CONTENTS

Back to contents

Rosatom NSTC to Come to Europe

Russia and Serbia agreed to build a nuclear science and technology center (NSTC). In December 2021, Rosatom and the Government of Serbia signed a framework agreement establishing a joint venture that will work on the NSTC project.

Sequence of actions

The Serbian NSTC project will be implemented in three successive stages. First, a radiopharmaceutical facility will be built in Serbia to produce radioactive substances for cancer treatment. The country has a number of functioning nuclear medicine centers, but most of the radioactive pharmaceuticals they use are imported. When the new facility is put in operation, radio pharmaceuticals will be produced domestically. At this stage, feedstock isotopes will be supplied by Russia.

The second step provides for the construction of a cyclotron. After it is launched, it will be used to fabricate feedstock isotopes for the production of radioactive pharmaceuticals. With an operating cyclotron in place, Serbia will produce enough isotopes to meet domestic demand and export them to neighboring countries.

At the third stage, Serbia will construct a research reactor and laboratories. The reactor will be used to fabricate isotopes, stage different experiments and conduct material studies. Medical isotopes obtained

in the cyclotron or the reactor have different half-life periods.

Rosatom's role in the project will not be restricted to that of a technology vendor. **"We plan to co-invest in the project to have a share in the production capacity and participate in research programs,"** President of Rusatom Overseas Evgeny Pakermanov said.

NSTC capabilities

The nuclear science and technology center in Serbia is Rosatom's second NSTC project globally and the first one in Europe. The NSTC is currently built in El Alto (Bolivia) at 4,000 meters above the sea level. It will comprise a research reactor, a pre-clinical cyclotron facility, a radiobiology and radioecology laboratory, and a multi-purpose irradiation center. The irradiation center is designed to improve quality and extend shelf life of agricultural produce and foodstuffs. It employs an ionizing radiation technique approved by the UN Food and Agriculture Organization (FAO), IAEA, and World Health Organization.

The Serbian project does not provide for an irradiation center and focuses on the use of nuclear technology in electronics and mining. In particular, it will produce neutron transmutation doped silicon for radio electronic applications. Neutron transmutation doping (NTD) is a method that transmutes atoms of a chemical material instead of adding dopants to it. Irradiation with thermal neutrons causes nuclear reactions in silicon, resulting in the formation of phosphorus. The advantage of the NTD method is an extremely uniform doping profile. When phosphorus is added to molten silicon (a conventional doping method), it is almost impossible to achieve the same level of uniformity. Neutron transmutation doped silicon meets all the requirements for power electronics and power industry applications. According to estimates, demand for silicon will double after 2025 when production of internal combustion engines is expected to shrink.

Geologists also need isotopes to better understand the genesis and age of mineral deposits. They study isotopes of biophile elements, i. e., those involved in biochemical processes (H, C, O, and S). For example, distribution of stable oxygen isotopes helps make conclusions about origins of the substance involved in the ore formation process. Sulfur of biogenic and volcanogenic origin has a different isotope composition. Accumulation of certain isotopes in minerals is used by the isotopic geochronology method to determine the age of geological objects with a high level of accuracy.

What makes the Bolivian and Serbian projects similar is the use of nuclear medicine technology. **"The radiopharmaceutical facility and nuclear medicine center will give local residents access to hi-tech medical assistance that primarily addresses**

oncologies," said Alexey Likhachev, Director General of Rosatom.

International significance

When in operation, the NSTC will become a point of attraction for researchers, engineers, doctors and politicians in the Balkans. **"We signed agreements bringing Serbia back to the ranks of the European countries that have a platform for nuclear technology research. Soon after that, we started receiving requests from neighboring countries willing to participate in our research programs,"** says Nenad Popović, Minister of Innovation and Technological Development of Serbia and Chairman of the Intergovernmental Committee for Cooperation between Serbia and Russia.

