



**KEY OPERATING RESULTS OF STATE ATOMIC
ENERGY CORPORATION ROSATOM**

1
No. 1 in the world in terms of uranium enrichment

3
No. 3 in the world in terms of uranium production

3
No. 3 in the world in terms of fuel fabrication

ROSATOM:

Nuclear power generation
(billion kWh)



Labour productivity
(RUB million per person)



Cargo traffic along the Northern Sea Route
(million tonnes)



15 YEARS OF OPERATIONS

- 11** new nuclear power units built in Russia
- 6** power units built abroad
- 8** countries where ROSATOM is building nuclear power plants
- 34** power units in ROSATOM's order portfolio
- 3** nuclear icebreakers accepted into service
- 3** nuclear icebreakers under construction
- ✓** The world's first floating thermal nuclear power plant put into operation
- >20%** of global cobalt-60 output produced at Russian NPPs
- >70** digital products developed in-house
- 7** wind farms with a total capacity of 780 MW in operation
- 2** wind farms with a total capacity of 255 MW under construction



Innovative research and development facilities

21% – share of innovative products and services in total sales across the industry



International partnership

1,370 Russian experts have participated in more than 380 IAEA events



Financial resources for development

> RUB 200 billion in ESG loans and green bonds



RESOURCES SUPPORTING ROSATOM'S TECHNOLOGICAL SOVEREIGNTY



Natural resource base

14% of the global market – uranium resources



Management training system

> 5,900 people – ROSATOM's executive succession pool (2% of the total headcount)

~400 enterprises of ROSATOM form an autonomous process chain covering all stages from uranium mining to industrial waste recycling



Closed-loop production chain

Green Energy



Large nuclear power plants

Nuclear power generation accounts for about 20% of the total electricity output in Russia. Moreover, the share of nuclear power generation reaches 30% in European Russia and 37% in the North-West.

A total of 37 power units with total installed capacity exceeding 29.5 GW are currently in operation at 11 NPPs in Russia.

Results in 2022

All Russian-design NPPs currently in operation worldwide helped to prevent greenhouse gas emissions totaling 217 million tonnes of CO₂e in 2022, including more than 109 million tonnes of CO₂e in Russia.

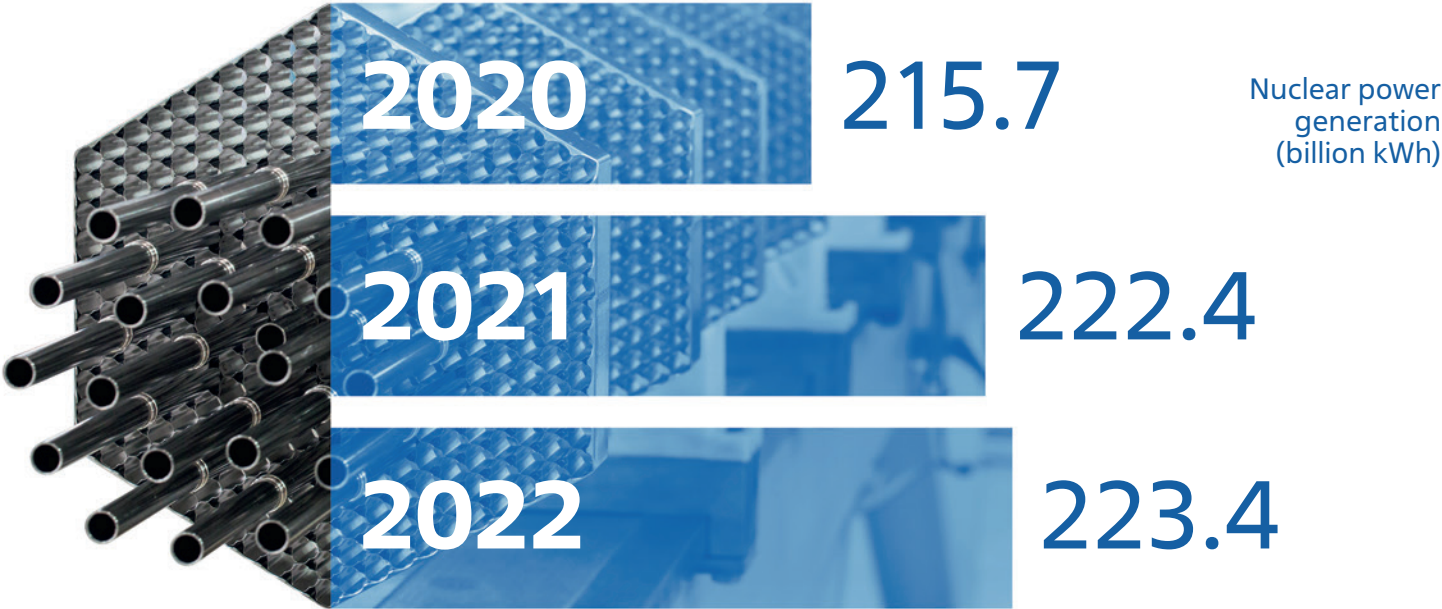
Construction of new NPPs in Russia and abroad

