



Heading for New Horizons

Along with its conventional lines of business, Rosatom seeks opportunities on new markets. By 2030, new businesses are expected to make at least 30% of the company's consolidated revenue. NDExpo 2017 forum hosted in Moscow on 20–22 March gave much of its focus to developing new businesses of the Russian state-owned nuclear corporation. You will find out in this issue of Rosatom Newsletter why new products are so important for Rosatom. More details on the forum will be given in the next issue.

Rosatom is a state-run high-tech company that has often been praised by the national government for its achievements. Today, the company is an undoubted leader in global nuclear construction. Alongside construction, Rosatom companies have competencies in non-nuclear and non-energy areas. Their versatile product portfolio comprises nuclear medicine solutions and radiation

uses in agriculture, sterilization of surgical instruments, water treatment and desalination, as well as additive manufacturing, green energy technologies, IT, petrochemical equipment and services, security systems, composite materials, small-sized hydro plants, and many more.

Rosatom set an ambitious goal of raising proceeds from its new products to 30% of the Group's total revenue by 2030, and the company has made considerable progress on its way to the goal over the recent years. Two years ago Rosatom's revenue from new products already amounted to 14%. "Rosatom regards new markets as new growth opportunities that can be leveraged with resources from its nuclear power businesses. Our activities on new markets are in line with Russia's national strategy and global technology trends, and can be of great importance to national security, improvement of living standards, and development of cutting-edge industries,"

notes Kirill Komarov, Rosatom's First Deputy CEO for International Business.

Nuclear science and technology centers in demand

Rosatom's another product, which is worth special attention, is nuclear science and technology centers built around research reactors. Such centers now attract particular interest from emerging nuclear countries. Two of them will be built by Rosatom in Bolivia and Zambia. The work is now underway in Bolivia, with a set of required project documents already signed. The center will feature a multi-purpose gamma irradiation unit, a 200 kW pressurized water research reactor, a cyclotron, an engineering department and several research laboratories.

AEM expertise

Over many years of Russia's nuclear industry development, its companies have acquired great expertise enabling them to come up with their own products for key national industries, be it power generation, petrochemistry, metallurgy or defense. This is best exemplified by Atomenergomash (AEM), Rosatom's mechanical engineering division. Not long ago, AEM's Hungarian subsidiary Ganz EEM signed its first contract for the supply of small containerized hydropower plants to Georgia. Each plant consists of a turbine and a set of auxiliary equipment in a container. Small hydro power plants boast low generation costs, short delivery time, fast and easy installation. They can serve either as independent power sources or an alternative to cost-inefficient and non-eco-friendly generators.

AEM also offers proprietary water treatment and desalination solutions for industrial, agricultural and public purposes. Many countries where Rosatom is building or plans to build nuclear power plants are in need of fresh water.

Russian engineers have relevant experience as Russian-made equipment was in operation at a water desalination plant in Kazakhstan for 40 years.

Nuclear medicine

Nuclear medicine is a stand-alone business area for Rosatom. Companies of the Russian nuclear group manufacture a range of medical equipment and isotopes. Not long ago Rosatom set up the production of molybdenum-99, an isotope that is widely used in cancer treatment. Russian-made medical isotopes are now supplied to other countries. Rosatom has also established a new division – Rusatom Healthcare – to foster the development of nuclear medicine. It is also set to promote radiation technology designed for use in irradiation and sterilization centers. The new company will integrate Russian products in the area of nuclear medicine and promote them on global markets. The new company has an authorized share capital of 480 million rubles (\$8 million), with 100% shares held by AtomEnergProm, a state-owned holding company in charge of Rosatom's civil assets, according to the Russian e-disclosure database.

All-out diversification

These are only a few examples of how Rosatom develops its new businesses and products. Another direction Rosatom is heading for is the wind power market. Last year, the company won a contract for the construction of three wind parks in Southern Russia, with investments totaling 1 billion euros. Russia's nuclear medicine is gathering a head of steam, with medical isotope sales geography expanding. It is hardly possible to capture all the new business interests of the Russian nuclear corporation in one article. This is why the RN team launches a series of reports on Rosatom's new businesses to be published during this year. Follow our news.



Kirill Komarov, Rosatom's First Deputy CEO for International Business:

"Developing new businesses will also help us improve the involvement of facilities and highly-skilled professionals that are no longer engaged in the basic production due to asset optimization measures.

