LEAD STORY

Focusing on Environmental Aspects of Nuclear Power

With Rosatom paying much attention to environmental safety, it is no coincidence that AtomEco, one of the nuclear industry's major environmental forums, is organized in Russia. Over 1,000 delegates from 19 countries took part in this year's forum themed Clean Energy for the Next Generation. You will find more details from the Forum in our report.

"Organizing the Forum in 2017, which is declared the Year of the Environment in Russia, highlights the importance of nuclear and radiation safety, environmental protection, mitigation of industrial impacts, and public acceptance of nuclear power. All these aspects are truly important, and common consent over them is a recipe for success of large-scale environmental projects and programs. This is proved by Russian and international experience," says a statement by Sergei Kiriyenko, First Deputy Chief of Staff of the Presidential Executive Office and Chairman of Rosatom Supervisory Board.

Mikhail Chudakov, IAEA Deputy Director General, praised the role of nuclear energy. "At present, the nuclear industry generates 11% of electric power worldwide. The share of nuclear power plants is expected to grow, but nuclear and renewables should not be opposed to each other but turned into a single operating system," he said. It was also noted that nuclear energy was not an alternative to renewable sources of

power. “We believe that they complement each other and will form a non-carbon energy mix of the future,” said Kirill Komarov, Rosatom’s First Deputy CEO for Corporate Development and International Business, commenting on the need to explain advantages of nuclear power. “If we consider life-cycle costs of power generation, we will see that nuclear energy is one of the most efficient sources of electricity,” Kirill Komarov said. He also mentioned the fact that consumers, regulatory authorities and state leaders “had to think about both economy and environment” when selecting a power generation facility to be built. “I think these aspects go hand in hand and form a basis for a carbon-free, green energy mix of the future where there is place for both nuclear and renewables,” Kirill Komarov concluded.

In his turn, Alexei Alyoshin, Head of the Russian technical regulator Rostechnadzor, called nuclear power “a green energy source indeed” meaning that it produced no greenhouse gases and caused no natural disasters on the planet. He also mentioned that nuclear power generation projects in Russia and other countries, broader research and nuclear legacy issues required continuous improvement of the regulatory framework for nuclear safety.

RUB 23bn spent on ecology

Rosatom pays special attention to environmental matters. Finding a solution to nuclear legacy problems and current industry tasks is a costly endeavor. In 2017, Rosatom plans to spend about 23 billion rubles on environmental initiatives. “Our environmental projects have received nearly 23 billion rubles in funding this year. These projects target both current industry tasks and [nuclear] legacy problems,” said Kirill Komarov, Rosatom’s First Deputy CEO for Corporate Development and International Business. One of the most outstanding environmental initiatives launched earlier this year was the removal of spent nuclear submarine fuel from Andreeva Bay in the Murmansk Region. In Kola Bay, the company is involved in a major project aimed at cleaning the sea bottom covered with sunken vessels and other objects affecting the environment. “And we are also engaged in a number of large-scale projects on the Kamchatka Peninsula, with a goal to dispose of decommissioned submarines and nuclear service vessels,” Komarov said.

Radioactive waste declines

Radioactive waste from Russian nuclear plants builds up at a twice lower rate than 25 years ago, says Mikhail Stakhiv, Head of Spent Nuclear Fuel, Radioactive Waste and Decommissioning at RosEnergoAtom.

This decline is a result of measures that have been taken by the company over the last decades. Many efforts are spent on developing new waste handling solutions. Waste limits for nuclear power plants are also revised regularly. Stakhiv underlined that Russian nuclear plants used solutions that ensured safe handling of radioactive waste at every step of this process – from collection and transportation to processing and conditioning. The final product of this process – conditioned radioactive waste – can reliably prevent radionuclides from getting into the environment for an extended period of time, which is enough for hazardous substances to decay and become totally non-radioactive.

The work is ongoing to install radwaste processing facilities on the nuclear plants' sites. A solid radwaste management center operates at Balakovo NPP; the world's first treatment facility for liquid radioactive waste is in operation at Kola NPP. A similar facility has been commissioned at Smolensk NPP as part of a larger waste processing center, with two more under construction at Leningrad and Kursk nuclear power plants. At present, most of the Russian nuclear plants have equipment they need to process solid and liquid radioactive waste. Additionally, a radwaste plasma treatment center was launched in Novovoronezh last summer to achieve a 35-fold decrease in processed waste as compared to its original volume.

RosEnergoAtom's primary task is to develop measures that will reduce new waste buildup by at least 5% by 2020. An ambitious long-term goal is to transport all radioactive wastes, previously conditioned, from on-site storage facilities to repositories.

