ROSATOM

PERFORMANCE
OF STATE ATOMIC ENERGY CORPORATION ROSATOM IN 2022

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2022

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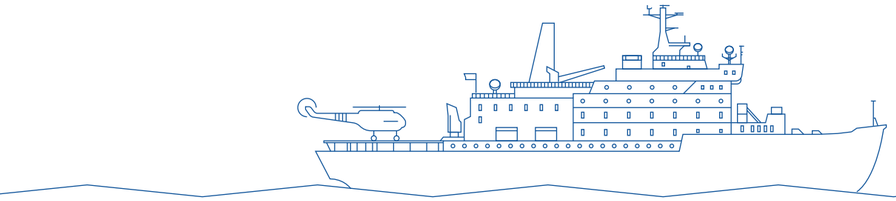
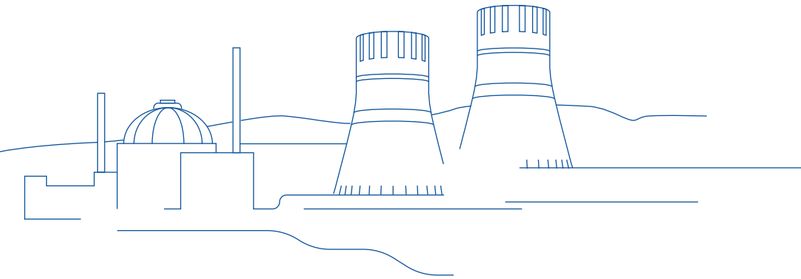
OF STATE ATOMIC ENERGY CORPORATION ROSATOM





The prioritised topic of the Report is ‘ROSATOM’s Contribution to the Technological Sovereignty of the Russian Federation’.

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ABOUT ROSATOM

GRI 2-1 State Atomic Energy Corporation Rosatom (hereinafter referred to as ROSATOM or the Corporation) is a diversified corporation owning assets and possessing competencies at all stages of the nuclear production chain: uranium exploration and mining, uranium conversion and enrichment, nuclear fuel fabrication, NPP design and construction, mechanical engineering, power generation, decommissioning of nuclear facilities, spent nuclear fuel and radioactive waste management.

GRI 2-6 The Corporation comprises over 400 organisations, including research institutes, the nuclear weapons division and the world's only nuclear-powered icebreaker fleet. ROSATOM is tasked with implementing a uniform government policy on nuclear power and fulfilling Russia's international commitments related to the peaceful use of nuclear energy and maintaining the non-proliferation regime.

ROSATOM is Russia's largest power generation company and a leading player on global markets for nuclear technologies (NPP construction, uranium enrichment services, nuclear fuel fabrication, decommissioning, etc.). ROSATOM carries out numerous large-scale international projects and generates substantial overseas revenue.

The scope of the Corporation's business also includes the production of innovative nuclear and non-nuclear products, scientific research, development of the Northern Sea Route and environmental projects, including the creation of environmental technology parks and a state system for hazardous industrial waste management. ROSATOM is also developing new businesses. These include wind power, nuclear medicine, digital products, infrastructure solutions, additive manufacturing and energy storage systems, process control systems and electrical engineering, environmental solutions, etc.

The Corporation's research activities are aimed at developing new solutions for the power industry and innovative technologies that will improve the quality of people's lives. ROSATOM's key project in the sphere of nuclear power is the Proryv (Breakthrough) Project[1], which is aimed at demonstrating the possibility of closing the nuclear fuel cycle using fast neutron reactors and developing the relevant technologies. A closed nuclear fuel cycle will significantly improve the efficiency of usage of natural uranium and will help solve the problem of nuclear waste accumulation and provide humankind with a reliable long-term source of clean energy.

ORGANISATIONS

1. The project forms part of the Comprehensive Programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024'.

ROSATOM today

№1
- in the world in terms of the overseas NPP construction project portfolio (34 power units)
- in the world in terms of uranium enrichment (35% of the global market)

№2
- in the world in terms of uranium reserves
- in the world in terms of uranium production

№3
- on the global nuclear fuel market

THE WORLD'S ONLY

nuclear-powered icebreaker fleet

19.9%

share in electricity generation in the Russian Federation[1]

435

organisations managed by the Corporation

RUB 556.37 BILLION

total personnel costs in 2022

RUB 24.65 BILLION

expenditure on environmental protection in 2022

337,400

employees in ROSATOM and its organisations

1 Within the Unified Power System of Russia.

STATEMENT OF THE CHAIRMAN OF THE SUPERVISORY BOARD

Dear colleagues,

In 2022, the Russian nuclear industry demonstrated a strong performance and accomplished all tasks set by the President and the Government of the Russian Federation. For instance, as in previous years, the state defence order was fulfilled in full. Russian nuclear power plants make an important contribution to the energy security of our country, as they account for about 20% of electricity supply in Russia's energy mix. In the reporting year, nuclear power generation by ROSATOM once again reached a new all-time high. Our unique nuclear-powered icebreaker fleet exceeded the targets set for the federal project aimed at developing the Northern Sea Route. Major highlights of the reporting year also included the establishment of the Federal State Budgetary Institution Northern Sea Route General Administration, a new organisation tasked with managing all navigation activities along the Northern Sea Route, and the expansion of the nuclear-powered icebreaker fleet, as the second follow-on nuclear icebreaker, *Ural*, was accepted into service. The construction of other nuclear icebreakers is underway; one of them, *Yakutia*, has already been launched.

Despite global political and economic instability, ROSATOM successfully builds new nuclear power units in Russia and fulfils all its contractual obligations related to the construction of new power plants abroad.

The Corporation continues to actively establish and develop new businesses, including operations on the renewable energy market: the Berestovskaya WPP in the Stavropol Territory has been put into operation.

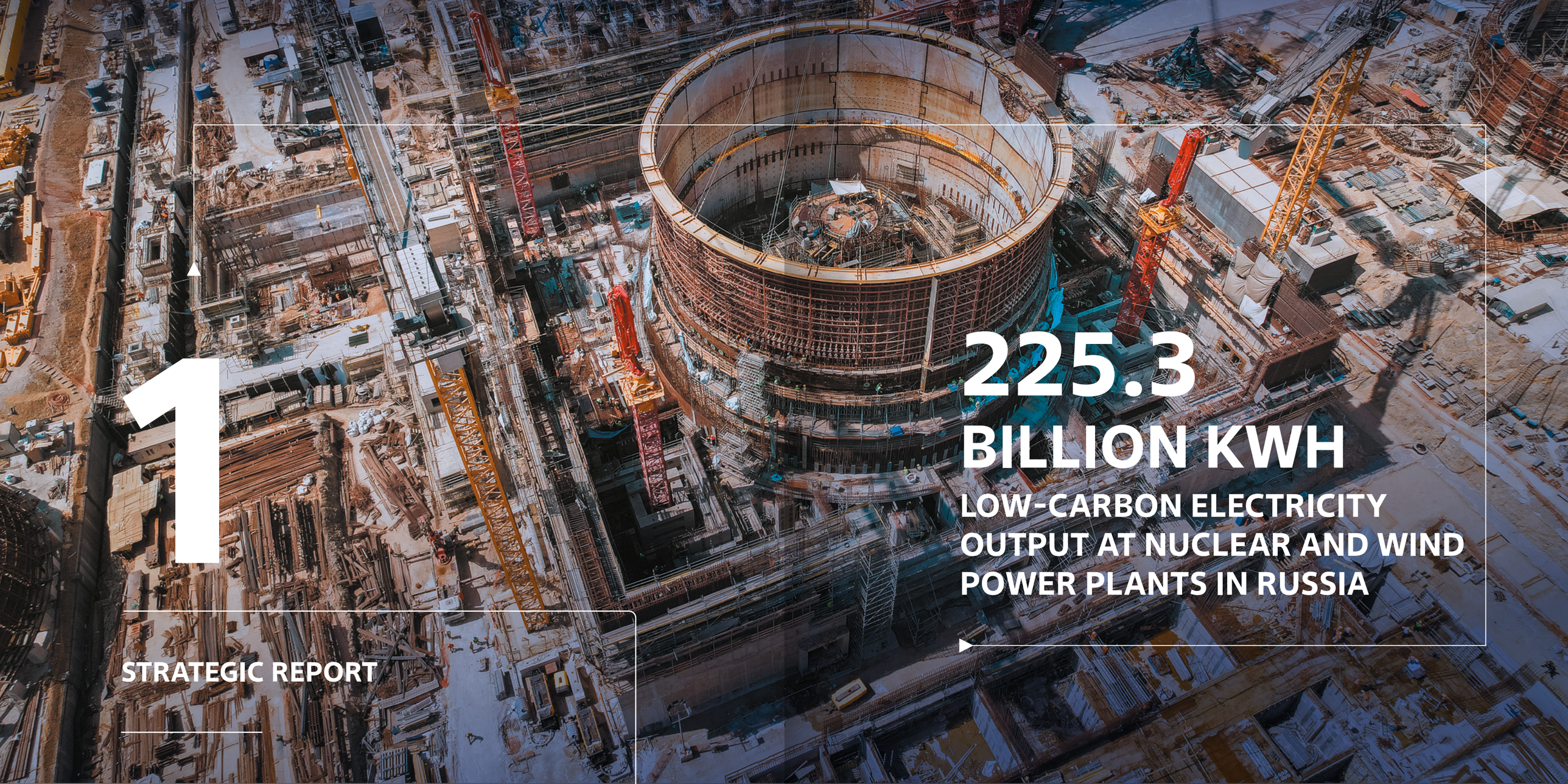
FULFILMENT OF THE STATE DEFENCE ORDER

The Corporation serves as an example of a major Russian company that is resilient to economic and geopolitical challenges and demonstrates a strong performance due to efficient strategic management, business diversification, a well-balanced HR policy and contribution to social and economic development of its regions of operation.

I would also like to emphasise that all this time, Russian nuclear employees have been on the front line, demonstrating unity with the Russian people. For instance, in 2022, ROSATOM's employees performed high-risk tasks related to ensuring the safety and security of nuclear facilities in the special military operation zone; they took on responsibility for Zaporozhye NPP and its satellite city, Enerhodar; they started to actively cooperate with volunteers participating in the WeAreTogether campaign and with the All-Russian National Front in providing relief supplies and served as volunteers in the special military operation zone.

I would like to thank the Corporation's executives and its entire team for their excellent work and for their contribution to promoting and enhancing Russia's technological sovereignty.

Sergey Kirienko
Chairman of the Supervisory Board of ROSATOM



1

STRATEGIC REPORT

225.3
BILLION KWH

LOW-CARBON ELECTRICITY OUTPUT AT NUCLEAR AND WIND POWER PLANTS IN RUSSIA

GRI 2-22

STATEMENT OF THE DIRECTOR GENERAL

Dear readers,

You are reading ROSATOM's public annual report for 2022 prepared in accordance with Russian and international public reporting standards.

Amid political and economic pressure on our country, ROSATOM successfully accomplishes complex and non-standard tasks set by the government. Indeed, despite the challenges, ROSATOM's team has achieved impressive results across all areas of its operations, including the fulfilment of government tasks, international cooperation and the development of new high-technology products to enhance Russia's technological sovereignty.

In 2022, ROSATOM traditionally fulfilled 100% of tasks under the state defence order. I would also like to highlight the fact that Russian nuclear power plants set a new record for electricity generation totalling 223.4 billion kWh. This was achieved due to the optimisation of duration of scheduled repairs at NPP power units, among other things. Despite a decline in international cargo transit along the Northern Sea Route, the nuclear-powered icebreaker fleet exceeded the target for cargo traffic by 3% as it transported 34.117 million tonnes of cargo.

