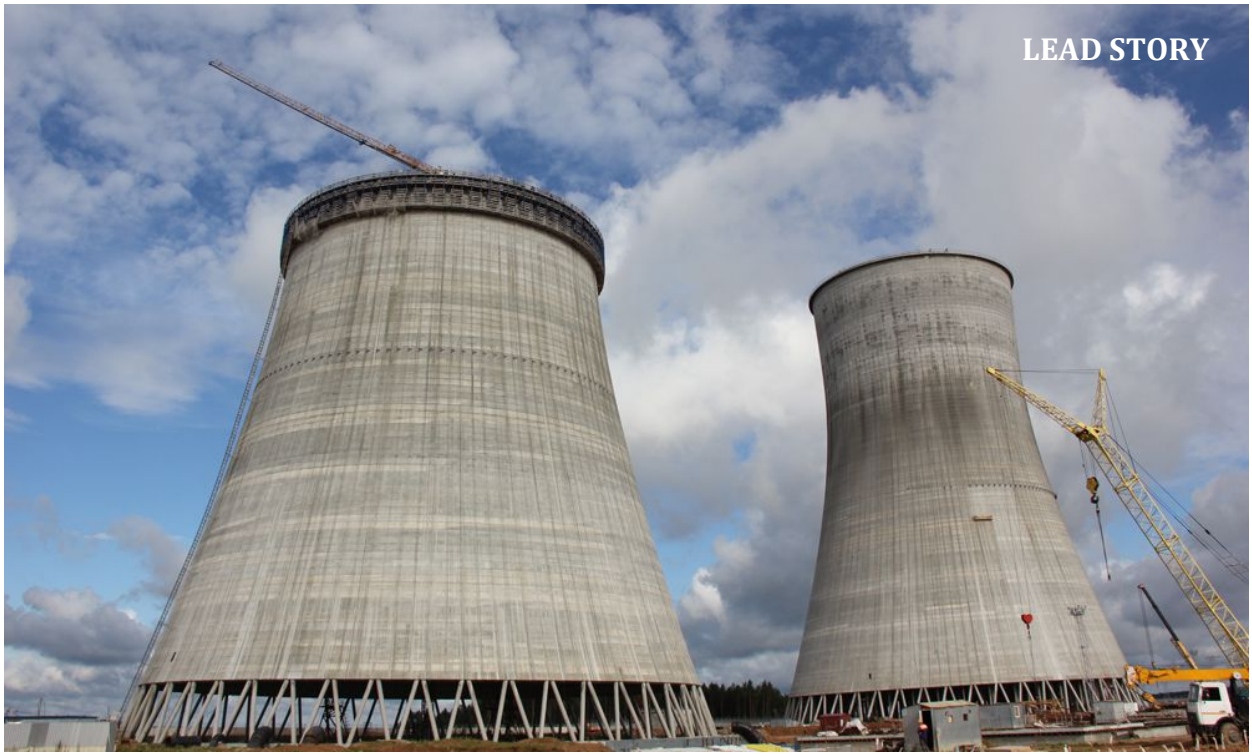


LEAD STORY

Belarus NPP Meets Highest Standards

Belarus provided the European Commission with a report on stress tests carried out at the nuclear plant under construction. The report proves that the Russian-designed plant with Generation 3+ reactors meets the strictest international safety standards.

It was Belarus' voluntary move to perform a comprehensive nuclear safety assessment based on the EU criteria after the country decided to adopt the Joint Statement on Comprehensive Risk and Safety Assessments of Nuclear Plants ('stress tests') in 2011. The stress tests were carried out in 2016 in accordance with the guidelines of the European Nuclear Safety Regulators Group (ENSREG). The national report on stress tests was finalized in October 2017 and submitted to the European Commission and ENSREG to be reviewed by international experts. Safety is an absolute priority for every country involved in nuclear construction and operation, Atom.Belta news agency quoted Olga Lugovskaya, Head of the Nuclear and Radiation Safety Department of the Belarusian Ministry of Emergency Situations, as saying. Belarus also shares this view and realizes the importance of safety for its nuclear plant under construction. "I would like to note that safety levels reported by us are sufficient based on the stress tests we performed. We are at the initial stage of our nuclear power program, and stress tests are seen as a reliable tool to analyze and confirm safety of the plant we are building. Stress tests are also a driver of competence improvement for both the regulator and tech companies that took part in preparing the national report," Lugovskaya added.