The installation of the outer containment dome was completed at power units No. 1 and 2 of Kursk NPP-2.

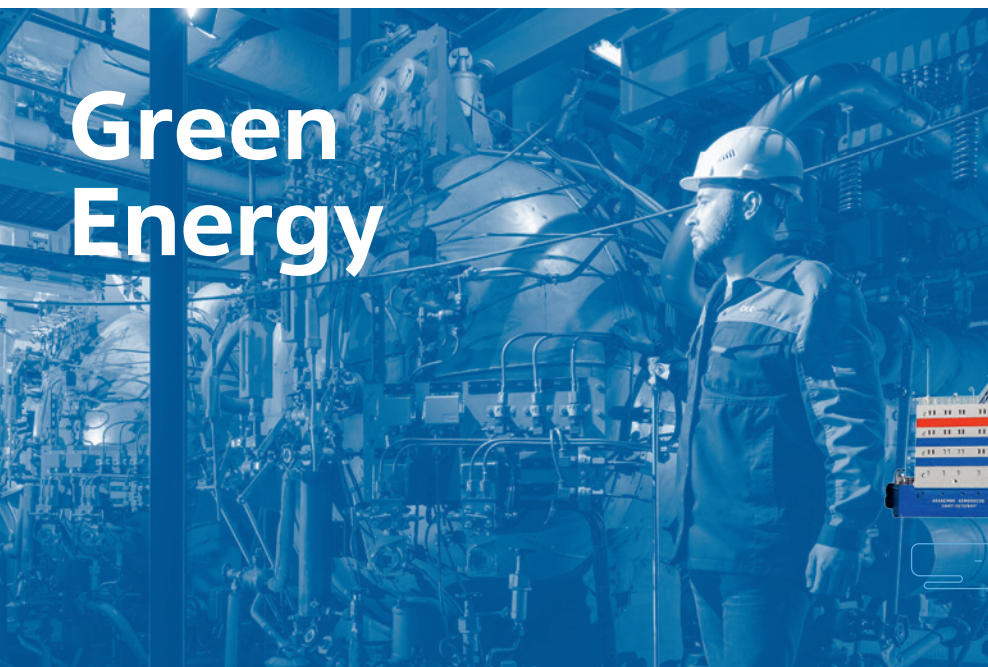
Grading and levelling started at the construction site of power units No. 7 and 8 of Leningrad NPP.

Concreting started at the construction sites of power unit No. 4 of Akkuyu NPP (Turkey), power units No. 1 and 2 of El Dabaa NPP (Egypt), power unit No. 8 of Tianwan NPP and power unit No. 4 of Xudabao NPP (China).

The Hungarian Atomic Energy Authority issued a permit for the construction of two power units at Paks II NPP.



Green Energy



**local content in equipment
for ROSATOM's WPPs
in 2022**

Small nuclear power plants

Onshore and floating small nuclear power plants are an optimal solution for providing steady and clean energy supply to consumers in areas remote from the central power grid and for replacing old power plants with a high level of CO₂ emissions into the atmosphere.