It takes a lot of time and painstaking work to establish a new business. You need to have in mind many questions that are not easy to answer, such as: How will the market (and its requirements) change short term and by 2030? What will be our source of proceeds? What will our product offer? What are our current competences and what are those we aim for? What is the scope and structure of resources we need? What are our competitors doing? The list will go on and on.

At first, it's reasonable to base the business on the competences available thanks to the enormous potential the nuclear industry has developed over the years that we can use when engineering new products for key industries, such as oil and gas, electricity, metallurgy, ship and aircraft construction, rocket and space systems, defense, etc.

For these industries, Rosatom is ready to offer solutions that can easily meet even the strictest requirements to safety, reliability and efficiency, which has been acknowledged both in Russia and abroad. The solutions include instruments, additive technologies, metal-working, IT, electric, power-generating, radiation, security systems, geophysical and many other technologies.

We never get complacent, even if we already hold quite a strong position at the market. Business models change, so we intentionally improve and increase our range of products, including maintenance, training and other services. As a result, a lot of our "traditional" areas, in fact, develop into "new" ones. That is how we established the NPP Service abroad, power supply business, energy effectiveness services, etc.

As far as cooperating with foreign partners is concerned, we really appreciate their experience and competences, especially in the areas that we are only starting to work in. If an area allows sharing of experience, as well as production and management methods, with our foreign partners, we will cooperate with them, when it seems reasonable.

Already in 2017, the Russian Venture Company will organize a roadshow for Rosatom Group companies to present their innovations in robotic science, healthcare, fuel and power solutions, additive technologies, and other areas. The roadshow will help them benchmark their products against peers, and venture funds will have an opportunity to share their ideas of rolling out or promoting new solutions on the market."



Iran: Construction Kicked Off

March 14, 2017 saw the start of works implemented directly at the Bushehr-2 NPP construction site in the Islamic Republic of Iran.

The construction start ceremony was attended by representatives of the Principal - Nuclear Power Production & Development Co. of Iran (NPPD), namely: Mr. Jafari, Bushehr NPP Project Manager, Mr. H. Ghaffari, BNPP Operating Co. Managing Director, Mr. A.R. Moradian, OCE Co. Managing Director - Principal's General Counsel, representatives of the Bushehr Province Mejlis, and other public officials.

The Russian General Contractor via ASE JSC as part of the ROSATOM Engineering Division was represented by CEOs and experts of ASE JSC Representative office in Iran headed by Suren Ambartsumyan, Director for Bushehr NPP Construction.

In opinion of Suren Ambartsumyan, the process of Bushehr-1 NPP construction contributed to building of a competent team of Russian and Iranian engineering experts that can efficiently handle complex engineering tasks and emergency situations by choosing and implementing the best solutions. The tremendous potential of the Iranian specialists will be involved in the process of Bushehr-2 NPP construction. S. Ambartsumyan voiced his confidence that the teams of Russian and Iranian experts would meet the challenges and guarantee high quality and time standards of the NPP construction.

FOR THE REFERENCE

In November 2014, Nuclear Power Production and Development Company of Iran (NPPD) and ASE JSC signed the turnkey EPC contract for construction of WWER-1000 power units 2&3 for Bushehr-2 NPP. The cumulative capacity of 2 units is 2,1 K MWe. The General Contractor is presented by ASE JSC. The

new NPP construction deadlines are to be met in 2024 (Unit 2) and in 2026 (Unit 3), correspondingly. The Bushehr-2 NPP project is based on the recent III+ NPP modification that implements unique state-of-the-art engineering solutions and

a new safety concept. As of today, the first three plots of the site have been set up for the beginning of the following works: excavation of man-induced soils, dismantlement of present structures, vertical levelling.

TECHNOLOGY



Nuclear Casks of the Future

Today, Russia uses TUK special nuclear casks to transport spent nuclear fuel. Focusing on reliability and safety as key parameters, Russian engineers continue their efforts to modernize existing TUKs and develop new designs of nuclear casks.

TUK is a Russian acronym for 'transportation packaging set'. Grouped together, TUKs fit into a dedicated container to transport spent nuclear fuel (SNF) by rail. The challenge faced by the nuclear industry is to ensure prompt SNF removal, reprocessing or transfer to long-term storage. At present, Russia transports spent fuel assemblies using Series 13 casks and carriers. Casks loaded with spent fuel are delivered to storage or reprocessing sites by purpose-built railway carriers. At the moment, 11 out of 20 carriers intended to transport Series 13 nuclear casks are scheduled for decommissioning in 2017–2019, and only nine of them will remain in operation till 2030.