One of ROSATOM's key strategic goals is to increase the share of its products and services on global markets. In 2022, revenue from overseas orders reached USD 11.8 billion, up by 31% year on year. ROSATOM remains a leader on the global market for new NPP construction, with 23 power units at the construction stage. In the reporting year, concreting was started at the sites of five new power units in Turkey, China and Egypt. A licence was obtained for the construction of two Russian-design power units with VVER-1200 reactors in Hungary. Overall, we currently operate in more than 50 countries worldwide.

ROSATOM is actively developing new high-technology businesses, such as nuclear medicine, additive manufacturing, wind power, electric transport, etc. Revenue from these businesses increased considerably compared to the previous year.

INTEGRAL ASSESSMENT OF PERFORMANCE AGAINST ROSATOM'S KEY PERFORMANCE TARGETS FOR 2022

ROSATOM actively participates in initiatives aimed at enhancing Russia's technological sovereignty. These efforts were accelerated in 2022. A project was launched to develop energy-saving technologies; the Corporation proposed an initiative to build a new shipyard for Arctic shipbuilding. ROSATOM is actively involved in the development of domestically designed solutions for critical information infrastructure across all industry sectors.

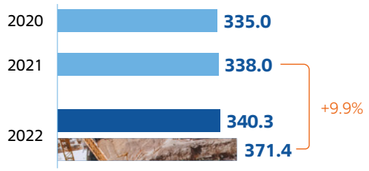
The reporting year marked the 15th anniversary of a historic decision of the President of the Russian Federation on the establishment of State Atomic Energy Corporation Rosatom. Over the years, ROSATOM has played a crucial role in the achievement of Russia's national development goals. I am convinced that, despite global turbulence and a changing international business environment, ROSATOM will continue to take advantage of emerging opportunities to develop its own business and enhance Russia's technological sovereignty. We have everything we need to achieve this goal: highly skilled specialists and a personnel training system, diverse engineering and production infrastructure covering the entire life cycle, government support and a diversified business model.

Alexey Likhachev
Director General of ROSATOM

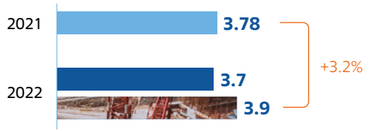
Key Results in 2022

Key performance indicators set by the Supervisory Board

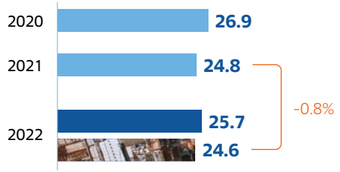
Adjusted free cash flow of ROSATOM, RUB billion



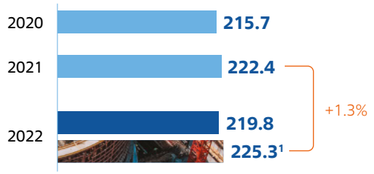
Consolidated labour productivity, RUB million/person



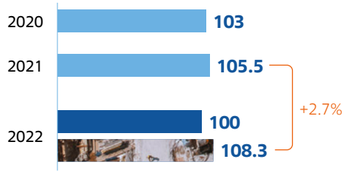
Unit semi-fixed costs (as a percentage of revenue), %



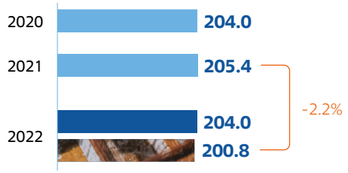
Power generation, billion kWh



Performance against the targets of JSC Rosenergoatom's investment programme, %



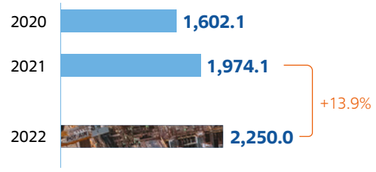
Portfolio of overseas orders covering the entire life cycle, USD billion



1. The figures for 2020 and 2021 reflected nuclear power generation in the Russian Federation; the figure for 2022 also includes wind power generation in addition to nuclear power generation. Nuclear power generation in the Russian Federation in 2022 totalled 223.4 billion kWh.

Target 2022 Actual 2022

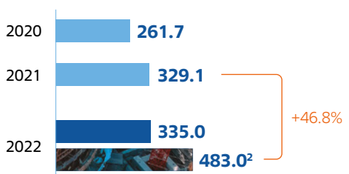
ROSATOM's 10-year portfolio of orders for new products (outside the scope of the Corporation), RUB billion



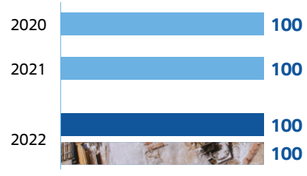
Foreign revenue, USD million

EBITDA, RUB billion

Revenue from new products (outside the scope of the Corporation), RUB billion



Fulfilment of government orders, %



Absence of events rated at level 2 or higher on the INES scale

1. Not including the revenue of MC Delo.
2. Not including the revenue of MC Delo.

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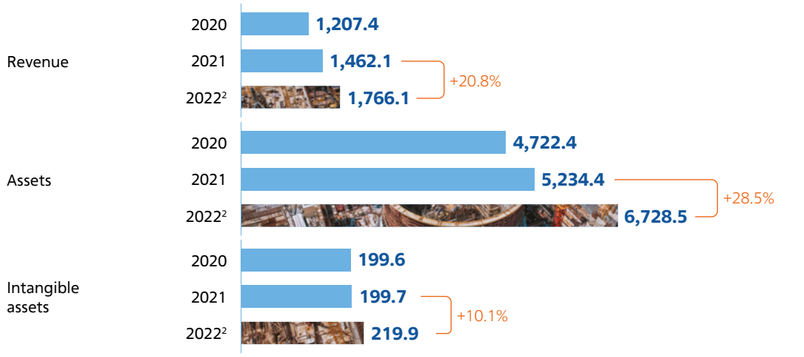
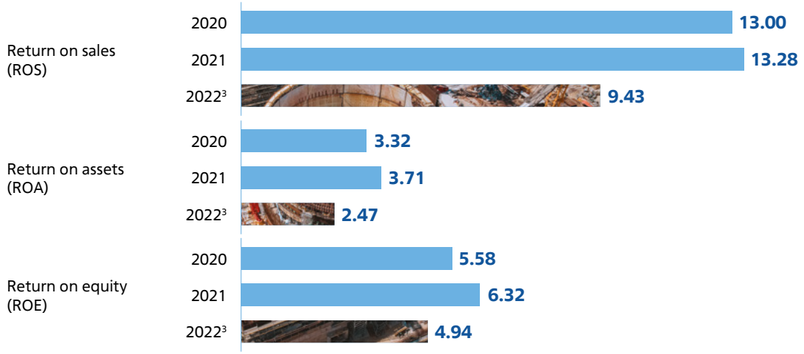
Financial and Economic Performance[1]

Key financial results, RUB billion



Profitability ratios, %



1. Data have been provided on the part of the scope of IFRS consolidation of ROSATOM for which information is publicly available. Comparative data on key financial indicators and profitability ratios for 2021 have been recalculated due to the fact that in 1Q 2022, the Group carried out common control transactions involving a business acquisition in the mechanical engineering segment. In accordance with the Group's accounting policy, the financial results of the acquired business have been retrospectively reflected in the financial statements at book value, as recognised in the consolidated IFRS financial statements of the transferring entity.
2. A 20.8% increase in revenue compared to 2021 was achieved mainly due to an increase in revenue from heat and power generation and capacity, transportation services and the integration of new businesses.
3. Profitability ratios decreased in 2022, primarily due to a year-on-year decline in profit in the reporting period.

KEY EVENTS IN 2022

NPP and WPP construction

May

– A permit was obtained for the construction of the Kuzminskaya WPP in the Stavropol Territory.

June

– The government of the Chukotka Autonomous District and JSC NovaWind signed an agreement on cooperation in the implementation of wind power projects. A permit was obtained for the construction of the 95 MW Trunovskaya WPP in the Stavropol Territory.

July

– Official ceremonies were held to mark the start of concreting at the site of power unit No. 1 of El Dabaa NPP in Egypt (20 July) and the start of concreting of the foundation of power unit No. 2 (November 2022).

– On 21 July, principal works were started at the construction site of power unit No. 4 of Akkuyu NPP in Turkey.

August

– An agreement was signed with a Vietnamese company An Xuan Energy to jointly implement a wind power project in the Son La Province.

– The Hungarian Atomic Energy Authority issued a permit for the construction of two power units equipped with VVER-1200 reactors at Paks II NPP.

December

– The Berestovskaya WPP in the Stavropol Territory was put into operation.

Small nuclear power plants

September

– The engineering design of the RITM-200N reactor unit was developed.

New products and technological sovereignty

July

– The Corporation obtained a registration certificate for the Onyx radiation therapy facility based on a linear electron accelerator.

August

– The first industrial facilities forming part of the Nuclear Research and Technology Centre in El Alto, Bolivia, started pilot operation.

October

– The construction of the first lithium-ion battery 'gigafactory' was started in the Kaliningrad Region.

– The development of the first stage of a data centre in Innopolis (Tatarstan) was started.

October

– X5 Group acquired licences for the use of an RPA platform, Atom. RITA, designed by ROSATOM to configure and support software robots.

November

– The development of technologies for stable isotope production based on fractional distillation and chemical isotope exchange was initiated.

December

– The construction of a new building of the Federal State Budgetary Institution Dmitry Rogachev National Medical Research Centre of Paediatric Haematology, Oncology and Immunology of the Russian Ministry of Health was completed.

Business development

January

– JSC Quadra – Power Generation was included in the scope of ROSATOM. It supplies heat and electricity to regions of the Central Federal District.

December

– ROSATOM and a Brazilian state-owned company Industrias Nucleares do Brasil concluded a contract for the supply of uranium products for Angra NPP to meet 100% of its needs between 2023 and 2027.

Development of the Arctic and the icebreaker fleet

February

– For the first time in the history of Arctic navigation, the flagship multipurpose nuclear icebreaker, *Arktika*, escorted a convoy of low-ice-class vessels from the east to the west in February.

June

– A federal law was adopted granting ROSATOM powers related to navigation management along the Northern Sea Route[1].

November

– The national flag was raised on the second follow-on Project 22220 nuclear icebreaker, *Ural*, and the third icebreaker, *Yakutia*, was launched.

Environmental protection

March

– FSUE FEO (an organisation of ROSATOM), the federal operator responsible for the management of hazard class 1 and 2 waste, started to provide services to facilitate the safe management of hazardous waste in the Russian Federation using the digital platform of the federal state information system for tracking hazard class 1 and 2 waste and monitoring its management.

April

– The main stage of the site restoration project was started at the Krasny Bor landfill in the Leningrad Region.

Research and innovations

April

– The Russian poloidal field coil (for plasma containment) for the ITER international project underwent the final test.

September

– The conversion of the BN-800 reactor at power unit No. 4 of Beloyarsk NPP to uranium/plutonium MOX fuel was 93% completed.

December

– The welding of the support plate for the BREST-OD-300 fast reactor, which is being built in Seversk (Tomsk Region) as part of the Proryv Project, was started.

1. Federal Law No. 184-FZ of 28 June 2022 on Amending Article 5.1 of the Merchant Shipping Code of the Russian Federation and the Federal Law on State Atomic Energy Corporation Rosatom.

1.1. BUSINESS STRATEGY

1.1.1 Business context

Trends in the development of the nuclear industry

The development of the nuclear industry is influenced by a number of factors, including[1]:

- Global population growth from 7.9 billion people in 2022 to 8.5 billion people by 2030 and an increase in the share of urban population from 57% to 60%;
- Global GDP growth of around 3% per year;
- Growth of global electricity output and consumption. Global electricity output is expected to increase by 22.9% compared to 2021 and reach 34.8 TWh as early as in 2030, with the Asia Pacific region accounting for two thirds of the growth;
- Accelerating greenhouse gas accumulation. In 2022, carbon dioxide emissions reached a new high of more than 36.8 billion tonnes. In 2022, the increase in emissions totalled less than 1%, well below the 6% growth in 2021, which was due to an accelerated economic recovery after the start of the COVID-19 pandemic. The level of global carbon dioxide emissions remains stable, which necessitates more decisive action to accelerate the transition to clean energy and achieve climate action targets.