The world's only innovative floating thermal nuclear power plant (FTNPP) with the *Akademik Lomonosov* power unit has been built in Russia and has been in operation since 2020 in Pevek (Chukotka Autonomous District).

At small NPPs, the reactor power can be adjusted to align power output with grid load requirements (from 30% to 100% of installed capacity).

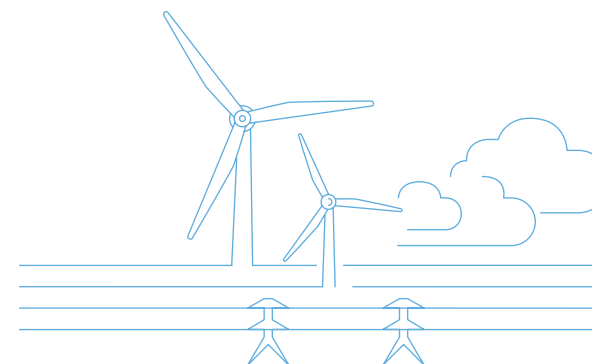
Results in 2022

- The FTNPP provided heat supply to almost ¾ of all residential buildings in Pevek.
- An agreement was signed to supply power from a small NPP for the development of the Kyuchus deposit in the Ust-Yansky and Verkhoyansky Districts of the Sakha Republic (Yakutia). Under the agreement, the world's first onshore small NPP with a RITM-200N reactor unit will supply electricity for 40 years starting from 2028.
- In 2022, the hulls of the first two floating power units (FPUs) for the Baimskaya Mining Company were laid. A total of four FPUs with installed capacity of up to 110 MW each will be produced.

Wind power generation

ROSATOM's Wind Power Division is responsible for electricity generation at wind power plants (WPPs), WPP maintenance and operation, and local production of wind turbines.

ROSATOM currently operates seven WPPs with a total capacity of 780 MW.



Results in 2022

- Electricity output from WPPs exceeded 1.96 million MWh.
- On 19 December 2022, ROSATOM's seventh wind farm, the 60 MW Berestovskaya WPP, was put into operation.
- A permit was obtained for the construction of two wind power plants in the Stavropol Territory: the Kuzminskaya (160 MW) and Trunovskaya (95 MW) WPPs.
- ROSATOM's Wind Power Division and the government of the Chukotka Autonomous District signed an agreement on cooperation in the implementation of wind power projects.
- An agreement was signed with An Xuan Energy (Vietnam) to jointly implement a wind power project in the Son La Province.