Russia meets its commitments

Russia used the Forum as a venue to present its 5th National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The report was published on the 13th of November, for the first time before its submission to the IAEA. "Our previous reports and the 5th National Report, which is already published on the Convention's website, demonstrate Russia's commitment to the principles of the Joint Convention on the Safety of Spent Fuel Management and Radioactive Waste Management; some of the measures we take are considered to be the industry's best practices that may serve as an example for other countries," said Oleg Kryukov, Rosatom's Director for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning, in an interview to RIA Novosti. According to him, the Joint Convention requires every contracting party to submit a national report, answer questions of other parties, and discuss its national reports in special meetings over the fulfillment of national commitments. "This is why we presented our report at AtomExo-2017 to an audience consisting of Russian and international experts as we wanted to have a detailed discussion of the report in advance," Kryukov stressed.

Special attention

Much interest was excited by the Nuclear Development and Arctic Environment roundtable discussion. It was noted that comprehensive development of Arctic territories was one of Russia's strategic priorities and that it would need cost efficient and environmentally safe technologies, including those developed by Russian nuclear companies. For

instance, Alexander Pimenov, Deputy CEO for Innovative Projects at NIKIET, presented a new line of small reactor units for low-capacity nuclear power plants. These reactor units belong to the Schelf series and are designed to be used as a source of power for offshore and onshore facilities along the Arctic coast and in remote areas with no power supply or transport infrastructure. The standardized Schelf unit has a capacity of 6.4 MW, and includes a nuclear power reactor and other systems needed for its operation, such as emergency cooling, safety and maintenance systems.

COOPERATION

Rosatom to Cooperate with France in Radwaste Management

A cooperation agreement was signed in Moscow at AtomEco-2017, an international forum held last week in Russia's capital.

Rosatom and the French National Radioactive Waste Management Agency (ANDRA) signed an agreement to cooperate in ultimate disposal of radioactive waste. Signatories to the document were Oleg Kryukov, Rosatom's Director for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning, and Patrick Landais, Director for Innovations, Development and International Relations at ANDRA.

Rosatom and ANDRA will cooperate in implementation of the national radioactive waste management system, exchange of scientific information and experience in legal, social and ethical aspects of nuclear waste management. The parties agreed to have technology and solutions assessed by joint expert groups, hold seminars, and organize expert visits to ultimate disposal sites in Russia and France.

On Russia's part, the agreement will be performed by the National Operator for Radioactive Waste Management (NORWM), a Rosatom Group company holding an official license for ultimate disposal of nuclear waste.

Cooperation between NORWM and ANDRA started in 2012 when Rosatom and the French agency signed a memorandum of intent. The partners plan to continue working on safe management of radioactive waste and believe that exchange of knowledge, expertise and technology will be of mutual benefit for the two countries.

NORWM was established in 2012 and is the only Russian company duly licensed to perform ultimate waste disposal operations. The company's primary task is to ensure environmental safety in the country by establishing safe and secure repositories where radioactive waste is isolated from the environment for the entire period it remains potentially hazardous. MORWM is also responsible for development and operation of the national infrastructure for

environmentally safe and cost efficient disposal of radioactive waste. It also functions as a source of information about safe management of nuclear waste and radioactive contamination around ultimate disposal sites for general public, government bodies and municipal authorities.

France's National Radioactive Waste Management Agency (ANDRA) was established in 1979. Its activities are supervised by the Ministry of Energy, Ministry of Environment and the Ministry of Higher Education, Research and Innovation. ANDRA is engaged primarily in the design, licensing and construction of ultimate disposal sites for different radioactive wastes, repository operation and monitoring, public awareness, and relations with international organizations. France operates three low and medium level waste repositories. Work is ongoing to prepare and file documents to obtain a construction license for a deep geological repository to store high and medium level radioactive waste.

IN FOCUS

Bulgaria Might Proceed with Belene Project

Temenuzhka Petkova: Bulgaria is ready to construct Belene, and with no other partner but Rosatom.

Bulgarian authorities are ready to resume the Belene NPP project only if Rosatom takes part in it. This was announced last week on bTV channel by Bulgarian Energy Minister Temenuzhka Petkova. According to her, Sofia considers the prospects for the project, with the reactors manufactured in Russia for Belene to be either sold or used to build Unit 7 at the Kozloduy Nuclear Power Plant. But these options come second after the main scenario, which is completion of the Belene plant, Petkova said.

She reminded that Bulgaria had invested over 3 billion Levs, or nearly 1.5 billion Euro, in the project. A recent report of the Bulgarian Academy of Science on the Belene project directly says that "doing nothing would be the worst scenario". Petkova noted that the nuclear power plant could be brought online in 2028 or 2029 if the construction started in 2019. But she does not see any possibility of implementing the project without Rosatom, Petkova added.