ROSATOM has identified two groups of factors that have the most significant impact on the Corporation's global operations:

The economic and geopolitical situation. Although global economic growth outpaces that of the Russian economy, as a global company ROSATOM sets itself higher growth targets, despite persisting political pressure.

The technological landscape. Global technology trends form a separate set of challenges for the development of the industry. New technologies are evolving rapidly and shaping global markets; trends that started to emerge as recently as five to ten years ago are accelerating, as exemplified by the rapid development of renewable energy generation, exponential growth of the scale of digital transformation in manufacturing, and growing markets for new materials and manufacturing solutions. The rate of innovation is also accelerating, and, as a result, technological solutions become obsolescent increasingly fast. The Corporation's strategy takes into account both the current set of global technology trends and the level of their development.

The development of low-carbon power generation, including nuclear power, is a necessary prerequisite for reducing emissions and achieving international climate targets. In recent years, environmental aspects of the electricity industry have come under closer scrutiny, which has driven an increase in the share of low-carbon power in the global energy mix. In 2022, amid price shocks, rising inflation and disruptions to traditional energy supply chains, the global commitment to low-carbon and sustainable energy solutions was reaffirmed and strengthened. The zero-emissions strategy adopted by major economies will significantly accelerate the electrification of the global economy, which will necessitate active development of all zero-carbon energy sources, including nuclear power generation.

1. Data from the World Bank, the IMF, the IEA World Energy Outlook 2022 (Stated Policies Scenario), IEA CO_2 Emissions in 2022, and the IAEA.

In the long term, the global nuclear power industry as an energy source will remain in demand. In February 2022, the European Commission adopted a resolution on the inclusion of nuclear power in the EU Green Taxonomy, a classification of sustainable activities for investors. The International Energy Agency[1] forecasts an increase in installed nuclear capacity from the current level of 393.8 GW[2] to 471 GW by 2030.

Thermal power generation will yield to nuclear energy primarily because of CO_2 emissions, which have a negative impact on the environment and drive up the cost of energy since many countries have imposed CO_2 emission fees. Projects to install CO_2 capture and utilisation systems at thermal power plants in order to minimise emissions are expected to be developed in the future. However, current estimates show that an increase in the LCOE of thermal power plants by more than 40-60% will make them economically unviable.

Due to these factors, nuclear power will remain in demand in the long term.

ROSATOM's competitive position

The competitiveness of services provided by ROSATOM is based on its unique facilities, technical capabilities and human resources, as well as the experience of coordinating R&D and design organisations. The Russian nuclear industry is one of the global leaders in terms of research and development in reactor design, capabilities and technologies in the nuclear fuel cycle and in the sphere of NPP operation. Russia has the most advanced enrichment technologies in the world; nuclear power plants with water-cooled water-moderated power reactors (VVERs) have proved their reliability over one thousand reactor-years of fail-free operation. In 2022, ROSATOM was the largest global market player in terms of the portfolio of overseas NPP construction projects (34 power units).

ROSATOM's competitive advantages:

- Integrated offer for the entire NPP life cycle, which guarantees a competitive cost per kilowatt-hour (LCOE);
- Use of reference technologies meeting the highest safety standards;
- Assistance in securing funding (including under the BOO (Build – Own – Operate) scheme) and building project infrastructure (legal framework, employee training, community relations, etc.).

For more information on ROSATOM's main competitors, see the section 'Markets Served by ROSATOM'.

1.1.2. Long-term strategic goals

ROSATOM's business strategy until 2030 has been developed based on the goals set by the government for the civilian branch of the nuclear industry; it was updated in 2020 and approved by ROSATOM's Supervisory Board on 28 April 2020.

ROSATOM's development is based on the long-term technological policy, which involves mastering new-generation nuclear energy technologies (including fast neutron reactors and the closed nuclear fuel cycle), as well as strengthening the export potential of Russia's nuclear technologies (construction of nuclear power plants abroad, rendering uranium conversion and enrichment services, nuclear fuel fabrication, etc.).

ROSATOM's mission is to leverage the achievements of nuclear science and modern high technology for the benefit of humanity.

1. IEA, World Energy Outlook 2022 (STEPS).
2. Power Reactor Information System (PRIS) developed by the IAEA (https://pris.iaea.org).

The global energy crisis caused by geopolitical tensions and restrictive policies adopted by certain countries was a major external factor in 2022. Most countries responded to the crisis by closely focusing on energy security, diversifying the energy mix and increasing investment in clean energy sources.

For ROSATOM as a global player on the nuclear technology and wind power markets, this opens up opportunities for further expansion into international markets, primarily with product offers focused on zero-carbon energy and targeted at emerging markets.

ROSATOM's strategy provides it with sufficient flexibility in its development to enable it to leverage the opportunities arising in the industry.

ROSATOM's mission reflects the development model that it has prioritised: the Corporation leverages the research, technological and manufacturing capabilities that it has developed over the years and continues to create new technologies that can help to improve the standard of living around the world.

ROSATOM's operations facilitate the implementation of the global sustainable development agenda. The Corporation contributes to the achievement of the UN Sustainable Development Goals through its product line and its efforts to ensure the sustainability of internal environmental, social and governance processes.

For details, see the section 'Sustainable Development Management'.

ROSATOM's business strategy provides general guidelines for the long term, shapes the target vision for 2030 and sets a framework for development.

ROSATOM's vision is to become a global technological leader. Accordingly, the Corporation intends to expand the scale of its business to match existing global technological leaders.

By 2030, the Corporation intends to increase its revenue to RUB 4 trillion, with the share of new products in revenue expected to increase several times over; the Corporation also intends to expand its overseas footprint.

The vision provides an industry-wide focus on developing modern high technology and sets ambitious goals for each of the prioritised areas. Thus, the overall goal of expanding the scale of business is decomposed. In the sphere of nuclear power generation, this helps to maintain the continuity of strategic goals, enabling ROSATOM to remain an undisputed leader in the global nuclear industry.

The vision also involves creating a governance system meeting international standards and easily adaptable to a changing environment; customer centricity, i.e. proactively identifying customer needs, and fully unlocking the potential of our employees by providing an environment for lifelong learning and developing programmes to attract the best talent.

ROSATOM has set itself four long-term strategic goals to be achieved by 2030:

- **To increase the international market share.** To assert its leadership on the global nuclear power market, ROSATOM is currently expanding its footprint in over 50 countries around the world and the long-term portfolio of overseas orders and increasing the corresponding revenue;
- **To reduce production costs and the lead time.** In order to develop the most competitive products, ROSATOM will take further steps to reduce the duration of NPP construction and the levelised cost of electricity (LCOE);

- **To develop new products for the Russian and international markets.** Given the accumulated knowledge and technologies of the 'nuclear project' in civilian sectors, ROSATOM plans to increase the share of new businesses in revenue significantly by 2030;
- **To achieve global leadership in state-of-the-art technology.** ROSATOM seeks to extend its global leadership beyond the nuclear industry. The Corporation intends to leverage its existing capabilities, the understanding of nuclear technologies and accumulated experience in order to diversify into new segments. In the future, ROSATOM aims to rank among international companies perceived as global technological leaders.

For details on steps taken by the Corporation in order to increase its international market share, see the chapter 'Business Development Report'.

Necessary prerequisites for the implementation of the strategy

- Ensuring safe use of nuclear energy;
- Minimising the negative environmental impact;
- Non-proliferation of nuclear technologies and materials;
- Ensuring that the development of nuclear power is socially acceptable;
- Developing ROSATOM's innovative potential;
- Shaping a corporate culture focused on results and performance improvement;
- Ensuring that the state defence order is fulfilled;
- Ensuring full compliance with Russian legislation.

Key strategy implementation risks

Key risks that can affect the achievement of strategic goals include:

- Economic risks (including financial risks, such as currency, interest rate and credit risks, etc.);
- Commercial risks (including risks associated with the nuclear fuel cycle product and service market, as well as reputational risks);
- Operational risks (including the risk of losing critical knowledge of existing and newly created products);
- Political risks;
- Technical (project) risks;
- Technological risks (including the risk of shortcomings in technology);
- Climate risks (including environmental risks and energy transition risks).

For details on the key risks, see the section 'Risk Management'.

1.2. SUSTAINABLE DEVELOPMENT MANAGEMENT

1.2.1. Key sustainable development results

In the context of sustainable development, it is important that sustainability should be recognised in official documents at the national level.

Nuclear power qualifies as 'green' in Russia's Taxonomy and in China's Green Bond Endorsed Projects Catalogue. Important developments in 2022 included the establishment of detailed criteria in the EU Sustainable Finance Taxonomy for nuclear power to qualify as a transitional activity. In late 2022, South Korea published a national Taxonomy, in which nuclear power is listed as a 'green' economic activity, provided that it meets a number of criteria. In addition, January 2023 saw the publication of the EAEU Taxonomy, in which nuclear power is also listed as a 'green' activity, provided that it meets basic sustainability criteria.

The sustainable development agenda is incorporated into ROSATOM's Business Strategy until 2030. The promotion of the 17 UN Sustainable Development Goals is explicitly stated in the Strategy as a vital prerequisite for ROSATOM's operation. In the course of its operations, ROSATOM is committed to global sustainable development priorities and adheres to the 10 principles of the UN Global Compact in the sphere of human rights, labour, the environment and anti-corruption. ROSATOM contributes to the achievement of the UN Sustainable Development Goals through its product line, its financial and economic performance and its efforts to ensure the sustainability of internal environmental, social and governance processes.

Executives' Memorandum of Commitment:

Sustainable development covers all employees in the industry; the Corporation regularly holds internal events and workshops on various aspects of sustainable development for its employees and executives, including events attended by ROSATOM's Director General. This included a strategic session titled 'Sustainability Principles in the Nuclear Industry' held for top 30 executives in early 2022, which resulted in the drafting and publication of a memorandum of commitment of executives in the nuclear industry to the principles of sustainable development.

Since 2020, ROSATOM has been a member of the UN Global Compact International Network. In 2022, the Corporation also joined the National ESG Alliance, which comprises companies leading the Russian ESG agenda. The National ESG Alliance aims to maintain and develop the sustainable development agenda in Russia. As a member of the ESG Alliance, ROSATOM will contribute to the development of sustainability tools and practices, including full-scale involvement of the nuclear industry in national ESG initiatives.

The level of ROSATOM's sustainability maturity is regularly confirmed by independent ESG ratings. More specifically, last year, the Russian Analytical Credit Rating Agency (ACRA) rated ROSATOM at ESG-3 and assigned it to the ESG-B category, which corresponds to a very high environmental, social and governance score (the assessment was solicited, and the Corporation participated in the rating process). The assessment took into account information on the performance of ROSATOM's five key Divisions: the Mining, Sales and Trading, Fuel, Engineering and Power Engineering Divisions, given their significant contribution to the company's overall performance.

ROSATOM continues to apply green finance instruments. 2022 saw the second placement of green bonds worth RUB 9 billion on the Moscow Exchange (the bonds were issued by JSC Atomenergoprom). Compliance of the bond issue with the Green Bond Principles of the International Capital Market Association (ICMA) and with the green finance criteria established by Decree No. 1587 of the Government of the Russian Federation dated 21 September 2021 was verified by the Expert RA rating agency. Overall, by year-end 2022, the Corporation had raised 19 external green loans (ESG loans and green bonds) totalling more than RUB 200 billion to refinance WPP construction projects and the Akkuyu NPP construction project (Turkey).