Technology for Health



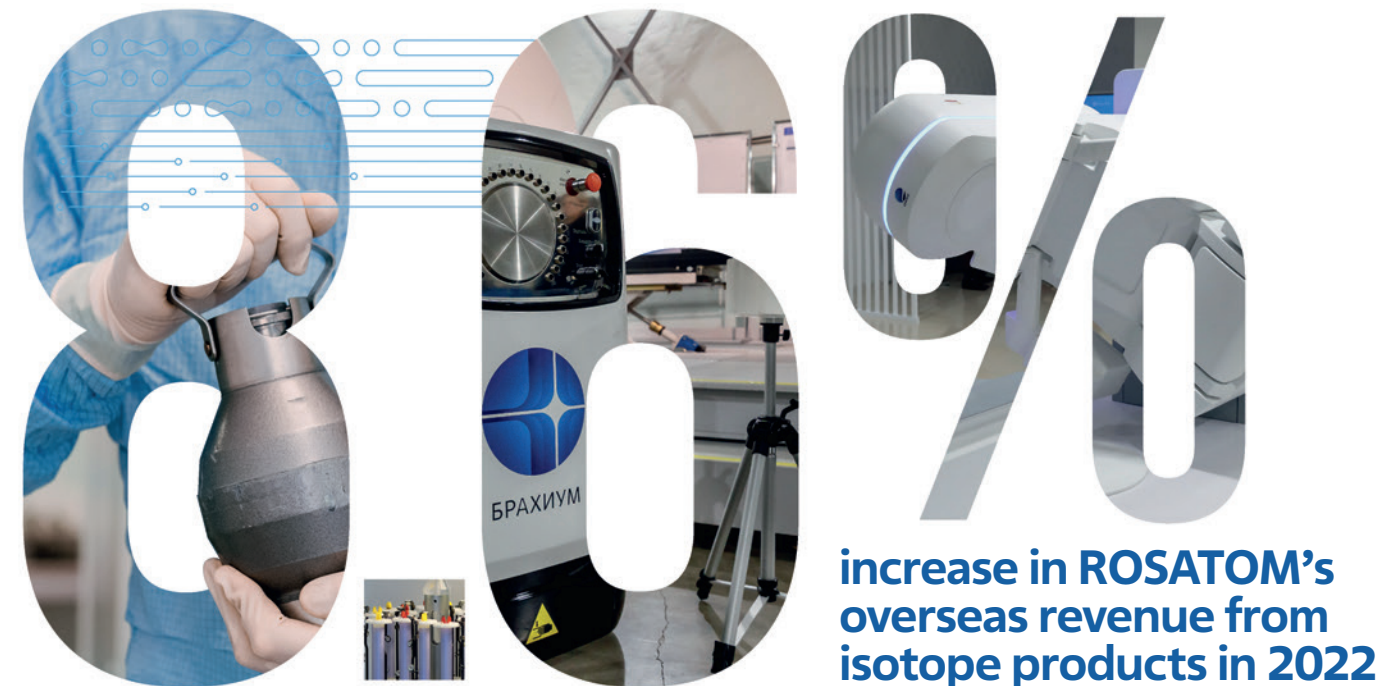
Nuclear medicine

ROSATOM ranks among the world's top five suppliers of raw isotopes and is a key supplier of medical isotopes on the Russian market.

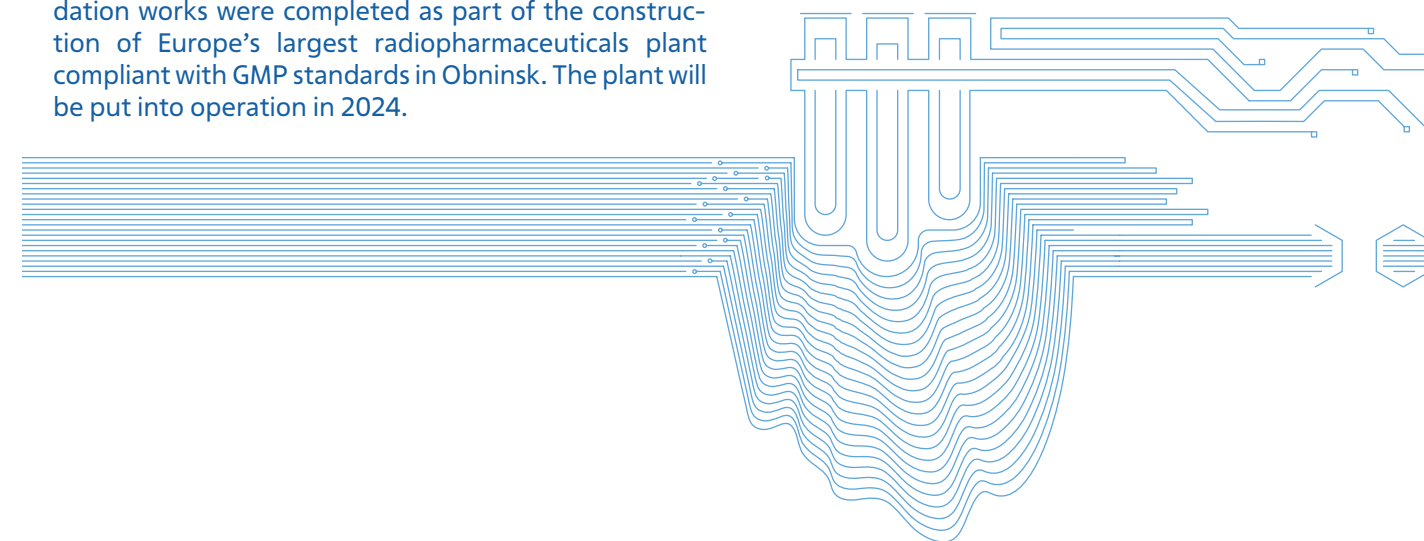
ROSATOM produces the widest range of isotopes in the world and supplies the domestic market with all the most in-demand radiopharmaceuticals for cancer therapy and for high-precision cancer diagnostics.