Construction of the NSTC is a practical implementation of the Russian-Serbian cooperation agreement signed in 2019 during the visit of Russian President Vladimir Putin to Serbia. Nenad Popović believes that the NSTC agreement signed in December would open up new prospects for nuclear technology partnerships between Serbia and Russia. He is echoed by Evgeny Pakermanov who said, **"The NSTC will stimulate development of a new economic sector based on non-power nuclear applications."**

Evgeny Pakermanov is confident, **"It is hard to find a facility that fits more into the sustainable development goals than the NSTC. It will employ carbon-free technologies aiming to develop medicine, science and industry. This project needs highly qualified professional staff. The first students from the Republic of Serbia already study at Russian universities, and their number is planned to grow. We hope that many of the graduates will take part in the construction and operation of the nuclear science and technology center."**

Top Books from Nuclear Experts

A fantastic book can wow you, entertain you and change the way you think, all over the course of a few hundred pages. It can also act as a source of inspiration. We asked 4 brilliant nuclear professionals from all over the world to pick their favorites that had influenced them earlier in their careers. The books they have recommended range from how to drive a nuclear reactor, to science fiction like Atlas Shrugged. Did any of your favorites make the list?

Princess Mthombeni, South Africa

Princess Mthombeni is an award-winning international communication specialist, founder of Africa4Nuclear and lifelong nuclear technology advocate, from South Africa. Her globally recognized work involves providing high-level strategic support to the government in leading, executing, and ensuring the success of nuclear communication strategies. With over 10 years of experience in the nuclear industry, Mthombeni has been part of numerous high-profile events across the globe.

Roseanne Montillo
ATOMIC WOMEN

This is a beautiful telling of the advent of the atomic bomb and several women whose contributions were vital to this great and horrid discovery. While it is short and easy to read, it does not breeze past the difficulties that women had, the lack of recognition, or the moral questions they faced.

Rauli Partanen, Olli Soppela
ONE BILLION TONS

This is a report that examines the wide-ranging consequences of Germany's nuclear phaseout, and the benefits that would result from keeping the country's last 6 nuclear reactors online. The title references the huge amount of added carbon dioxide emissions that will result from Germany's nuclear phaseout between now and 2045.

Edward S. Ayensu
OUR GREEN AND LIVING WORLD: THE WISDOM TO SAVE IT

This is a coffee table conversation book that contains a vivid and wonderfully illustrated statement about the role of plants in our world. The author(s) have done an incredible job through visuals and written designs to establish the link that human survival may very well depend on how well the current generation cares for the green mantle of our planet.

ROSATOM NEWS

Back to contents

Mushfika Ahmed, Bangladesh

Mushfika Ahmed is one of the few Bangladeshi girls who dreamt of working in the field of nuclear during her academic career. After completing her Masters in Physics from a leading technical university in the country, she started her career as a Medical Physicist in a specialized hospital in the capital city of Dhaka. In 2019 Mushfika joined Nuclear Power Plant Company Bangladesh Limited (NPCBL) as a Manager of Chemical and Radioactive Waste Management Department. Now, she is working at the construction site of Rooppur Nuclear Power Plant Project (Rooppur NPP), the first ever nuclear power facility in Bangladesh.

Craig Nelson
THE AGE OF RADIANCE

When Marie Curie, Enrico Fermi, and Edward Teller forged the science of radioactivity, they created a revolution that arced from the end of the nineteenth century, through the course of World War II and the Cold War of superpower brinkmanship, to our own twenty-first-century confrontation with the dangers of nuclear power and proliferation — a history of paradox, miracle, and nightmare. Writing with a biographer's passion, Craig Nelson unlocks one of the great mysteries of the universe in a work that is tragic, triumphant, and above all, fascinating.

James E. Martin
PHYSICS FOR RADIATION PROTECTION

A practical guide to the basic physics that radiation protection professionals need. A much-needed working resource for health physicists and other radiation protection professionals, this volume presents clear, thorough, up-to-date explanations of the basic physics necessary to address real-world problems in radiation protection. Designed for readers with limited as well as basic science backgrounds, Physics for Radiation Protection emphasizes applied concepts and carefully illustrates all topics through examples as well as practice problems.

Maxwell Irvine
NUCLEAR POWER: A VERY SHORT INTRODUCTION

Nuclear Power: A Very Short Introduction' explains the development of nuclear physics up to the emergence of the nuclear power industry. What part can nuclear power play in meeting global energy demand without destroying the environment? What is the extent of public concern and confusion about the use of nuclear power and its safety? The nature of nuclear power and its risks, looking specifically at safety records and major incidents. The cost of its development and waste disposal is also considered.

ROSATOM NEWS

Back to contents

Geni Rina Sunaryo, Indonesia

Geni has a Basic study on Analytical Chemistry and got PhD from Nuclear Engineering, University of Tokyo, Japan. She has gained thirty-six years experience on nuclear reactor safety and technology research, Indonesia Nuclear Agency. Geni started struggling as a researcher for Indonesia's future Nuclear Power Plant since twenty-seven years ago, but more intensely doing promotion related to NPPs since becoming a leader of Woman in Nuclear — under the umbrella of Indonesia Nuclear Society, four years ago. Hence, she is having valuable experience on leading a NPP design team named Experimental Power Reactor, when she has been a director on Center for Nuclear Reactor Technology and Safety.