9 RUB BILLION

TOTAL VALUE OF GREEN BONDS PLACED IN 2022

1.2.2. Assessment of greenhouse gas emissions

ROSATOM has conducted a pilot calculation of greenhouse gas emissions for 2022 for its entire corporate scope (Scope 1 and Scope 2) in accordance with international methodologies. In 2022, greenhouse gas emissions[1] totalled 20.4 million tonnes of CO_2e, including direct emissions (Scope 1) totalling 17.5 million tonnes of CO_2e.

The major share of the Corporation's direct greenhouse gas emissions (about 88.5%) is produced by JSC RIR, which manages heat and power supply systems in the towns and cities in which ROSATOM operates (mainly coal- and gas-fired CHPPs) to ensure steady energy supply to consumers. As part of its efforts to improve energy efficiency, ROSATOM upgrades its power generation capacities.

1.2.3. 'Green' nuclear power: contribution to the climate agenda

The Corporation has singled out the climate agenda as a priority both because it is an essential aspect of sustainable development and given the important contribution of the nuclear power industry to reducing the carbon footprint in Russia and globally.

Nuclear power is characterised by one of the lowest levels of greenhouse gas emissions among existing power generation options and plays a fundamental role in combating climate change. This fact was reflected, among other things, in the final resolution of the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27) held in November 2022 in Sharm El Sheikh (Egypt). In 2022, a separate IAEA pavilion, #Atoms4Climate, was provided for the nuclear power industry at the conference venue for the first time in the history of the COP climate conferences.

ROSATOM participates in the Conference of the Parties to the United Nations Framework Convention on Climate Change, including as part of the official delegation of the Russian Federation. The highlight of the Corporation's programme at COP27 in 2022 was the Energy Day on 15 November, including a public discussion titled 'Nuclear Energy Contribution to the Prosperity of Africa' held by ROSATOM on the sidelines of the conference. Its participants included speakers from Egypt, Nigeria, Ghana and South Africa.

1. Including PJSC Quadra – Power Generation, which was included in ROSATOM's scope of consolidation in 2022.

As part of an analysis of ESG requirements for nuclear power, in 2022, ROSATOM conducted a detailed analysis of compliance of Russian nuclear technologies with the criteria established in the Complementary Delegated Act (CDA) to the EU Taxonomy. Compliance of Russian nuclear technologies and projects with the requirements of the EU Taxonomy has been confirmed through the following groups of criteria: confirmation of the minimum level of greenhouse gas emissions, safety guarantees for the NPP operation stage, commitment to closing the nuclear fuel cycle, and safe radioactive waste management and NPP decommissioning. The findings of the analysis are publicly available on ROSATOM's website.

EU Taxonomy Requirements for Nuclear Power:

In Russia, nuclear power generation accounts for almost half of the total low-carbon power generation. NPPs currently in operation in Russia help to prevent greenhouse gas emissions exceeding 100 million tonnes per year, or about 7% of total emissions in the country.

Since 2017, ROSATOM has been developing the wind power business. At year-end 2022, the Corporation operated seven wind power plants with a total capacity of 780 MW in the Republic of Adygea, the Stavropol Territory and the Rostov Region.

Total contribution of the Corporation's low-carbon power generation (NPPs and WPPs) to greenhouse gas emission savings in Russia:

Indicator	2020	2021	2022
Low-carbon power generation in Russia (ROSATOM's NPPs and WPPs), billion kWh	215.9	223.6	225.3
Greenhouse gas emission savings in Russia (ROSATOM's NPPs and WPPs), million tonnes of CO_2e	108.4	109.2	110.2

Since 2022, ROSATOM jointly with the Russian Ministry of Energy and other relevant government agencies has been participating in a major national-scale innovative project titled 'Full Life Cycle Low-Carbon Energy'. This involves providing R&D support for the development and implementation of new approaches to developing full life cycle low-carbon energy with a focus on nuclear power generation, hydrogen energy, renewable energy and energy storage systems based on new domestically developed knowledge-intensive solutions and technologies.

GRI 2-23
GRI 2-24

1.2.4. Fulfilment of responsible business commitments. Sustainable processes

ROSATOM applies the Uniform Industry-Wide Policy on Sustainable Development[1], which sets out the objectives and key principles guiding the efforts of ROSATOM and its organisations in the sphere of health, safety and the environment, in the social sphere and in the sphere of corporate governance. In addition, in order to systematise sustainability initiatives in the industry, ROSATOM applies and regularly updates the Uniform Industry-Wide Methodological Guidelines on the Management of Sustainability Initiatives.

Regulations concerning every aspect of sustainable development have been approved in the industry. They define the key principles underlying environmental, social and governance initiatives of ROSATOM and its organisations, as well as the mechanisms for implementing these principles. These include the following documents adopted in ROSATOM and approved by ROSATOM's Director General: the Environmental Policy[1], the Social Policy[2], the Code of Ethics and Professional Conduct[3], the Anti-Corruption Policy[4], etc. In 2022, ROSATOM developed and approved a Human Rights Policy[5].

1. https://rosatom.ru/upload/iblock/a42/a42fc60d74177edf55f9e4ec64618da3.pdf
2. https://rosatom.ru/upload/iblock/5c3/5c3ce2206d4406f2686f2e1fdec013c5.pdf
3. https://rosatom.ru/upload/iblock/278/278a5b347258378ee344cfe106806484.pdf
4. https://rosatom.ru/upload/iblock/d08/d08a5dc6dedea5cf251f81e14f8742d7.pdf
5. https://www.rosatom.ru/upload/iblock/685/68595993dc72b393b5a60aaa95548e5b.docx
6. https://rosatom.ru/journalist/729-11.pdf

The Corporation's sustainable development initiatives involve continuous process improvement, the implementation of health, safety and environmental projects, development of a supply chain management system, as well as personnel management and talent development. Progress on various aspects of sustainable development is monitored on a regular basis. Tools used for measuring the Corporation's sustainability performance include ESG indicators approved in 2022 as part of an industry-wide library of ESG indicators. Indicators forming part of the library include both universal ESG metrics (such as greenhouse gas emissions, the share of recycled and reused water as a percentage of water withdrawal, the share of women in the industry's workforce) and indicators specific to the nuclear industry (such as SNF processing volumes).

Sustainability principles are being implemented not only in ROSATOM but also in other organisations in the industry. Sustainability coordinators have been appointed in 24 holding companies and organisations in the industry; steps are being taken to operationalise the sustainable development agenda, and the relevant action plans are being implemented.

ROSATOM's representatives participate in public discussions on sustainable development on Russian and international platforms. For instance, in 2022, they took part in discussions focused on sustainable development on platforms such as EXPO2020, COP27, SPIEF, and 'Arctic: Today and the Future'.

Systematic steps are taken in the industry to inform employees about sustainability priorities and objectives; workshops and other events are held, and employee surveys are conducted. A section titled 'Sustainable Development' has been created on the intranet portal; it includes a Library of Industry Sustainability Practices designed to systematise existing approaches and enable organisations in the industry to share their experience.

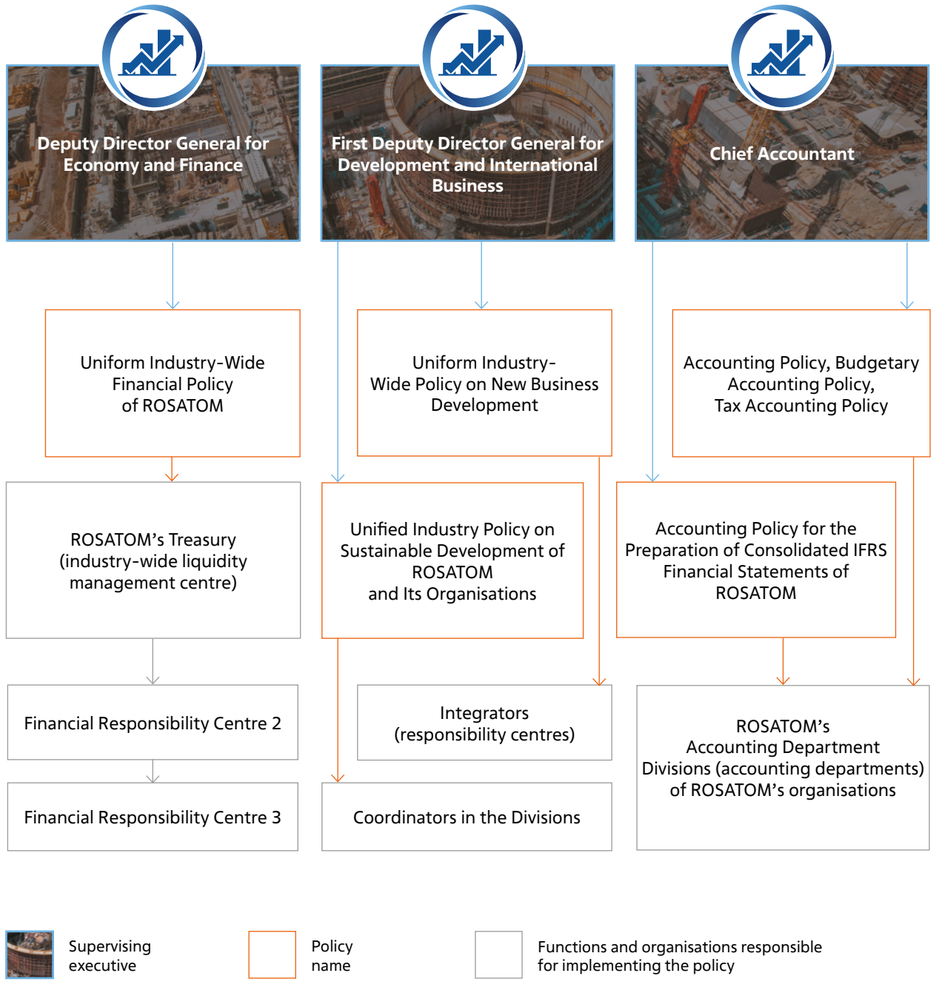
GRI 2-26 Employees are informed about an industry-wide hotline which can be used for submitting reports, including complaints and enquiries from individuals and organisations, to safeguard their right to apply in person and to submit individual and group enquiries to protect the rights and legitimate interests of the company, its organisations and their employees.

GRI 2-17 In order to develop sustainability competences, in 2022, a face-to-face training programme on sustainable development was launched for employees in the industry at ROSATOM's Corporate Academy. Representatives of 46 organisations of ROSATOM completed the training; the programme will be run on a regular basis. In addition, the sustainability section of ROSATOM's online training system, RECORD Mobile, is systematically updated. The Supervisory Board did not undergo sustainability training in the reporting year.

ROSATOM adheres to the principle of maximum transparency and seeks to maintain a dialogue with stakeholders. More specifically, as part of its commitments as a member of the UN Global Compact International Network, in 2022, ROSATOM prepared its second sustainability report, which was published on the website of the UN Global Compact at https://www.unglobalcompact.org. The report has been rated 'Active', which means that ROSATOM monitors a number of ESG indicators and operates in accordance with the 10 principles of the UN Global Compact in the sphere of human rights, labour, the environment and anti-corruption.