Results in 2022

- Supplies of short-lived medical isotopes from European countries were completely replaced with ROSATOM's isotope products. More specifically, ROSATOM's share on the Russian market for technetium generators currently stands at 100%.
- ROSATOM's overseas revenue from isotope products increased by 8.6%.
- JSC Isotope Regional Alliance concluded 149 new contracts to supply isotope products abroad.
- Imports of life-saving drugs were replaced; this included the start of supply of radioimmunoassay (RIA) kits and a 53% increase in the supply of samarium-153 oxabifor for the treatment of bone metastases.



- The Tula Regional Cancer Centre was the first in Russia to receive a Brachium machine and carried out the first radiation therapy procedures.
- The relevant documentation was approved and foundation works were completed as part of the construction of Europe's largest radiopharmaceuticals plant compliant with GMP standards in Obninsk. The plant will be put into operation in 2024.



Logistics Services



Development of the Northern Sea Route

Comprehensive development of the Russian Arctic is a national strategic priority. An increase in cargo traffic along the Northern Sea Route (NSR) is a vital prerequisite for accomplishing the objectives set in the sphere of transportation and cargo delivery. The development of this logistics corridor involves organising regular cargo transportation, building new nuclear icebreakers and upgrading the relevant infrastructure.

ROSATOM is actively involved in these efforts: it escorts vessels along the NSR to ice-bound Russian ports, undertakes research expeditions in the High Arctic and conducts rescue operations in ice-covered areas along the NSR. The transportation of hydrocarbons and other commodities to Asian and European markets along the NSR can provide a viable alternative to existing transport links between countries in the Atlantic and Pacific regions.

Results in 2022

- In 2022, cargo traffic along the NSR exceeded the target set for the federal project by more than 2 million tonnes.
- Atomflot's order portfolio totalled RUB 3.5 billion (+ RUB 1.7 billion compared to 2021).
- Three new icebreakers, *Chukotka*, *Yakutia* and *Rossiya*, a unique Project 10510 icebreaker that will be the most powerful in the world (120 MW), are under construction.
- The second follow-on Project 22220 icebreaker, *Ural*, was accepted into service in November.
- The Federal State Budgetary Institution Northern Sea Route General Administration was established. Its principal task is to provide competitive conditions for shipping along the Northern Sea Route, given the expanded scope of maritime traffic management tasks.

cargo traffic along the Northern Sea Route in 2022



Comprehensive Solutions for the Ecology National Project

Site restoration and waste management infrastructure

ROSATOM implements federal-level projects aimed at restoring and ensuring the safety of decommissioned legacy sites that cause environmental damage and developing infrastructure for the safe and efficient management of hazard class 1 and 2 waste. It also operates a federal state information system for tracking such waste and monitoring its management.

ROSATOM has started to develop a network of seven environmental technology parks with a total throughput of 350,000 tonnes of waste. This will help to address the national shortage of capacities for the processing of these classes of waste. The resulting materials will be commercialised.

3 major legacy sites causing environmental damage are being remediated by ROSATOM:

- The Krasny Bor toxic industrial waste landfill (Leningrad Region);
- The site of the defunct Usolyekhimprom plant (Usolye-Sibirskeye, Irkutsk Region);
- OJSC Baykalsk Pulp and Paper Mill (Baykalsk PPM): the Babkhinsky and Solzansky landfills and the site of the central wastewater treatment facilities.



modern environmental technology parks are being developed by ROSATOM

Results in 2022

- At the Krasny Bor landfill, landfill cells containing liquid and paste-like waste were reinforced. The construction of a cut-off wall and infrastructure for the treatment of liquid and paste-like waste was started.
- At the Usolyekhimprom site, the dismantling of 204 buildings and structures was completed ahead of schedule.
- Positive opinions were obtained following state expert reviews of design documentation for work to be performed at the Babkhinsky landfill and at the site of the Baykalsk PPM. Top-priority measures implemented to lower the water level above the sludge layer

helped to prevent an environmental catastrophe that could have damaged the unique ecosystem of Lake Baikal.