Raden Ajeng Kartini

AFTER DARKNESS, LIGHT IS BORN

Raden Ajeng Kartini heralded woman's emancipation; she fought for equal rights to education regardless of gender and status. She opened the first Indonesian women school and campaigned for Indonesia's independence from Dutch occupation, thus become a national hero. Kartini's legacy is found in the many letters she wrote to friends in Holland. The book was then translated into several languages.

Soekarno

UNDER THE BANNER OF REVOLUTION

Biography of Ir. Soekarno, the first president of the Republic of Indonesia, his life all the way from youth to the President of Indonesia. He tried to explain the thoughts on Nationalism, Islamism, Marxism, Communism and various ideas in the world. This book is an authentic account of the beginning of the nation's historical journey and references the nation's introspection.

Leila Budiman

IDEALISME & KEARIFAN ARIEF BUDIMAN: THE SPECIAL STORY OF ARIEF & LEILA

Arif Budiman — Indonesian scientist, politician and human rights activist. This book tells his the story, written by various groups who have observed his work.

ROSATOM NEWS

Back to contents

Egor Kvyatkovsky, Russia
Egor graduated with Master's degrees from the Faculty of Sociology, National Research University Higher School of Economics (Moscow). In 2019 he graduated from Summer Institute, World Nuclear University. His first and only place of work for 10 years is Rosatom. Since 2018 he is responsible for the marketing in Rusatom International Network.

G.E. Kodina, A.O. Malysheva
THE MAIN ISSUES OF QUALITY ASSURANCE OF RADIOPHARMACEUTICALS

We all know well that atomic and radiation technologies are deeply integrated into processes related to the spheres of human life — energy, agriculture, medicine — it is simply impossible to imagine these segments without these technologies today.

At the same time, few people thought about the physical and chemical processes underlying these technologies. The book by G. E. Kodina and R. N. Krasikova is focused on students of physical and chemical specialties and at the same time easily and easily tells the reader about the technologies and processes in the segment of nuclear medicine.

Ayn Rand
ATLAS SHRUGGED

This book written over half a century ago is Ayn Rand's prophecy for all time. A dystopia, which formulates a simple truth — friendship, love, business, society, built on coercion, rejection of their own values and principles, are doomed to tragedy.

The heroes of the book are businessmen striving to remain faithful to themselves, to their ideals and principles, ready to destroy their own empires and rebuild them, but not to compromise with their conscience. A truly life-affirming book that strengthens the reader's faith in himself, motivates him to achieve his goals, regardless of the difficulties.

Tom DeMarco
THE DEADLINE: A NOVEL ABOUT PROJECT MANAGEMENT

In a book written by a software engineer, in easy and accessible language, it tells how to implement projects that fall on you unexpectedly, require execution on time and adhere to budgets and quality levels. Throughout the book, the author skillfully weaves storylines and project management theory. Of course, this book cannot be considered a teaching aid. It is designed to spark interest in project activities in the reader and to explain that project management can and should be exciting. NL

To the beginning of the section

ROSATOM DIVISIONS

Back to contents

Composites: Bearable Lightness of Being

This year, we are launching Rosatom Divisions, a series of articles dedicated to the divisions of the Russian nuclear corporation, their business lines and most interesting products. The opening article deals with Advanced Materials and Technologies, a division manufacturing Umatex-branded composite materials.

The division comprises the Umatex group of companies manufacturing carbon fiber and associated products.

Aircraft Engineering

One of the company's major achievements is participation in the development of a new Russian medium-range MC-21–300 airliner. Umatex composites are used in its 17.5 m long wing panels, center sections, high-lift devices, and the tail assembly. On December 25, 2021, the aircraft made its successful maiden flight. Speaking at the event, Russian Minister of Industry and Trade Denis Manturov announced that two sets of composite wings had been manufactured and the third one was in production. MC-21–300 is a medium-range airliner with a capacity of 163 to 211 passengers. At the moment, the certification process is nearing completion; the first customers will receive their planes as soon as 2022. Rossiya Airlines will be the first operator of the new aircraft.