However, this will not be enough to maintain a seamless SNF removal process.

New TUK sweeps clean

Replacing the rolling stock for spent nuclear fuel from VVER-1000 reactors is an undeniable necessity. A large-scale design effort was launched across Rosatom Group companies, with many of them involved in the development of updated nuclear cask designs. The TUK-1410 design is the closest to completion at the moment, with a pilot cask already built. The design was licensed, and the regulator issued an SNF transportation permit. In March 2016, the newly designed cask successfully passed acceptance tests, followed by field trials at Kalinin Unit 1 in April, where the existing fuel handling equipment was checked for compatibility with TUK-1410 in routine transport operations, including loading and unloading of VVER-1000 dummy assemblies. Last December, the TUK-1410 cask and the TK-U-141 spent fuel carrier successfully passed field tests at the Mayak reprocessing facility. In September and October 2017, TUK-1410 will be tested in a trial transportation of spent nuclear fuel from the VVER-1000 reactor operating at the Balakovo Nuclear Power Plant to Mayak. If the test is passed, the new casks may be deployed at all operating VVER-1000-based power plants.

Series 14: key features

Series 14 TUKs have been marketed by the Federal Center for Nuclear and Radiation Safety (FCNRS). The new casks are made of steel and weigh over 100

tons. A TUK-1410 nuclear cask can hold 18 spent fuel assemblies, or 50% more in comparison with the previous model. "Of course, TUK-1410 is better because of its holding capacity. With TUK-13 holding up to 6 tons of spent nuclear fuel, TUK-1410 can be loaded with up to 9 tons. This is a definite advantage as it reduces the number of carriers to be used in transportation. This will also bring benefits when entering international back-end markets. The new TUK makes it possible to carry more spent nuclear fuel from VVER-1000 reactors based outside Russia on one train", says Sergei Kirillov, Deputy CEO for Civil Products at Mayak. A spokesperson for FCNRS said to RN that the firm neutron protection and double lids of the new TUK ensure exceptional nuclear and radiation safety. Thanks to enhanced safety levels, the time needed to cool spent fuel assemblies in the storage pool can be reduced by half. TUK-1410 is designed to handle spent nuclear fuel with a high heat release (up to 36 kW per flask) and is therefore suitable to carry spent fuel from VVER-1200 and VVER-TOI reactors.

After the removable inner casing is upgraded, the cask will be able to hold

damaged or faulty fuel assemblies. With minor structural adjustments, the new TUK is fit for carrying spent nuclear fuel from foreign nuclear plants by rail.



Andrei Golinei, CEO of FCNRS: "The TUK-1410 nuclear cask and the TK-U-141 railway carrier have proven to be functional, safe and reliable. In 2017, we will arrange trial SNF transportation from the VVER-1000 reactor at Balakovo. If successful, we will begin replacing the container stock for VVER-1000/1200 reactors with new casks."

IN BRIEF

Rosatom to Cooperate with AYNG

ROSATOM America Latina and the Argentine Youth Nuclear Generation signed a Memorandum of Understanding (MoU) in the field of peaceful atomic energy use on the sidelines of the 2nd Nuclear Industry Summit Latin America (NISLA 2017).

The document defines basis for interaction and further joint projects of parties. Collaboration is deemed in wide range of areas: development and implementation of joint projects on the promotion of nuclear technologies in Latin America and public acceptance, bilateral seminars, olympiads, joint

educational materials etc. The Parties also expressed their willingness to establish a Working Group for regular interaction which will develop a list of specific projects of cooperation which will be specified in separate agreements to be binding. "We are happy for signing this Memorandum with such promising association, which is composed, indeed, of the future leaders of Latin American nuclear industry. Besides that, we believe they are unique from the view point of awakening the interest of young people in the nuclear sector, what is indispensable to solve this gap between nuclear workers generations of Latina America",

said Ivan Dybov, President of ROSATOM America Latina.

Stator Mounted at Belarus Nuclear Plant

A generator stator has been installed in the turbine island of Belarus Unit 1. The traveling crane lifted the 440-ton stator to Level 15 of the turbine island to put it in the permanent position. “The stator is an essential electrical part of the

turbine and the heaviest piece of the power plant machinery. It is the stator that converts mechanical energy of the turbine into electricity,” noted Sergei Olontsev, Senior Vice President for National Projects at NIIAEP. “All the operations now performed at the facility are approved by the project owner and licensed by the Belarusian regulator,” he added.