- The integrated information system for tracking hazard class 1 and 2 waste and monitoring its management was launched. The system is operated by FSUE FEO. In 2022, about 60,000 users registered in the system.

Energy of the Future; Unique Materials

Energy storage systems

There are plans to produce at least 25,000 electric vehicles (EVs) and open more than 9,000 charging stations in Russia by 2024. Domestic demand for energy storage systems will reach 17.5 GWh, with EVs accounting for 16 GWh per year.

ROSATOM's Fuel Division produces lithium-ion batteries for the energy industry, electrical equipment and EVs, including lithium-ion traction batteries for vehicles, as well as stationary energy storage systems for the power grid and industrial enterprises.

Lithium-ion batteries are hermetically sealed; they do not require maintenance or special charging facilities. Systems based on lithium-ion batteries help to significantly reduce equipment costs and improve equipment efficiency.

Results in 2022

- In October 2022, the construction of Russia's first integrated gigafactory started in the Kaliningrad Region; the factory will produce lithium-ion batteries (cells) and assemble battery modules. The first batteries will come off the production line in 2025.
- The first stage of the gigafactory will have a capacity of 4 GWh per year, supplying lithium-ion batteries for up to 50,000 EVs.



**reduction in aircraft
weight achieved
by using carbon fibre
composites**

Composite materials

The production of composite materials is based on a state-of-the-art approach to product design that involves deliberately combining heterogeneous components to obtain the required strength, rigidity, chemical and weather resistance. Carbon fibre has high tensile strength and elasticity.

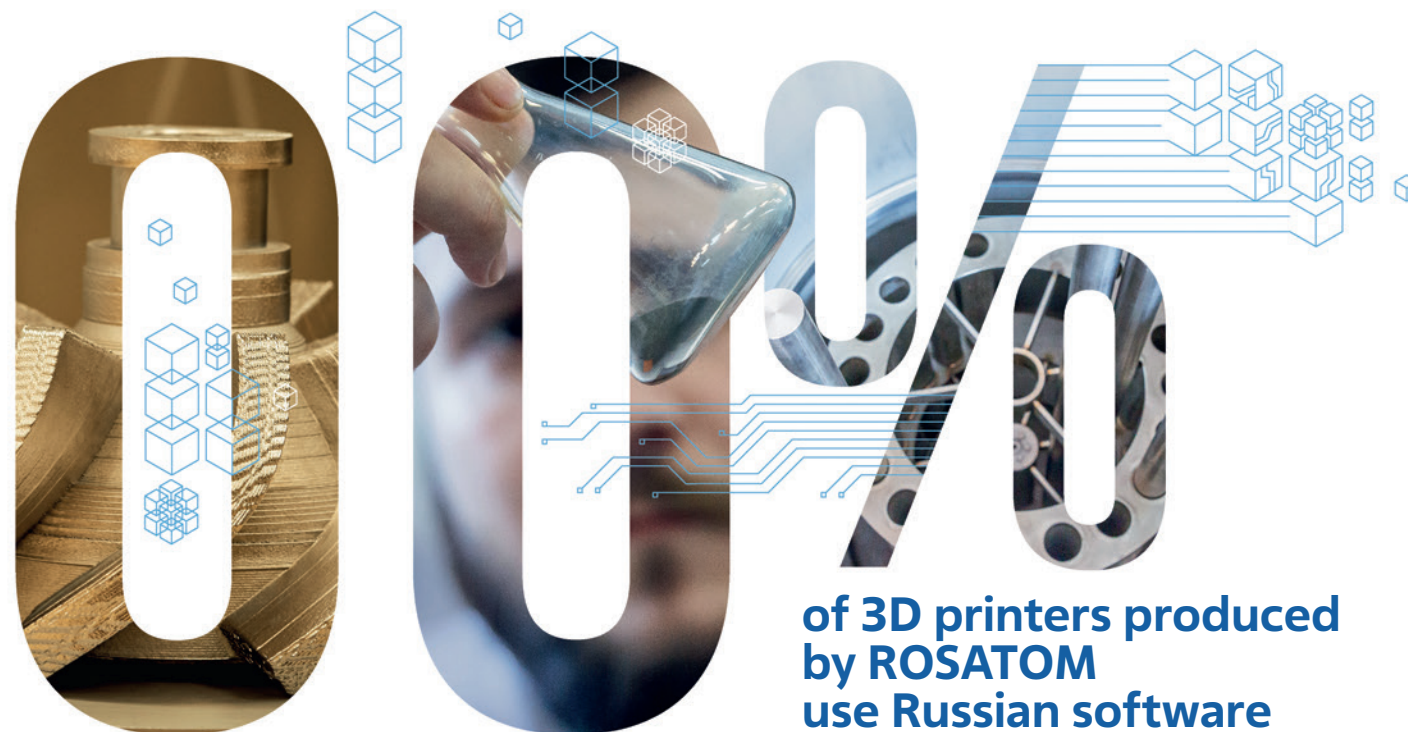
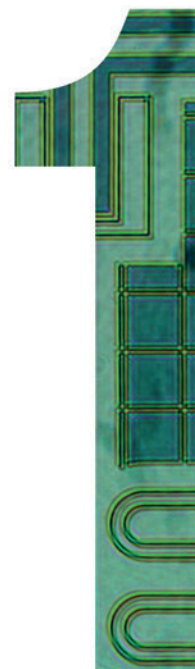
Carbon fibre fabrics are high-tech textiles with superior performance characteristics. Carbon fabrics have high tensile strength and are resistant to most aggressive chemicals.