Umatex helps secure Russia's independence from carbon fiber imports. In November 2021, the company opened a plant in the Alabuga Special Economic Zone (Republic of Tatarstan) to manufacture polyacrylonitrile (PAN). This substance is the most common carbon fiber precursor, which used to be imported from China. "As recently as 2015–2016, more than 80% of carbon-based materials consumed in Russia were imported. Today, the country manufactures over 90% of carbon-fiber fabrics and prepregs domestically. For the past five years, we have built a comprehensive value chain," said Umatex CEO Alexander Tyunin at the Composites Without Borders Forum. The new plant will produce 5,000 tons of the PAN precursor annually. This amount will suffice to provide feedstock for two carbon fiber manufacturers, the plant in Alabuga (Tatarstan) and Argon in Balakovo (Saratov Region).

The newly built facility features Italian equipment and software. Even though there were no problems with deliveries, many Italian technicians had to work remotely due to the lockdown. Nevertheless, they managed to do an excellent job. **"What we see is yet another milestone in the close relationships between Italy and Russia. Umatex has long been working with Italian companies. It supplies composite parts for Italian sports motorcycles and provides the country's leading shipyards with carbon-based fabrics for high-end yachts and motor boats. Meanwhile, a company from Piacenza, a city in Northern Italy, provides equipment for the Russian plant. This cooperation is mutually beneficial, and we want these close Italian-Russian relationships to continue,"** Vittorio Torrembini, President of the Italian Entrepreneurs Association in Russia (GIM Unimpresa), said at the opening ceremony.

Sports

Among the areas of cooperation mentioned by Mr. Torrembini was the design and manufacture of composite fairings enhancing motorcycle speed performance by reducing air drag. In 2021, the first motorcycle equipped with a Umatex carbon shell took part in the British Superbike Championship. In addition to that, a member of the team Kawasaki Puccetti Racing participated in the Superbike World Championship which was held in Spain, Italy and the UK in May–July 2021.

Production of ice hockey sticks is another sports business area. Umatex' subsidiary Zaryad produces ice hockey sticks for all ages (minors, teenagers, and adults) and skill categories (professional, semi-professional, and amateur players) under the eponymous brand. The Zaryad ice hockey sticks are exported to Latvia and Canada.

Construction and mechanical engineering

Composite materials are also applied for structural reinforcement in construction. For example, Russian hydroelectricity

ROSATOM DIVISIONS

Back to contents

company RusHydro used FibArm carbon tapes to reinforce the pipelines at the Ezmi Hydropower Plant, and Russian power grid operator Rosseti employed the same technique while repairing power transmission towers. Composite piles were used in a campaign to remove legacy waste in Usolye-Sibirskoye, Irkutsk Region, as a means of protecting soil from hydrocarbon infiltration.

Finally, composites find use in nuclear engineering as structural materials for Generation 9+ gas centrifuges. If made of composites, centrifuge rotors can withstand the rotation speed of 750 m/s, while those of maraging steels function at no more than 498 m/s. Additionally, composites are used in making wind turbine parts. Umatex has already begun developing composite tanks for hydrogen transportation, which are expected to be lighter and stronger than those of steel.

Lightness and strength are the key features that make composites perfectly suited for green economy. **“Composites are not only a profitable business, but also a good answer to the climate challenges the entire world faces now. In terms of product quality and environmental criteria, our composites fully meet the sustainable development requirements. Whether used in an aircraft or a car, they make a product 20% more lightweight. This means they increase the mileage while reducing emissions by 20% during operation, which is a big deal. This is also the case in construction where we can achieve economies of up to 30–40% across the entire value chain by using composite materials instead of steel and concrete. The resulting economies in energy and production processes make a big difference for climate,”** Director General of Rosatom Alexey Likhachev noted at the Composites Without Borders Forum held in November 2021.

To the beginning of the section

Rosatom Highlights in 2021

The Russian nuclear corporation invested much effort in achieving the goals set for 2021 and laying groundwork to deliver on its strategic plans. The last year was a success as revenue from international projects grew, several construction agreements were signed, a number of projects were completed with new ones launched aiming to make nuclear more sustainable and cost-efficient. Here is our account of Rosatom's performance in 2021.

International agenda

Growing recognition of nuclear as a key component of a carbon-free future was a pivotal achievement of the last year, Rosatom Director General Alexey Likhachev said, commenting on the industry performance in 2021.