"Rosatom is a project designer and equipment manufacturer after all. It would be difficult to do anything without Rosatom," said the Bulgarian Minister. Meanwhile Kirill Komarov, First Deputy CEO of Rosatom, made it clear in an interview to Bulgarian news agency BGNES on the margins of Atomex-Europe 2017 in Budapest that the company was ready to take part in the project as a contractor or, depending on the terms and business model to be chosen by the Bulgarian Government, as a project investor. Komarov also said that the 'Hungarian model' adopted for Paks II could be the best option for Bulgaria. The Paks II project is financed with a sovereign loan that was obtained by Hungary at a low interest rate and will be

repaid after the nuclear plant is put in operation.

"The most important thing for the country is cheap electricity it needs to develop the national economy and make competitive products with cheap electric power. They want to be competitive on the market by generating cheap electricity. This is their primary goal and the reason why they have chosen to borrow money from another country," Komarov explained. Akkuyu in Turkey was named another potential model for the Belene project. Russia invests in the Akkuyu Nuclear Power Plant, while Turkey undertakes to buy electric power to be generated by the plant at a relatively high price that will cover costs and risks of the investor. "To be honest, the price is higher than in the Bulgarian market. But their motivation is clear – they are not willing to take any risks because this is the first nuclear power plant in Turkey. Ankara wants the investor to bear risks and are ready to pay for it," Komarov noted.

According to him, Rosatom's participation in the Belene project is directly dependent on what the Bulgarian Government decides about the national priorities and needs. "This decision will be taken on the basis of a recently published report of the Bulgarian Academy of Sciences, other expert sources, and public debate. But my opinion is that the best and most promising way for Bulgaria is that chosen by Hungary. In terms of costs and efficiency, this is the best option for Bulgaria," he said.

When asked for more details on Rosatom's readiness to take part in the construction of the Belene Nuclear Power Plant if the decision were made to sell the project to private investors, Komarov answered, "As a contractor, we are ready to take part in any form of the project chosen by the Bulgarian Government. But it depends on financial terms and a business model whether we will invest in the project."

The report prepared by the Bulgarian Academy of Sciences says that the most feasible option for the project is to keep the Government involved and acquire a strategic investor that will provide 70% of finance, with the remaining 30% to be financed with equity. According to researchers, costs of the nuclear plant project will amount to at least 10.5 billion Euro. The document also says that Bulgaria will need new generation capacity after 2047–2050 when the service life of Kozloduy Units 4 and 5 expires. Kozloduy NPP remains the only operating nuclear power plant in the country.

IN BRIEF

Lepse Depot Ship Disposal to Be Completed in 2019

The disposal of Lepse depot ship that serviced Russian nuclear vessels is scheduled for completion in 2019. In 1963–1981, the depot ship supported fuel reloading operations on Lenin, Arktika and Sibir nuclear icebreakers. After 1981 Lepse was only used to store spent nuclear fuel and radioactive waste and was decommissioned in 1988. The vessel contains over 600 spent fuel assemblies. Since some of them are damaged, they cannot be unloaded from the storage unit with a standard procedure. The disposal of Lepse is an important project for maintaining nuclear and radiation safety in Northwest Russia. It is supported by the European Bank for Reconstruction and Development (EBRD) and is part of Russia's federal target program Nuclear and Radiation Safety 2030. Unloading of

nuclear fuel from Lepse is expected to begin in the second half of 2018, with the forward storage unit to be shipped to Sayda Guba by the end of 2019.

Contract Signed to Supply Turbines for Akkuyu in Turkey

Turbine Technology AAEM Limited Liability Company, a joint venture of AtomEnergoMash and General Electric, has awarded a contract to Alstom Power Systems (a GE company) that will manufacture core components of steam turbines for the Akkuyu Nuclear Power Plant in Turkey. According to the contract, steam turbines for Akkuyu's four reactor units will be delivered over the period of 2021–2024 in line with the construction schedule of each unit. Turbine Technology AAEM Limited Liability Company was established in 2007 to provide turbine island integration services for Russian nuclear power plants. "The contract for the turbines and auxiliary systems for the Akkuyu Nuclear Power Plant is an important milestone in the joint venture development. It strengthens long-term cooperation between AEM and GE acting as shareholders and partners in this strategic project," said Andrei Nikipelov, CEO of AtomEnergoMash. Earlier AtomEnergoMash signed a contract to supply turbine islands for the Turkish power plant. The Akkuyu project provides for the construction of four power units with Russian-designed Generation 3+ VVER-1200 reactors compliant with the most stringent safety standards. Each reactor unit will have a capacity of 1200 MWe.