Semi-finished composite materials (pre-pregs) have high strength and help to reduce the weight of the finished product.

Results in 2022

- A new business producing protective polymer coatings was launched; they are widely used in construction.
- The Composite Technology Competence Centre was opened in the Ulyanovsk Region.
- Enterprises producing glass fibre and insulating materials in the Vladimir and Tver Regions and a division in the Republic of Belarus were included in the scope of ROSATOM.

3D Printing; Contribution to Digitisation



**of 3D printers produced
by ROSATOM
use Russian software**

Additive manufacturing

ROSATOM operates across all segments of the additive manufacturing market: the manufacture of 3D printers and powder production equipment, software development and the establishment of additive manufacturing centres.

The development of additive manufacturing is a major area of focus at the federal level. ROSATOM's Additive Manufacturing Centre in Moscow is the only one in Russia to use Russian equipment produced in-house. The Centre is equipped with Rusmelt 300M, Rusmelt 600M and Rusmelt 600RM metal powder 3D printers that use the selective laser melting (SLM) technology. All these printers use Russian software.

Results in 2022

- An additive manufacturing centre was opened in the Republic of Tatarstan.
- Mass production of stainless steel powders was launched, and an additive manufacturing centre was opened in Novouralsk (Sverdlovsk Region).
- The first commercial delivery of an industrial 3D printer using the selective laser melting technology developed in-house was made.
- A hotline was launched for companies facing a shortage of imported spare parts, materials and components that can be manufactured by 3D printing (JSC Rusatom – Additive Technologies).

Digital products

ROSATOM's ambition in the digital sector is to become a technological leader both on the Russian market and globally. ROSATOM actively contributes to the digitisation of the Russian economy by developing IT solutions not only for the nuclear power industry but also for other industries across seven prioritised areas: Mathematical Modelling and R&D; Enterprise and Production Management; Digital Infrastructure; Management of Large-Scale Utility Construction Projects; Information Security and Physical Security; Digitisation of Municipal Services and Processes; System Integration and Software Development.

Results in 2022

- An experimental prototype of a 16-qubit quantum computer was developed; two-qubit quantum operations were performed.
- 10 pilot projects were implemented in the sphere of end-to-end digital technologies and data management, with economic benefits totalling RUB 105.88 million.
- The fifth stage of productisation of the Logos digital product was completed: the functionality of basic software modules (Logos Aero-Hydro, Logos Thermo, Logos Strength and Logos Platform) was expanded. An international version of the Logos product was developed.
- The Multi-D product line (Multi-D Platform and Multi-D Project) was included in the Unified Register of Russian Computer Software and Databases.
- The Multi-D ESB product was launched on the market.