Nuclear industry was in the focus of attention at the UN Climate Change Conference held in Glasgow last November. The report prepared by UNECE helped pro-nuclear activists gain a foothold. It says nuclear power plants generate less carbon dioxide emissions than any other source of power (5.1–6.4 grams of CO2e per kilowatt-hour). To compare, wind farms produce 6 to 147 g/kWh, and solar

farms 8 to 122 g/kWh, depending on the technology employed.

In September, the IAEA initiated the establishment of the Group of Vienna, an informal club for major players of the global nuclear market. The group will serve **"as a platform for dialog on how best to address current global challenges through the effective and sustainable use of nuclear technologies and by fostering innovation in the nuclear sector"**. The new collaborative initiative brought together 13 leading companies in the nuclear industry from around the world, including Rosatom. **"The Group of Vienna will meet regularly to discuss the latest developments in the nuclear field and their contribution to addressing key challenges, including climate change and human health. The Group will support the IAEA in its mission to accelerate and enlarge the contribution of nuclear technologies to meeting environmental, social, and economic objectives and to improve the health and well-being of people,"** read the Joint Statement of the Group of Vienna published on the IAEA website.

Traditional businesses

In 2021, Rosatom's subsidiary RosEnergoAtom generated over 222.4 billion kWh of electricity — more than any other utility company in Russia. If the same amount of electric power had been generated by coal-fired power plants, CO2 emissions would have reached 111 million tons.

In late December, the work started at Belarusian NPP Unit 2 to prepare the nuclear reactor for achieving criticality. It was announced on December 27 that the

fuel loading campaign was completed and all 163 fuel assemblies were loaded into the reactor core. The next steps will be closing the reactor, carrying out hydraulic tightness tests, heating up the reactor in the pre-critical condition, and bringing the reactor to criticality.

An upgrade program was completed at the Armenian Nuclear Power Plant. Its buildings and structures were reinforced to increase their earthquake resistance. The program comprised an upgrade of the emergency core cooling system, repairs on the spent fuel pool and, most importantly, annealing of the reactor pressure vessel. In January 2021, the government of Armenia adopted a strategic energy program that provides for the development of nuclear power as well. The country plans to construct a new power reactor.

The last year was successful for the Russian nuclear corporation as it completed or made much progress in some of its major international projects. In late December 2021, Rusatom Overseas (part of Rosatom) announced the completion of functional tests on the fluorodeoxyglucose production line for the Nuclear Research and Technology Center in Bolivia. Fluorodeoxyglucose is used in positron emission tomography for early

detection of cancer diseases. Commissioning operations on the pre-clinical cyclotron facility and the multi-purpose irradiation center are nearing completion. The reactor and laboratories are currently under construction.

Also in December, the government of Serbia and Rosatom signed an agreement to build a nuclear science and technology center in that Balkan country.

The World Nuclear Exhibition in Paris was also a success for Rosatom. Top managers of the Russian nuclear corporation and its subsidiaries held business talks and signed several documents of importance for Rosatom's business. For instance, Rosatom, the Alternative Energies and Atomic Energy Commission of France (CEA) and French company EDF signed a declaration of intent to develop long-term collaboration in nuclear research and engineering. Framatome and the Russian nuclear corporation signed an agreement providing for a broader long-term cooperation in fuel fabrication and development of I&C systems, as well as joint efforts in other areas.

Rosatom's nuclear fuel division signed contracts with French companies ROBATEL Industries and D&S Groupe.

New businesses

Uranium One Holding N.V. (part of Rosatom) and Alpha Lithium Corporation (Canada) made a joint venture agreement to develop a lithium project, Tollilar, in Argentina. The deal is particularly important for the Russian nuclear corporation because Tollilar is its first lithium mining project.

Rosatom's subsidiary RENERA acquired a 49% stake in Enertech International, a South Korean manufacturer of Li-ion cells and energy storage systems. This move will help RENERA to better establish itself in the energy storage market.

Rusatom Overseas signed a number of agreements in the field of hydrogen economy with Air Liquide and Russian partners.

In general, Rosatom's revenue from international projects doubled over the last decade. According to preliminary estimates, its revenue for 2021 will reach at least USD 8.4 billion (more accurate data will be available later). **"This is a record-high result,"** Alexey Likhachev pointed out and reminded that the company planned to receive more than a half of its revenue from international projects by 2030. For now, this figure stands at 40%.