GRI 2-13
GRI 2-24

Allocation of responsibility for impact management and implementation of the Corporation's policies



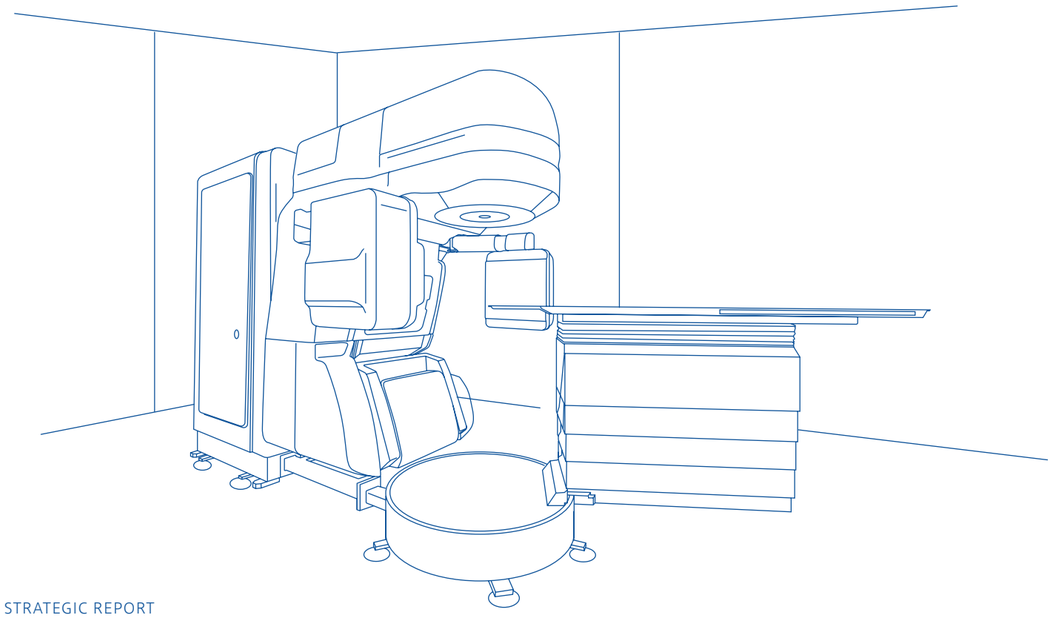
1.2.5. Sustainable products

As part of product line development in the industry, special emphasis is placed on environmental and climate performance of products and projects, value creation for end users and assessment of product solutions in terms of their alignment with sustainability priorities. More specifically, in order to enhance the sustainability of the product line, in 2022, ESG reporting requirements were incorporated into product strategies and strategic programmes.

The nuclear industry is one of the most knowledge-intensive and high-technology sectors. In addition to nuclear power, the Corporation is also developing other low-carbon products, including wind power generation, hydrogen energy technology, energy storage systems and digital solutions for the electric power industry. Nuclear technology also provides a basis for the development of solutions for nuclear medicine and isotope products, radiation processing technologies, environmental solutions, international logistics, etc.

As part of its focus on increasing the share of 'green' products in its product line, ROSATOM monitors ESG performance across its key product areas. To do so, ROSATOM has established an internal ESG certification procedure. In 2022, more than 20 product areas underwent certification, including small NPPs, wind power, the 'smart city', nuclear medicine, etc. In 2022, product areas that underwent internal sustainability certification and had their 'green' status confirmed accounted for about 40% of total revenue from new businesses.

For details, see the Sustainability Report.



1.3. VALUE CREATION AND BUSINESS MODEL

ROSATOM manages the assets of the Russian nuclear industry at all stages of the nuclear fuel cycle, the cycle of NPP construction, operation and decommissioning and in other segments related to the use of nuclear energy. Realising the importance of its operations for the economy and society, ROSATOM seeks to develop its business sustainably, including by increasing its total value for the Corporation and a wide range of its stakeholders. The term 'value' refers not only to products created, services rendered and financial results achieved by ROSATOM, but also to the combination of economic, social and environmental impacts of ROSATOM on its stakeholders, society as a whole and the environment.

ROSATOM defines the business model as a system that enables value creation in the short, medium and long term and is aimed at achieving strategic goals.

The business model is based on ROSATOM's long-term business strategy. It forms part of the business value chain, which also includes:

- Available capitals;
- A governance system aimed at ensuring the most efficient use of the capitals;
- Operating results and their contribution to the long-term increase in the capitals, which is measured by performance against the targets set in the strategy.

The business model gives special focus to the external environment because: a) some of ROSATOM's available capitals are obtained from the external environment, and many of its results are also related to it; b) the external environment is a source of risks and opportunities.

The diagram below represents an integrated process of value creation. ROSATOM's business model is at the core of this process; it determines the set of different activities and results that contribute to the change in main types of capital during the reporting period.

ROSATOM's capitals

ROSATOM's capitals are one of the main elements of the value chain. In the course of commercial and other activities, they are changed (increased, reduced, transformed), which generally creates value in the medium and long term.

The Corporation defines capitals as specific resources (reserves) of tangible and intangible assets that ROSATOM uses in its operations. ROSATOM acknowledges that some of the available capitals (e.g. natural resources or public infrastructure) are owned jointly with other stakeholders. Accordingly, it takes a responsible approach to handling them. ROSATOM identifies six types of capital it uses: financial, manufactured, human, intellectual, social and relationship, and natural. An integral increase or decline in capitals causes an increase or decrease in value; therefore, ROSATOM attaches great importance to managing the capitals available to it and using them more efficiently.

Capitals available as at 31 December 2021

Financial capital
Adjusted free cash flow: **RUB 338.0 billion**
Revenue under IFRS: **RUB 1,462.1 billion**

Manufactured capital
Number of power units in operation: **35**
NPP capacity factor: **83.18%**

Intellectual capital
Intangible assets under IFRS: **RUB 199.7 billion**
Number of foreign patents obtained by ROSATOM: **2,906**

Human capital
Average headcount: **288,500 people**
Personnel turnover rate: 10.0%
Average training hours per employee: **42.27**

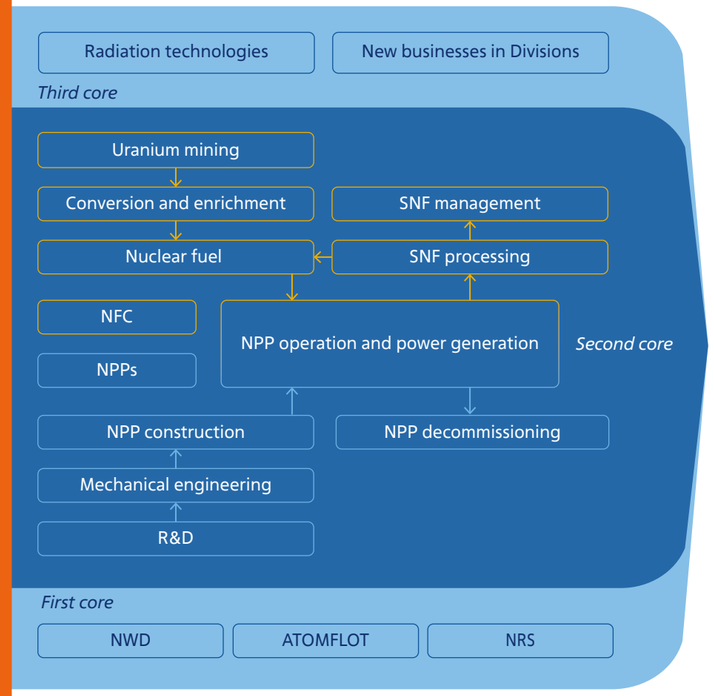
Social and relationship capital
Level of support for nuclear power in Russia: **66%**
Taxes paid: **RUB 249.3 billion**

Natural capital
Water withdrawal from natural sources: **4,979.2 million m³**

ROSATOM's business model

GOVERNANCE SYSTEM

VALUE CREATION IN CORE BUSINESSES



KEY PRODUCTS (RESULTS IN 2022)

Revenue under IFRS
RUB **1,766.1** billion

Share of innovative products and services in the total sales of products and services across the industry
23.2%

Nuclear power generation in Russia
223.4 billion kWh

Cargo traffic along the NSR
34.1 million tonnes

Uranium production in Russia
2,500 tonnes

Goals of the 2030 Strategy:

1. To increase the international market share
2. To reduce production costs and the lead time
3. To increase the share of new products for the Russian and international markets
4. To achieve global leadership in state-of-the-art technology

STRATEGY

MISSION AND VALUES

Capitals available as at 31 December 2022

Financial capital
Adjusted free cash flow **+9.9%**
Revenue under IFRS **+20.8%**

Manufactured capital
Number of power units in operation during the year **+0%**
Capacity factor of Russian NPPs **+3.6%**

Intellectual capital
Intangible assets under IFRS **+10.1%**
Number of foreign patents obtained by ROSATOM **+8.4%**

Human capital
Average headcount **+14.1%**
Personnel turnover rate **+6%**
Average training hours per employee **-5.2%**

Social and relationship capital
Level of support for nuclear power in Russia **+11 p.p.**
Taxes paid **+16.9%**

Natural capital
Water withdrawal from natural sources **+11.2%**

Value creation results

Indicator	2020	2021	2022	2022/2021, %
FINANCIAL CAPITAL				
Adjusted free cash flow, RUB billion	335.0	338.0	371.4	+9.9%
Revenue under IFRS, RUB billion	1,207.4	1,462.1	1,766.1	+20.8%
MANUFACTURED CAPITAL				
Number of power units in operation during the year[1], pcs.	36	35	35	+0%
Capacity factor of Russian NPPs, %	81.07	83.18	86.21	+3.6%
INTELLECTUAL CAPITAL				
Intangible assets under IFRS, RUB billion	199.6	199.7	219.9	+10.1%
Share of innovative products in revenue, %	25.0	25.7	23.2	-9.7%
Number of foreign patents obtained by ROSATOM, applications for foreign patents submitted and registered under the established procedure, registered trade secrets (know-how), pcs.	2,562	2,906	3,150	+8.4%
HUMAN CAPITAL				
Average headcount, '000 people	276.1	288.5	329.2	+14.1%
Personnel turnover rate, %	12.0	10.0	10.6	+6%
Average training hours per employee	30.65	42.27	40.05	-5.2%
LTIFR	0.09	0.08	0.11	+37.5%
SOCIAL AND RELATIONSHIP CAPITAL				
Level of support for nuclear power in Russia, %	53	66	77	+11 p.p.
10-year portfolio of overseas orders, USD billion	138.3	139.9	135.9	-2.9%
Taxes paid, RUB billion	249.9	249.3	291.4	+16.9%
NATURAL CAPITAL				
Water withdrawal from natural sources, million m^3	6,059.2	4,979.2	5,536.1	+11.2%

1. Excluding the floating thermal nuclear power plant.

Benefits provided to stakeholders in 2022

Government level

Tax payments to budgets of all levels **RUB 291,427 million**

National projects and programmes involving ROSATOM:

- Housing and Urban Environment;
- Education;
- Culture;
- Ecology;
- Clean Water;
- Demographic Situation;
- Small and Medium-Sized Businesses;
- Safe and High-Quality Roads;
- Healthcare;
- Digital Economy of the Russian Federation;
- Science;
- Labour Productivity and Employment Support;
- Sports as a Way of Life;
- Modern School;
- Efficient Region;
- Every Child's Success;
- Government Programme 'Development of the Nuclear Power and Industry Complex';
- Comprehensive Programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024'.

Corporate level

Nuclear power generation in Russia: **223.4 billion kWh**

Number of events rated at level 1 or higher on the INES scale: **0**

Expenditure on scientific research: **RUB 10.3 billion**

Procurement from SMEs: **RUB 312.9 billion**

Average monthly salary: **RUB 107,200 per month**

Expenditure on corporate social programmes for employees: **RUB 15.2 billion**

Total number of students studying at universities under arrangements with organisations in the industry:

- More than **8,700** students completed internships and work placements in ROSATOM's enterprises;
- About **2,500** university and college graduates were hired in the industry.