People, Towns and Cities



A people-centric approach

As it works to accomplish its business objectives, ROSATOM focuses on people. The top priority for ROSATOM and all its enterprises is to create a safe and comfortable environment for the Corporation's employees and the residents of nuclear towns and cities. More specifically, this involves a focus on the safety of technological solutions, occupational safety and health and environmental protection.

As a responsible corporate citizen, ROSATOM makes a significant economic and social impact on a large part of Russian regions and a range of foreign countries where it is building NPPs and other facilities.

ROSATOM's efforts to develop its business both in Russia and abroad are aligned with long-term sustainable development objectives, taking into account the special characteristics of each individual region.

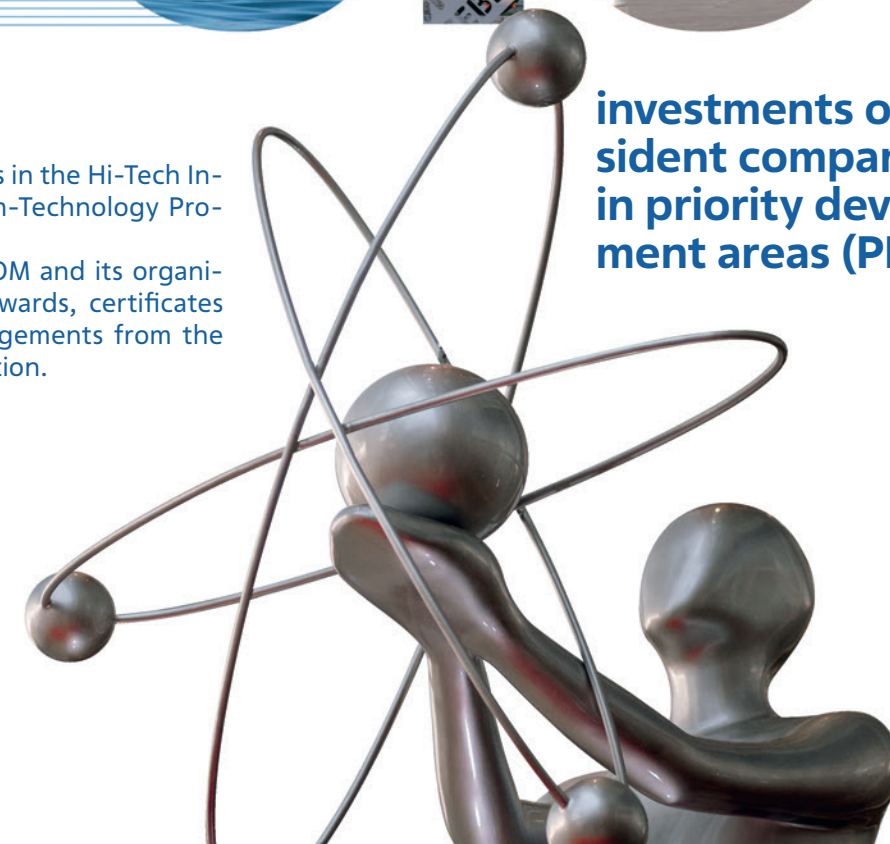
Results in 2022

- Total investments of resident companies in priority development areas (PDAs) increased to RUB 86.5 billion.
- Funding for national projects in nuclear towns and cities increased by 37% (RUB 7.9 billion).
- 24 towns and cities were assigned an urban environment quality rating indicating a favourable urban environment.
- The number of planned new jobs reached 10,184.
- The employee engagement rate in the industry stood at 84%, on a par with the best global employers.
- 67% of employees were covered by training programmes.
- 92% of members of the executive succession pool were appointed to new managerial positions.



- ROSATOM's team won 61 medals in the Hi-Tech International Competition of High-Technology Professions.
- Over 340 employees of ROSATOM and its organisations received government awards, certificates of appreciation and acknowledgements from the President of the Russian Federation.

investments of resident companies in priority development areas (PDAs)



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