Vasily Aksyonov, Director of WANO Moscow, said that the World Association of Nuclear Operators welcomed every event that was aimed at improving

nuclear plant safety. Conclusions of the stress test report will be taken into account during the peer review that will take place before the commissioning of the Belarus nuclear power plant. “Relying on expert assessments is a strength of the nuclear industry. Any peer review is an important step towards nuclear safety as it helps sharing experiences between countries and nuclear operator companies,” Vasily Aksyonov said.

In 2018, the nuclear power plant will be visited by experts of the World Association of Nuclear Operators (WANO). A number of IAEA missions and training seminars are also on the plan before the plant is started.

Earthquake is no threat

Earthquake is a potential stress factor assessed by the Belarusian regulator. Following a probability analysis, the maximum seismic intensity of an earthquake around the nuclear plant site was estimated to be 6 on the MSK-64/EMS-98 scale (not to be confused with the Richter scale measuring magnitude). Intensity 6 is taken as a ‘design basis’ earthquake for the plant. That said, reactors are designed to safely withstand even a highly unlikely intensity 8 earthquake (intensity 7 on the MSK-64/EMS-98 scale was identified as the ‘strongest potential earthquake’ for the plant’s site). The plant will also withstand a flood although floods in the area are totally unlikely (otherwise the water level should rise 51.5 meters above historical highs). The analysis and subsequent simulations have shown that there is no threat to the reactor even if underground rooms of the plant are flooded in a hypothetical scenario. There will be no emergency even in the most extreme weather conditions, which occur once in 10,000 years (such as a temperature increase to 50°C or a 62 m/s wind storm or their combinations), because measures against floods, earthquakes and other natural disasters are sufficient for the plant to withstand the harshest impacts of the environment.

Wide public support

Around 60% of Belarusians support the nuclear construction project delivered with Russia’s input. Earlier Mikhail Mikhadyuk, Belarusian Deputy Minister of Energy said that in areas adjacent to the construction site the popular support of the nuclear plant reaches 83%. He stressed that a 50% support for the nuclear construction project was seen as high across the globe.

FOR REFERENCE

VVER-1200 is the only Generation 3+ reactor with a demonstrated history of successful commercial operation. The first VVER-1200 was brought online at Novovoronezh in 2016, with the second to be commissioned by the end of 2017. Its design is the most advanced for now and combines the latest active and passive safety solutions compliant with the post-Fukushima standards as set out in the European Utility Requirements (EUR) and other regulations adopted by the EC, ESREG and IAEA.

FUEL CYCLE

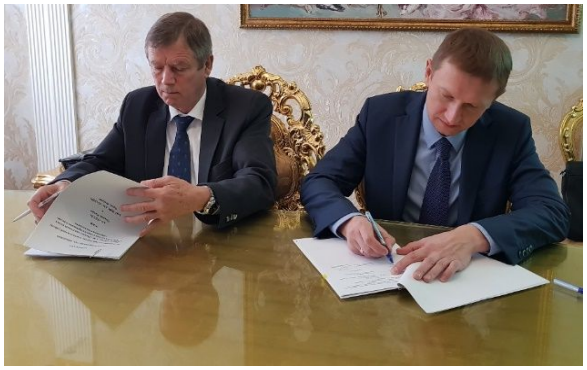
Paks Will Have Better Fuel

Rosatom will modify nuclear fuel for Hungary's Paks Nuclear Power Plant to improve its cost efficiency.