Social level

Jobs created: **6,389**

The Smart City platform is being rolled out in **102 towns and cities;** 12 regional projects

Expenditure on environmental protection: **RUB 24.65 billion**

Energy cost savings: **RUB 560.68 million**

Direct greenhouse gas emissions in Russia: **17,503,400 tonnes of CO_2 equivalent**

Waste processed by ROSATOM's enterprises: **30,447,400 tonnes**

1.4. MARKETS SERVED BY ROSATOM

In 2022, ROSATOM ranked:

- First in the world in terms of the number of NPP power units in the portfolio of foreign projects (34 power units);
- First on the global uranium enrichment market (35%);
- Second in the world in terms of uranium production (14% of the market);
- Third on the global nuclear fuel market (17%).

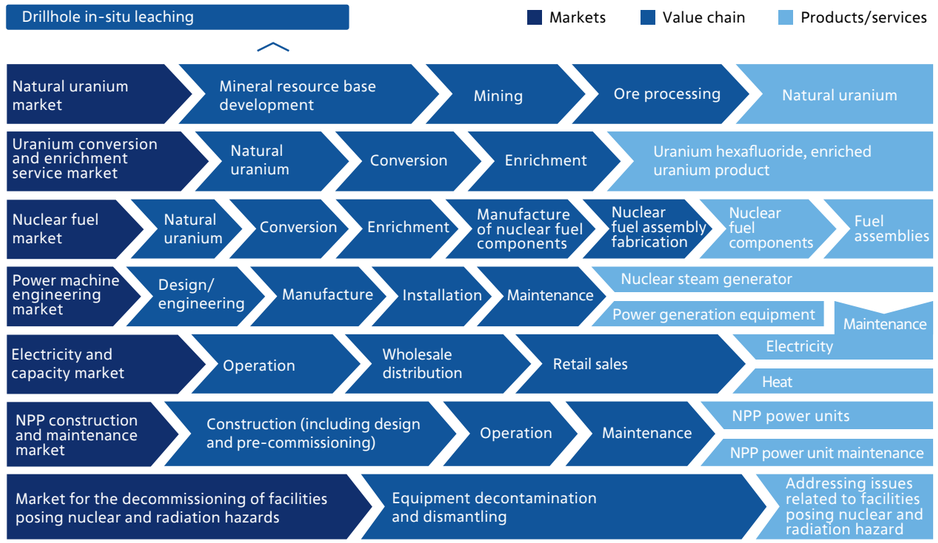
ROSATOM's vision is to become a global technological leader. Accordingly, the Corporation intends not only to rapidly develop its business in traditional segments, but also to take active steps towards entering new high-technology markets as a leading research and technology company.

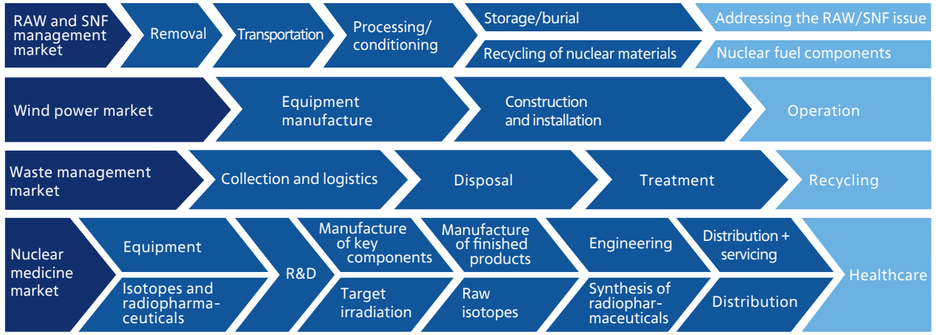
One of the key priorities of ROSATOM's business is to develop globally competitive products that are able not only to effectively replace imports, but also to become leaders on global markets (both traditional and new ones).

GRI 2-6

Markets served by ROSATOM and value chains

In the reporting year, there were no changes in the value chain, including the supply chain.





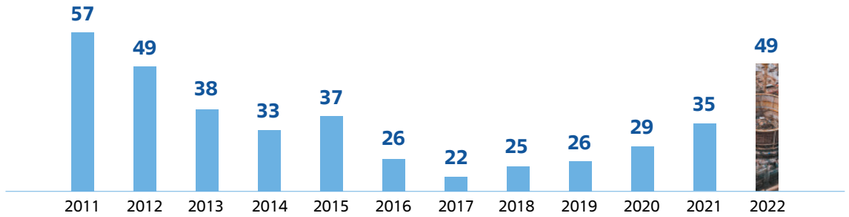
Natural uranium market

Forecast for changes in uranium demand by 2030

In 2022, global reactor demand for uranium totalled 63,500 tonnes[1]. At the same time, global demand taking into account commercial and strategic stockpiling not intended for current consumption is estimated at 74,300 tonnes.

According to UxC, in 2022, average spot market quotations for uranium increased by 42% to USD 49/lb of U_3O_8. The rise in market prices was driven by geopolitical tensions and continued uranium buying by financial investors. In April 2022, spot quotations reached USD 63.75/lb of U_3O_8 for the first time since the Fukushima nuclear disaster (11 March 2011). During the months that followed, amid limited demand from energy companies, quotations were driven primarily by demand from intermediaries and financial investors, whose activity was limited by the ability to raise financing.

Average annual spot market quotations for natural uranium, USD/lb of U_3O_8



Sources: input data from UxC[22]; average values have been calculated by JSC Atomredmetzoloto.

1. Hereinafter, data on the uranium market from a report by UxC (UMO Q1 2023) are used.
2. UxC, LLC (UxC) is an independent international company specialising in market analysis, research and forecasting covering the entire nuclear fuel cycle (https://www.uxc.com/).

The uranium market fundamentals remain favourable. In the medium and long term, demand for natural uranium is expected to increase due to the commissioning of new power units at NPPs in China, India and other countries. According to the base case forecast of the World Nuclear Association (WNA), global reactor demand for uranium will increase to 70,200 tonnes by 2025 and to 79,400 tonnes by 2030.

Natural uranium market overview

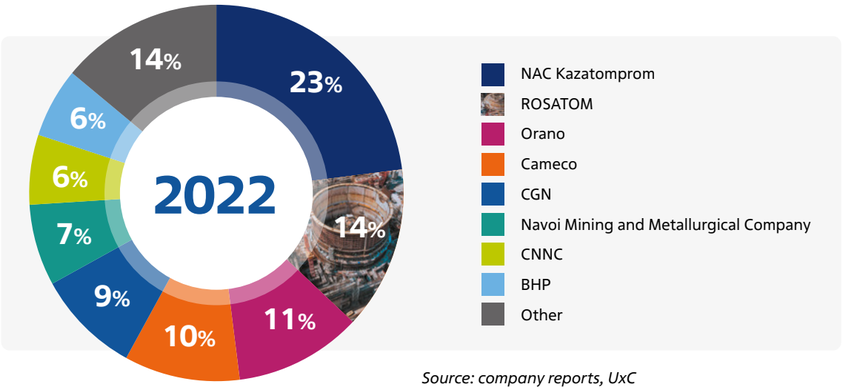
In 2022, global uranium production increased by 6% to 50,400 tonnes, with nine major companies, namely NAC Kazatomprom (Kazakhstan), CNNC and CGN (China), JSC Atomredmetzoloto and Uranium One (companies of ROSATOM), Orano (France), Cameco (Canada), Navoiyuran State Enterprise (Uzbekistan) and BHP (Australia – UK) accounting for about 85% of global production.

NAC Kazatomprom has been the largest uranium mining company globally since 2010 (23% of global production in 2022). In 2022, ROSATOM ranked second in the world in terms of uranium production.

Supplies from secondary sources (inventories of energy companies and some states, repreparation of depleted uranium hexafluoride, reprocessed uranium, etc.) in 2022 were estimated at 24,000 tonnes of natural uranium equivalent.

According to the UxC forecast, in 2023, global uranium production will total 56,000 tonnes, while supply from secondary sources will total about 14,000 tonnes. Global production of natural uranium is expected to increase by 2030 due to rising demand. Supply from secondary sources will total about 7,000 tonnes of natural uranium equivalent in 2030.

Largest players on the natural uranium market in 2022



Source: company reports, UxC

Uranium conversion and enrichment market

Products and services offered on the market include uranium hexafluoride (UF_6), uranium conversion services, enriched uranium product and uranium enrichment services.

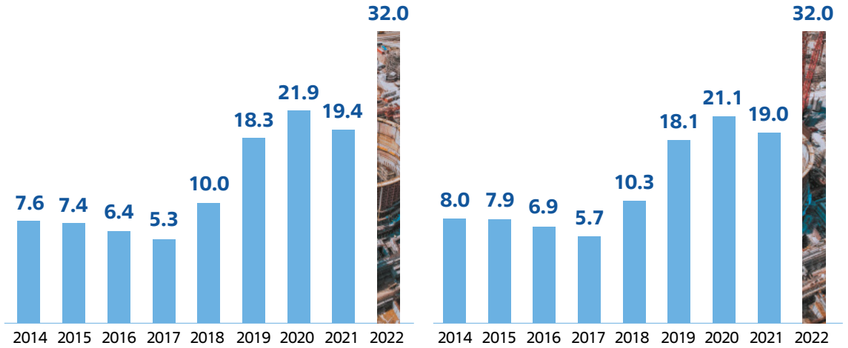
Forecast for changes in demand for uranium conversion services by 2030

According to the base case scenario of the World Nuclear Association, in the reporting year, global reactor demand for uranium conversion services totalled about 63,000 tonnes.

In 2022, average annual spot quotations on the North American and European markets rose by 65% and 68% respectively, while average annual long-term quotations increased by 34% and 35% respectively.

The increase in quotations was caused mainly by market concerns over the availability of material, including given the limited conversion capacities of Western producers.

Average annual spot market quotations for conversion services, USD/kg of uranium



On the North American market

On the European market

The development of nuclear power generation until 2030 will have a positive impact on the market for uranium conversion services. According to the base case scenario of the World Nuclear Association, global demand for conversion services may grow to 67,000 tonnes by 2025 and 75,000 tonnes by 2030.

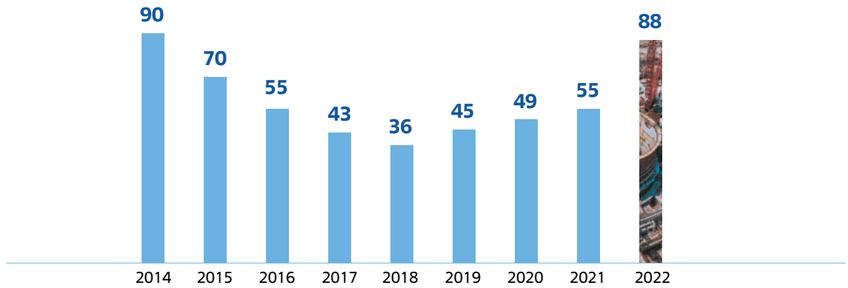
Forecast for changes in demand for uranium enrichment services by 2030

According to the World Nuclear Association, in 2022, global reactor demand for enrichment totalled about 52 million separative work units (SWU)[1]. In 2022, average annual spot market quotations rose by 61%, while long-term quotations soared by 88%. Their growth was driven mainly by market concerns over the availability of enrichment services, including given the limited capacities of Western producers.

1. Report by the World Nuclear Association, 2022 (at a tails assay of 0.22%). ROSATOM estimates this figure at 55 million SWU at a tails assay of 0.18% (which is equivalent to 49 million SWU at a tails assay of 0.22%).

The development of nuclear power generation until 2030 will have a positive impact on the market for uranium enrichment services. According to the base case scenario of the World Nuclear Association, global demand for enrichment will grow to 55 million SWU by 2025 and 63 million SWU by 2030.