Russian power industry

In 2021, the government of Russia approved a 'green' taxonomy that — unlike the EU Taxonomy — includes nuclear energy projects. Despite reasonable evidence that nuclear is a reliable and carbon-free source of power, which is of particular importance in an energy crisis like that evolving in Europe now, European politicians had not

included nuclear in their Taxonomy until the end of 2021. It was December 31 when the European Commission sent the EU Member States a draft Taxonomy Complementary Delegated Act proposing to include natural gas and nuclear power into the Taxonomy and initiated consultations with experts. The European Commission will consider expert opinions and adopt the act later in 2022.

Russia published an updated Generation Capacity Development Strategy 2035 and Prospects 2040 providing for the construction of 16 power reactors by 2035. New reactors are built in Russia first, and then they serve as reference models for international projects. For instance, the first VVER-TOI reactors featuring improved technical and economic performance and BREST-300 fast neutron reactor are already under construction in Russia. BREST-300 will be used to pilot the so-called closed nuclear fuel cycle technology and create a two-component nuclear energy system, which is expected to be safer and more sustainable.

Work started to build four floating power units for Baimsky GOK (a mining and processing plant that will develop one of Russia's largest gold deposits). This is also an international project because the mining plant is owned by Kazakhstan company KAZ Minerals.

Five wind farms were put in operation in 2021. The total capacity of wind farms owned by Rosatom reaches 720 MW. The plan is to commission 280 MW of wind capacity in 2022 and another 1.7 GW by 2024. NovaWind (Rosatom's wind power division) has plans to enter the international market both as an equipment supplier and a project developer and holds talks to this effect.

Environment

Rosatom continues its consistent efforts in nuclear legacy management to create a safer environment both in Russia and other countries.

A landfill site near Chelyabinsk was rehabilitated and turned into a green hill. As a result, the life of over 1 million of local residents improved — emissions decreased by 30%, landfill smells disappeared, and no hazardous effluents find their way into the local river Miass anymore.

Much work is done in the Arctic. Last year, all spent nuclear fuel was removed from the damaged depot ship Lepse. The final step of this cleanup effort — transportation of the properly packed ship's bow to the long-term storage facility in Sayda Bay — is scheduled for 2022. The afterbody of the ship is already there.

Removal and transportation of spent nuclear waste from the repository in Andreeva Bay is currently in progress. In 2021, six damaged fuel assemblies, which prevented the rehabilitation of the spent fuel pool, were removed from the repository.

TRENDS

Back to contents

Around 900 assemblies fuel assemblies were removed from the Gremikha naval base that used to be a storage site for spent fuel from nuclear submarines.

Digitalization

Rosatom introduced a new digital product, Logos Platform, to the market. It facilitates the use of the Logos Suite products in combination with third-party software.

A huge step forward was made in the development of a quantum computer as researchers created a four-qubit machine based on ytterbium ions. They managed to develop a system that employs a proprietary technology for scaling up quantum processors. **"It is a breakthrough for Russian science,"** Alexey Likhachev is sure.

Northern Sea Route

In 2021, the Northern Sea Route (NSR) set a new record of 34.85 million tons of cargo transported. In 2020, the total cargo traffic amounted to nearly 33 million tons. Cargo transit also demonstrated a sizable growth. Last year 86 ships, including 75 foreign-flag ships, traveled on the NSR. German, Norwegian, Swiss and Chinese carriers transported over 2 million tons of cargo. In 2020, cargo transit on the NSR reached 1.3 million tons.

In 2021, Rosatom proposed to create a Great Northern Sea Route (GNSR) spanning from Norway in the Barents Sea to the Korean Peninsula. It is expected that the GNSR will enable year-round navigation, increase cabotage traffic between Northwest and Far East Russia and will serve as a regular sea corridor for container transit between Northwestern Europe and East Asia. **"The Russian government supported the idea of creating a GNSR,"** Alexey Likhachev announced.

In November-December 2021, the icebreakers of Atomflot (Rosatom's subsidiary operating the nuclear fleet) rescued almost two dozen of Russian and foreign merchant vessels trapped in the ice. Help came right in time. **"No one of the crew was harmed and no ship sent an SOS signal,"** Alexey Likhachev said.

In 2021, the lead Project 22220 icebreaker Arktika got back on track after repairs and went on escort duty of the convoy heading to Pevek and carrying cargo for large construction projects in the Chukotka Peninsula. The first serial icebreaker of the same design, Sibir, was commissioned on December 24 and is expected to enter upon its duties on the NSR as soon as February 2022.

To the beginning of the section