Denis Sezyomin, Director for Construction and Production Organization at Akkuyu Nuclear, spoke about the progress of the Akkuyu NPP, while Polina Lion, Chief Sustainability Officer at Rosatom, talked about the importance of including nuclear power in green taxonomies. In addition, presentations were made on Rosatom's comprehensive product offering for the Turkish market (with a focus on energy solutions) and on Rosatom's lithium-ion batteries and energy storage products.

The company's exhibition booth was dedicated to innovative large-scale nuclear generation projects based on the VVER-1200 reactor technology, which is employed at the Akkuyu NPP. The visitors could also learn about small-scale nuclear generation projects, onshore and offshore SMR designs, Rosatom's wind power projects, and energy storage solutions offered by the nuclear corporation.

In early October, Rosatom took part in Technofest 2024, the largest technology festival in Turkey. Akkuyu Nuclear regularly takes part in the festival. This year, the company's booth was themed around the Nuclear for Everyone concept. Nuclear energy is an industry employing people of various professions, including engineers, physicists, chemists, mechanics, and so on. The interactive exhibition gave visitors a chance to learn about the basic principles of nuclear power plant operation and study physical and chemical phenomena. Every day, the Akkuyu NPP exhibition booth was attended by at least 5,000 children and teenagers, their families and school teachers. Over 50,000 people visited the booth during the five days of Technofest.

Also in October, Akkuyu Nuclear representatives took part in the Global Nuclear Communications Forum of the World Association of Nuclear Operators (WANO). The WANO brings together nuclear power plant operators from all over the world, representing a total of about 450 power units.

For three days, representatives of Turkey's first nuclear power plant adopted international experience and best practices in the field of safety and reliability of nuclear power plants, and studied tools and methods that can be employed at the plant in the future.

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Kazakhstan Up For Nuclear

The majority of Kazakhstan citizens who voted in the national referendum support the construction of a nuclear power plant in the country. Earlier, Kazakhstan authorities had suggested entrusting this large-scale project to an international consortium. Rosatom has extensive experience in delivering overseas projects in close cooperation with partners from other countries.

Over 5.5 million people, or 71% of those who voted in a referendum in early October, supported the government plans to build a nuclear power plant in Kazakhstan, Nurlan Abdirov, Chairman of the Central Referendum Commission, said at a briefing. Two million people opposed the construction. Participants were asked the question "Do you agree with the construction of a nuclear power plant in Kazakhstan?" A total of 7.8 million people took part in the vote, with a turnout of 63.6%.

The nuclear power plant is planned to be built in the village of Ulken, Almaty Region, on the shore of Lake Balkhash and put in op-

eration by 2035. As explained by the Kazakh authorities, the choice of the construction site is conditioned by the shortage of power in the southern regions of the country, while the location near Lake Balkhash has been considered as a potential site since the Soviet times.

"Like coal-fired plants, the nuclear station needs cooling water, which is planned to be taken from Balkhash, but spent water will not be discharged into the lake. The cooling water that will come from Balkhash will be only 0.32% of the amount evaporating naturally from the lake. What is more, the water used at the nuclear plant will not come in direct contact with the reactor. […] In the autumn of 2023, IAEA experts once again confirmed that there are no obstacles preventing the construction of a nuclear power plant near Lake Balkhash," the country's government website says.

Foundations of energy sovereignty

A few days before the referendum, Kazakh President Kassym-Jomart Tokayev reiterated his support for the project to build a nuclear power plant.

"I have repeatedly expressed my opinion about the construction of a nuclear station. We must use our competitive advantages not to be left in the dust. If our citizens vote for the project, it will be the most ambitious undertaking in the history of independent Kazakhstan," the President said at a forum of regional deputies. Kassym-Jomart Tokayev explained that the nuclear plant construction was a long-term project that would contribute to the nation's sustainable progress for decades to come and strengthen energy sovereignty. "This is an imperative of the present. But it is our younger and future generations who will enjoy all of its benefits in full," the president concluded.

The Kazakhstan government website reports that the construction process will be supervised by international organizations such as the IAEA and WANO, and 'the choice of a contractor for the nuclear plant construction project will be based on economic feasibility, technological reliability and environmental safety'.

Kazakhstan is considering China (CNNC), Russia (Rosatom), South Korea (KHNP) and France (EDF) as suppliers of reactor technology. Kassym-Jomart Tokayev said in the run-up to the referendum that the construction and operation of the country's first nuclear power plant should be entrusted to an international consortium provided the people approved the project.

In close partnership

Rosatom has extensive experience in building multi-lateral international partnerships as

part of nuclear construction projects in other countries. For instance, Rosatom is taking part in the construction of four Russian-designed power units with Generation III+ VVER-1200 reactors in China, two at the Tianwan NPP and two at the Xudabao NPP. Russian and Chinese engineers have been working on the designs of these two nuclear plants in close contact. As agreed between the parties, Rosatom designs and supplies core equipment for the 'nuclear islands' of VVER-1200 power units and provides construction and commissioning supervision services. The Tianwan NPP is the largest economic cooperation project between Russia and China.

In Hungary, Rosatom is building the Paks II NPP with two VVER-1200 reactors. This is the first Russian-designed nuclear facility to be erected in the European Union. The general construction license issued by the Hungarian regulator in 2022 confirms that the design of the plant complies with international and European safety standards. The construction project involves both local and international companies. "We are proud that a truly international project is being implemented in Paks. Apart from the Russian general contractor, the chain of subcontractors includes German, French, Austrian, Swedish and American companies," Hungarian Minister of Foreign Affairs and Trade Peter Szijjártó said in March this year.

In Egypt, Rosatom is building the country's first nuclear power plant, El Dabaa, which will consist of four units with VVER-1200 reactors. This project is attractive for companies from different countries. Major Egyptian companies have joined the pool of qualified subcontractors, and so has Korea Hydro and Nuclear Power (KHNP). This South Korean corporation signed a contract with Rosatom to construct 'turbine islands' for each of the four El Dabaa units, as well as to procure and supply the necessary equipment. NL

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