Average annual spot market quotations for enrichment services, USD/SWU



Uranium conversion and enrichment market overview

Along with ROSATOM, key players on the global market for uranium conversion services include Orano (France), Cameco (Canada), CNNC (China) and Converdyn (US).

The main players on the global market for uranium enrichment services include ROSATOM (35% of the global market), URENCO (UK, Germany, Netherlands; 33%), Orano (France) and CNNC (China) (13% each). Together, they control more than 90% of the market. At present, all players use modern gas centrifuge technology for uranium enrichment.

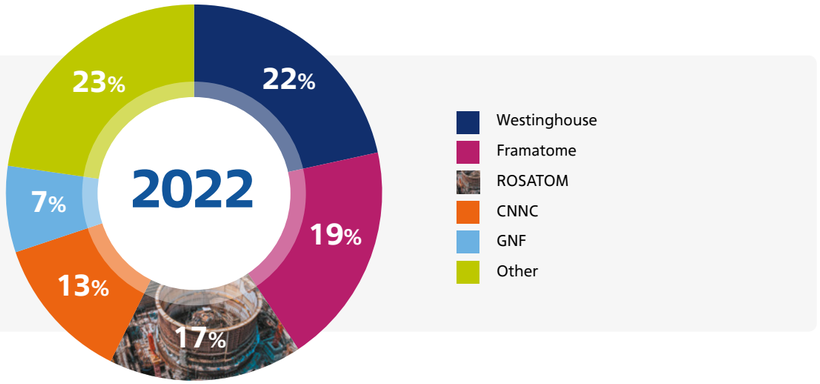
Nuclear fuel fabrication market

According to ROSATOM's estimates, in 2022, the global nuclear fuel market capacity totalled 10,200 tonnes of heavy metal (tHM), with fuel for light-water and other reactors requiring uranium enrichment accounting for ~7,200 tHM (including ~1,200 tHM of fuel for water-cooled water-moderated power reactors (VVERs)) and fuel for heavy-water reactors accounting for ~3,000 tHM.

As the reactor fleet will be expanding, the demand for fabrication services may increase to 12,500 tHM by 2030.

Global suppliers on the fabrication market include Westinghouse (with a market share of 22%), Framatome (Areva until 2018, with a market share of 19%), ROSATOM (17%), CNNC (13%) and Global Nuclear Fuel (7%).

Shares of players on the nuclear fuel fabrication market, %



In the reporting year, Russian nuclear fuel fully met the demand of Russia and a number of partners, including Belarus, Armenia and some Central European countries, for reactor fuel. ROSATOM also partially met the demand of Finland, India, China and a number of other countries for reactor fuel.

Entering new nuclear fuel markets

In 2022, the Corporation continued to take steps towards entering the market for fuel for Western-design power reactors, and fuel and components for Western-design research reactors.

A separate promising area is the manufacture of fuel for fast neutron reactors. In 2022, the Corporation continued the transition to the use of uranium/plutonium MOX fuel in the BN-800 reactor at power unit No. 4 of Beloyarsk NPP. The formation of a core fully loaded with MOX fuel at the power unit will be completed in 2023. In addition, fuel for start-up core loading and for the first reloading of CFR-600, the first high-power fast neutron reactor currently under construction in China, was manufactured and shipped to the customer.

The Corporation continues to implement the Proryv (Breakthrough) Project. It involves building a fuel fabrication/refabrication module, which will produce mixed nitride uranium/plutonium fuel. In 2022, fuel assemblies with removable containers, which will enable the testing of nitride fuel up to design limits, and an assembly for materials testing containing samples of materials for advanced fast reactor cores were loaded into the BN-600 reactor at Beloyarsk NPP. In addition, in 2022, the first MNUP fuel assemblies with BN-1200-sized fuel elements were produced, to be loaded for testing into the BN-600 reactor.

For details, see the section 'Research and Innovations'.

Power machine engineering market

Power machine engineering helps to ensure reliable electricity supply and thus meets a basic need of the modern economy.

In 2022, the Russian market saw a relative decline in industrial output, which affected all segments of mechanical engineering. The Russian power machine engineering industry demonstrated a mixed performance across key product groups. In the steam turbine equipment segment, a downward trend continues, with production declining by 33.2%[1] in 2022 following a 67% decrease in 2021. In the steam generation equipment segment, a 207% rise in production in 2021 was followed by a 68.6% decline in 2022. In the gas turbine equipment segment, output increased by 43.9% in 2022 following a 60% decrease in 2021. This was driven by the adaptation of the power machine engineering market after foreign producers had left Russia and unfriendly countries had imposed sanctions.

The Mechanical Engineering Division of ROSATOM is one of the largest power machine engineering companies in Russia. In 2022, ROSATOM increased its share on the Russian power machine engineering market in terms of revenue from 42% to more than 43.2%.

The core competence of the Mechanical Engineering Division is the supply of full sets of reactor and turbine island equipment for nuclear power plants. In 2022, equipment produced by the Division was used at 19% of power units globally. Enterprises forming part of the Mechanical Engineering Division produce reactor equipment for 39% of large power units under construction globally.

Given that foreign suppliers have left the Russian market, this provides ROSATOM with additional opportunities to actively develop new businesses.

NPP construction and operation market

In recent years, key trends in the development of the global electricity market include heightened scrutiny of environmental aspects of the electric power industry and an increase in the share of zero-carbon power generation in the global energy mix. Countries seek to reduce the share of power plants using fossil fuels, such as coal and gas, and to develop renewable energy sources, such as solar and wind power plants, etc. Despite a surge in renewable power generation, its stability in the absence of expensive energy storage systems remains an unresolved issue. As a result, nuclear power generation is currently one of the most reliable, cheapest and most environmentally friendly sources of electricity. The International Energy Agency forecasts that by 2030, the global installed capacity of NPPs will reach 471 GW[2], which reflects steady growth of nuclear power generation.

In 2022, nuclear power accounted for about 10% of global electricity generation. According to the IAEA, in 13 states, more than a quarter of electricity demand is met by nuclear power generation. Countries with the largest share of nuclear power generation include France (69%), Slovakia (52%) and Belgium (47%).

According to the IAEA[3], as at 31 December 2022, 439 power reactors with a total capacity of 393.8 GW were in operation (including the suspended Japanese reactors). Another 57 reactors were under construction.

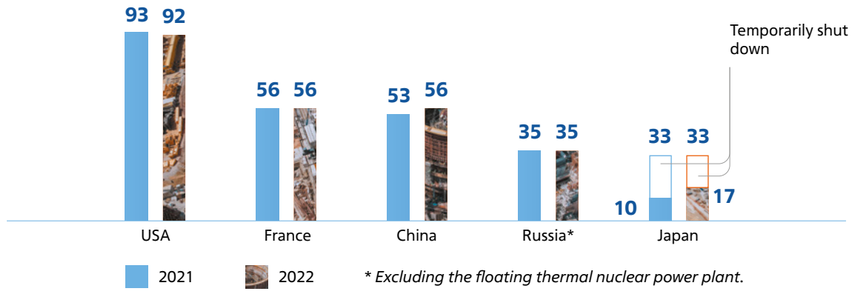
1. Estimates based on data from the Federal State Statistics Service.
2. IEA, World Energy Outlook 2022 (Stated Policies Scenario).
3. Power Reactor Information System (PRIS) developed by the IAEA (https://pris.iaea.org).

In 2022, 35 power units of 10 NPPs and the floating thermal nuclear power plant were in operation in Russia, with their installed capacity totalling 29.6 GW. In 2022, ROSATOM ranked second among nuclear power generation companies globally in terms of installed NPP capacity, surpassed only by the French EDF. Russia ranks fourth in the world in terms of the number of NPP power units in operation.

Light-water reactors (VVER, PWR, BWR, LWGR) are the main type of reactors currently in operation in the world. They make up 92% of the global market (as a percentage of the total installed capacity).

According to the IAEA, new nuclear power generation capacities connected to the grid globally in 2022 totalled 6.1 GW. At present, demand for NPP construction comes primarily from Asian countries, which is due to rapidly growing electricity consumption in this region. ROSATOM is taking active steps to expand its footprint on the overseas market as a leader in terms of the number of NPP construction projects.

Leading countries by the number of operating NPP power units in 2021 and 2022, at year end



** Excluding the floating thermal nuclear power plant.*

NPP servicing market

ROSATOM provides NPP maintenance services covering the entire life cycle: it assists in the development of nuclear infrastructure, provides personnel training and supplies equipment for training centres, provides engineering and technical support at the commissioning and operation stages, carries out maintenance, repairs and upgrades, supplies spare parts and equipment and extends the service life of NPPs.

Key end markets in this segment include foreign countries where there are Russian-design power units in operation or under construction, namely Armenia, Bangladesh, Belarus, Bulgaria, Hungary, Egypt, India, China, Slovakia, Turkey, Finland and the Czech Republic.

In the reporting year, the portfolio of power units serviced by the Corporation comprised 48 Russian-design NPP power units abroad.

Furthermore, the Corporation is a market leader in China, Bulgaria and Armenia, acting as a general contractor for life extension, scheduled preventive maintenance and equipment modernisation at NPPs equipped with VVER reactors.

ROSATOM's rivals on this market include national operators and local service companies forming part of or partnered with local energy corporations, as well as large international companies (Framatome, Engie, Westinghouse, Afry, etc.).

To consolidate its position on the NPP servicing market, the Corporation has initiated and continues its localisation efforts in key regions by creating partnerships and joint ventures with local market players or establishing subsidiaries.

ROSATOM is exploring localisation opportunities in other regions of operation (Turkey, Egypt, Bangladesh, etc.) and plans to develop a line of NPP servicing products by 2030.

For details, see the chapter 'Business Development Report'.

Market for RAW and SNF management, processing and disposal

By the end of 2022, the volume of spent nuclear fuel (SNF) accumulated globally totalled about 330,000 tonnes of heavy metal (tHM). Most countries have chosen to postpone SNF management efforts, which necessitates long-term SNF storage due to a lack of available permanent disposal facilities and processing capacities. Every year, around 10,000 tHM of SNF is produced globally, of which less than 2,000 tHM is sent for processing. An increase in the amount of accumulated SNF encourages the development of the waste processing and temporary waste storage market.

Key players on the SNF storage market are Holtec (US), Orano (France), GNS (Germany) and SKB (Sweden).

ROSATOM promotes its own radioactive waste (RAW) and SNF management solutions as part of an integrated offer for a balanced nuclear fuel cycle. The Corporation's basic solution in the field of SNF management involves spent fuel processing.

Orano and ROSATOM are the leaders on the SNF processing market.

ROSATOM's development plans include expanding SNF processing capacities at the sites of FSUE Mining and Chemical Plant and FSUE Mayak Production Association. The development of this market is closely linked to the improvement of the relevant technologies and the use of regenerated SNF processing products in the nuclear fuel cycle. A reduction in the cost of processes and improved efficiency of separation of SNF components will significantly increase processing volumes.

The market for permanent disposal of SNF and high-level waste (HLW) is still at an early stage of development. There are no operating HLW disposal facilities at present. The possible use of deep repositories is being actively examined by the countries that have chosen the policy of direct SNF disposal: Sweden, Finland, the US and Canada.

Market for the decommissioning of facilities posing nuclear and radiation hazards

The decommissioning of facilities posing nuclear and radiation hazards (nuclear decommissioning) is becoming a promising segment of the global nuclear technology market. Throughout the history of nuclear power and industry, a large number of facilities has been built worldwide whose service life will soon expire. Their decommissioning requires special competences.

IAEA documents set out two approaches to nuclear decommissioning: 'immediate dismantling' and 'deferred dismantling'. Over the past decade, a growing number of countries have adopted the 'immediate dismantling' strategy, as its total cost is lower compared to 'deferred dismantling'. Countries pursuing the 'immediate dismantling' strategy include France, Italy, Germany, Slovenia, Sweden, Finland and Switzerland. The US and the UK apply both strategies at different facilities. Japan has adopted the 'deferred dismantling' strategy.