Rosatom's TVEL Fuel Company will develop a new modification of nuclear fuel for the nuclear plant in Paks. The contract to this effect has been signed with Hungarian company MVM VM Paks NPP Ltd. It provides for the development of modified second generation fuel assemblies for VVER-440 reactors. The new fuel modification to be developed by engineers of TVEL Fuel Company will have an increased uranium capacity and optimized hydro-uranium ratio as compared to the assemblies currently in use. This will improve cost efficiency of the nuclear plant's operations while maintaining the current fuel cycle length.

Paks NPP is the only nuclear plant operating VVER-440 reactors with an extended 15-month fuel cycle. Nuclear fuel supplied to the Hungarian power plant is manufactured at Elemash (TVEL's fuel fabrication unit in Elektrostal near Moscow). The contracts signed between TVEL and the Hungarian party provide for nuclear fuel supplies for all the four 440 GWe reactors of Paks NPP till the end of their service life.

"Important is that our Hungarian partner pays much attention to every possibility of improving efficiency of our nuclear fuel and actively takes part in developing technical aspects of the project. TVEL Fuel Company views research and innovation as its priority and offers its customers the latest modifications of nuclear fuel with improved performance and efficiency," says TVEL President Natalia Nikipelova.



The Paks Nuclear Power Plant was built by Soviet engineers in 1974–1987, with its four reactors generating over 40% of power consumed in Hungary. Paks is one of the world's safest and most reliable nuclear stations. In late 2014, Russia and Hungary signed an agreement to construct Units 5 and 6 with the most advanced Russian-designed VVER-1200 reactors compliant with the strictest 'post-Fukushima' safety standards (the project is also known as Paks-2). The European Commission gave a green light to Hungary's most important energy project. Just recently, it came to the conclusion that the project drew no illegitimate support from the government as being otherwise profitable and competitive.

Paks II is also confirmed to have the rate of return that is comparable with rates available on the local financial market. According to Brussels, the Paks II project adheres to the principles and facilitates the performance of the Euratom Treaty. Hungary's nuclear capacities also serve interests of the European Union and make power supplies to its member states more reliable. Two nuclear reactors to be constructed at Paks will replace 4 existing units that will remain in operation until the 2030s.

TVEL Fuel Company is a global leader in nuclear fuel fabrication and uranium enrichment services. Its share in the global nuclear fuel market is 17%. Jointly with TENEX, the company provides 36% of global uranium enrichment services.

ROSATOM NEWSLETTER #196

CONSTRUCTION

Rooppur Project Moves Forward

Rosatom obtained a construction license for the nuclear plant in Bangladesh. Construction is about to start.

The Bangladesh Atomic Energy Regulatory Authority (BAERA) issued a design and construction license for the Rooppur Nuclear Power Plant. According to ASE (Rosatom's engineering division), the document enables the company to proceed with construction operations. "As a general contractor of the plant, ASE strictly follows the Rooppur project schedule. On 4 November, BAERA issued the license we need to go full tilt with construction on the nuclear plant's site," the company said.
The plan for November is to start concreting the foundation for the reactor building. This operation usually marks the beginning of the plant's construction, says Alexander Khazin, ASE Senior Vice President for International Projects. The Rooppur Nuclear Power Plant will be built on the bank of the Ganges, 160 km away from the country's capital Dhaka. The plant will have two most advanced VVER-1200 reactors. The foundation stone ceremony was held in October 2013 after the preliminary project contract was signed between the countries. The general construction contract for the plant was signed on 25 December 2015. In early 2017, the Russian government provided Bangladesh with sovereign loan to finance the main construction phase at Rooppur. Unit 1 is scheduled for commissioning in 2023 to be followed by Unit 2 in 2024.
In September, Russia also signed an agreement to remove spent nuclear fuel from the future nuclear plant for subsequent disposal.

Russian-designed process control system

The Rooppur Nuclear Power Plant will use a Russian-designed process control system. This system integrates multi-level software and hardware components into a single NPP management tool. It is planned to be manufactured and delivered to Rooppur in 2019–2021. Equipment installation and testing will begin right after that. The process control system will be installed by Rusatom Automated Control Systems (RASU, a Rosatom Group company) under the supervision of AtomStroyExport (a subsidiary of Rooppur's general contractor ASE).

IN BRIEF

ZiO-Podolsk Certified by TAEK

ZiO-Podolsk (a subsidiary of AtomEnergoMash, Rosatom's mechanical engineering division) obtained a certificate from the Turkish Atomic Energy Authority (TAEK) authorizing ZiO to manufacture equipment for Turkish nuclear facilities. TAEK representatives visited ZiO-Podolsk to audit the quality management system, technology, procurement procedures, environment protection and industrial safety to assess

its capacity and expertise required to manufacture equipment for the Turkish nuclear power plant. This audit was an important step towards obtaining the certificate needed to participate in nuclear projects in the Republic of Turkey.

AtomEnergoMash Expands Partnership with Japanese Companies

AEM Technologies (a subsidiary of AtomEnergoMash, Rosatom's engineering division) was visited by representatives of Chiyoda Corporation and Toyo Engineering Corporation from Japan. Chiyoda's delegation visited AEM's production facilities in Volgodonsk (Atommash) as part of the supplier qualification process. Atommash is bidding to become an equipment supplier for the Sakhalin-2 project. Representatives of Toyo Engineering aimed to discuss potential cooperation in construction and modernization projects in the petrochemical industry. The foreign delegates were demonstrated technologies and logistic capacities of Atommash, and key production flows for nuclear and petrochemical equipment. Specific attention was paid to quality assurance procedures. The Japanese businessmen reviewed the quality management system, compliance with international standards, material and product testing procedures, and equipment maintenance programs. When completing their visit, the representatives of Chiyoda Corporation and Toyo Engineering Corporation praised expertise and potential of AEM Technologies in the production of nuclear and petrochemical equipment.

WANO Review Started at Kursk NPP

A full-scale peer review by the World Association of Nuclear Operators (WANO) began at the Kursk Nuclear Power Plant on 9 November 2017. An international team of 27 experts from 10 countries (Brazil, Hungary, Belarus, Armenia, Iran, Taiwan, Romania, Russia, Ukraine and the Czech Republic) will spend two weeks analyzing key information about the Kursk NPP to examine its compliance with WANO recommendations. The peer review follows new guidelines set out in WANO's Performance Objectives and Criteria. Having received necessary information about the operation of Kursk NPP during preliminary contacts, experts will clarify how adequate the preliminary assessment is and how operational procedures affect safety of the plant. The peer review extends beyond mere operating functions, which are usually performed by the plant's relevant structural units, to cover general performance, overall organization and interaction between functional units of the facility. These areas include work process management, design basis management, equipment reliability, operational experience, organization efficiency, etc. Following the peer review, the international expert team will identify improvement priorities, strengths, and best practices to be introduced at other nuclear facilities.

Rosatom team became the winner of medal standings of WorldSkills

On November 7 in Yekaterinburg the large-scale competitions of young professionals WorldSkills Hi-Tech was summed up. Rosatom became the winner of medal standings for the third year by winning 3 gold, two silver and one bronze medals. This year, the major title in 30 competences was rivaled by over 300 representatives of largest corporation and industrial companies of Russia. The Rosatom's select team was represented by 53 participants and 60 experts selected based on results of the sectoral championship AtomSkills-2017. Alexei

Grigorovich, gold winner in Welding Technology, was the absolute winner of the championship and one million ruble prize winner. In his address to the award ceremony, Head of Rosatom Aleksei Likhachev said to all championship participants: “Now, all we are a single team, the team of Russia’s industry! The championship is of great importance to us, to the management of corporations because today in this hall there is tomorrow of our companies, best professionals in their sectors, best professionals of our country. We do all possible to have the number of participant grow each year, professionalism grow; our future victories are planted here!”

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