By the end of 2022, about 210 power units had been shut down in the world. According to ROSATOM's estimates, by 2030, the number of shut-down power units will reach 300 (the NPP construction activity peaked in the 1970s and 1980s, and in the 2030s the service life of many units will have reached 60 years). The service life of many of the NFC facilities supplying nuclear fuel to NPPs is also nearing its end.

The market for the decommissioning of facilities posing nuclear and radiation hazards is growing steadily (with an average CAGR of 7.3%); the potential market size is estimated at more than USD 200 billion.

The market growth is driven by the following factors:

- The continued trend towards NPP decommissioning in developed countries;
- The rising cost of projects;
- Stricter environmental requirements for projects and an increased focus on safety matters.

Key market players include ROSATOM, Energy Solutions (US), Westinghouse (US), Orano (France), Bechtel (US), Studsvik (Sweden), AECOM (US), GNS (Germany), Cavendish Nuclear (UK), North Star (US), Siempelkamp (Germany), Onet Tech (France) and Holtec (US).

In 2022, ROSATOM's operations on this market underwent major changes. Due to geopolitical constraints, the largest market segments (Europe, the US and Japan) became unavailable, with the size of the available market reduced by more than 80%.

Despite the above constraints, ROSATOM continues to develop this business area. Its geographical focus has shifted to the CIS, Latin American and Asian markets. The Corporation focuses on RAW management projects, given their significant synergy with decommissioning operations. As part of these efforts, the Corporation is taking steps to enhance its product offer by establishing an engineering centre specialising in the decommissioning of facilities posing nuclear and radiation hazards and RAW management. The key task of this entity will be the transfer of foreign decommissioning technologies.

In Russia, ROSATOM is decommissioning power units No. 1, 2 and 3 of Novovoronezh NPP, power units No. 1 and 2 of Leningrad NPP, power units No. 1 and 2 of Beloyarsk NPPs, power unit No. 1 of Bilibino NPP and power unit No. 1 of Kursk NPP, which have been shut down. It is also participating in NPP decommissioning in a number of European countries and is decommissioning nuclear fuel cycle facilities, namely enrichment, conversion and fuel fabrication plants.

In 2022, ROSATOM (through JSC TVEL) continued to promote cooperation in the back-end segment among the CIS countries. This involved developing and approving a RAW Management Strategy in the Republic of Belarus and preparing for NPP decommissioning in Armenia and Kazakhstan.

For details, see 'Performance of the Fuel Division in 2022'.

Electricity and capacity market in the Russian Federation

Expansion on the electricity and capacity market in the Russian Federation remains one of ROSATOM's top priorities. The Corporation is one of the key power generation companies in Russia. In addition, the local market is important in terms of obtaining references for new technological solutions for their subsequent global implementation.

In 2022, electricity consumption in the Unified Power System of Russia totalled 1,106.3 billion kWh as against 1,090.4 billion kWh in the previous year (up by 1.5%).

Nuclear power plants maintained their role in terms of meeting base load demand in the Unified Power System of Russia, with nuclear power generation reaching a new all-time high of 223.4 billion kWh in 2022 (as against 222.4 billion kWh in 2021). The increase in nuclear power generation was mainly driven by a reduced duration of scheduled repairs at power units. As a result, in the reporting year, the Corporation managed to remain a leader among power generation companies, with the share of nuclear power generation in the country's total electricity output (in the Unified Power System of Russia) totalling 19.9%. ROSATOM's key goal remains to ensure safe and reliable operation of nuclear power plants and remain a leader in terms of its share in electricity output in the country's energy mix.

In early 2022, ROSATOM became a major player on the thermal power market. As a result of the acquisition of PJSC Quadra – Power Generation, the total power generation capacity of thermal power plants (TPPs) managed by the Corporation exceeded 4 GW, while their heat generation capacity exceeded 19,000 Gcal/h. Power and heat generation at the TPPs totalled 16.2 billion kWh and 30 million Gcal respectively (2021: 3.3 billion kWh and 7.5 million Gcal respectively). The TPPs supplied power and heat to regions of the Siberian, Ural and Central Federal Districts.

In addition, ROSATOM builds and operates wind power plants in Russia. The portfolio of wind power plants to be built by ROSATOM by the end of 2027 totals 1.7 GW, with 780 MW already put into operation. In 2022, electricity output from ROSATOM's WPPs totalled 1.96 billion kWh (2021: 1.2 billion kWh).

In addition to NPP, TPP and WPP operation, the Corporation also sells electricity. In the reporting year, JSC Atom Energy Trade continued to operate as the power supplier of last resort in the Kursk, Tver, Smolensk and Murmansk Regions, while LLC REC continued to operate as the power supplier of last resort in the town of Zheleznogorsk (Kursk Region) and became a supplier of last resort in the Republic of Khakassia as from 1 September 2022. JSC Atom Energy Trade and LLC REC provide services to more than 60,000 legal entities and more than 2 million households in Russia.

In 2022, retail electricity sales by the branches and standalone divisions of JSC Atom Energy Trade and LLC REC totalled 16.8 billion kWh, up by 5% compared to 2021 (16.0 billion kWh).

For details, see 'Performance of the Power Engineering Division in 2022'.

Wind power market

The global wind power market is growing steadily in terms of both capacity additions and investment activity. In 2021, wind power capacity increased by more than 92 GW, while in 2022, the increase exceeded 74 GW[1].

According to the most conservative estimates by the International Energy Agency, wind power capacity will increase from 0.93 TW in 2022 to 1.83 TW in 2030 and 3.56 TW by 2050[2]. Wind power capacity additions may average 110 GW per year.

The wind power market is highly competitive and consolidated. The top 10 turbine manufacturers accounted for 75% of the total capacity of onshore and offshore WPPs commissioned in 2022, with major players, such as Vestas, Siemens Gamesa, Gold Wind, GE and Envision, accounting for about 42%. In 2022, investments in renewable energy increased by 16% compared to 2021 and reached USD 0.5 trillion for the first time, with about USD 200 billion allocated for wind power projects[3].

1. IRENA, Renewable capacity statistics 2023.
2. IEA, World Energy Outlook 2022.
3. IRENA, Global landscape of renewable energy finance

On the global wind power market, ROSATOM plans to become an integrated wind power project developer. In order to accomplish its objectives, in June 2021, ROSATOM's Strategic Council approved a programme titled 'Renewable Energy: Foreign Markets', which was revised in September 2022 taking into account geopolitical factors. In accordance with the programme, the portfolio of overseas projects will total 700 MW by 2024 and 5 GW by 2030 (across the onshore and offshore wind power and solar power segments). ROSATOM has selected Southeast Asia, Africa and the CIS countries as its target markets.

ROSATOM'S SHARE ON THE RUSSIAN WIND POWER MARKET

As part of the Russian programme to support renewable energy based on capacity supply agreements on the wholesale market, the capacity of onshore WPPs to be commissioned by the end of 2024 is expected to total 2.74 GW, with a further 3.9 GW to be commissioned between 2025 and the end of 2035. According to ROSATOM's estimates, by 2035, the total installed capacity of onshore WPPs in Russia might reach 7 GW.

The portfolio of wind power plants to be built by ROSATOM by the end of 2027 as part of the Wind Power Strategic Programme totals 1.7 GW, with 780 MW already put into operation.

In 2022, the 60 MW Berestovskaya WPP was put into operation and started to supply electricity on 1 January 2023. The construction of two WPPs with installed capacity totalling 220 MW (the Kuzminskaya WPP (160 MW) and stage 1 of the Trunovskaya WPP (60 MW) was started in the Stavropol Territory.

ROSATOM's share on the Russian wind power market totals about 34%.

For details, see the chapter 'Business Development Report'.

Nuclear medicine market

In the reporting year, the global nuclear medicine market totalled ~USD 13.2 billion and is expected to exceed USD 33 billion by 2030 (this figure refers to the total value of healthcare services provided globally).

The global market for nuclear medicine equipment totals USD 2.9 billion and is expected to reach USD 5.6 billion by 2030.

The volume of the Russian nuclear medicine market exceeds RUB 100 billion, and the market is expected to grow steadily until 2030 and reach ~RUB 162 billion: according to ROSATOM's forecasts, the growth rate will total up to 8–9% per year, given an increase in compulsory health insurance contributions. In the coming years, key growth drivers will continue to include the implementation of the Healthcare National Project, nuclear medicine procedures and high-technology healthcare services being prescribed more often, as well as the development of healthcare infrastructure and, more specifically, the construction of nuclear medicine centres specialising in radionuclide diagnostics and therapy. In a number of Russian regions, steps are being taken or plans have been developed to provide existing healthcare institutions with state-of-the-art nuclear medicine equipment for diagnostics and therapy.

ROSATOM sees considerable potential for the development of nuclear medicine services for the general public. The Corporation has initiated projects to create a network of radionuclide therapy and nuclear medicine centres in Russia and abroad, which will provide high-quality healthcare services to patients.

ROSATOM is a major supplier of isotopes and radiopharmaceuticals for nuclear medicine in Russia. 30% of the world's reactor units producing medical radioisotopes are located in Russia. ROSATOM accounts for 25% to 50% of global radioisotope production (for some types of radioisotope products, its share totals 100%). The Corporation's long-term goal is to rank among the top five global suppliers of isotope products for medical applications, including brand-name radiopharmaceuticals and generic drugs.

In addition, the Corporation is a major player on the market for medical device sterilisation using radiation processing technologies.

ROSATOM also produces and actively upgrades medical equipment for diagnostics and therapy. By 2030, the Corporation plans to become a National Champion in a number of segments, including MRI equipment, 6 MeV and 18 MeV linear particle accelerators, cyclotron and radiochemistry facilities, SPECT scanners and brachytherapy equipment.

For details, see the chapter 'Business Development Report'.

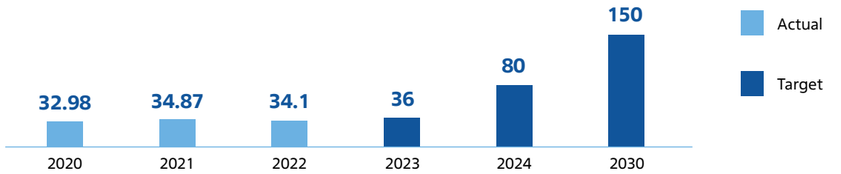
Market for cargo transportation along the Northern Sea Route

Mineral extraction, oil and gas production in the Arctic are projected to grow significantly, resulting in an increase in cargo traffic along the Northern Sea Route (NSR) from 34.1 million tonnes in 2022 to 80 million tonnes in 2024 and 150 million tonnes in 2030.

Global cargo traffic can become a driver for further growth of cargo transportation along the NSR in the long term (after 2030). Cargo transportation along the NSR provides a number of advantages compared to traditional routes via the Suez and Panama Canals (the distance between Northern Europe and East Asia is reduced by up to 39%, while the distance between the western coast of North America and Northern Europe is reduced by up to 28%).

For details, see the section 'Development of the Northern Sea Route'.

Actual cargo traffic and targets set under the Northern Sea Route Development Federal Project



Waste management market

ROSATOM is supporting the development of an integrated system for the management of hazard class 1 and 2 waste in Russia. This initiative has been launched under the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project, which forms part of the Ecology National Project. Hazard class 1 and 2 waste includes 485 types of waste, such as mixtures of inorganic salts, oxides, hydroxides, acids (waste from the metals, manufacturing and mechanical engineering industries), mercury-containing waste (mercury-vapor lamps and mercury thermometers, as well as mercury-containing industrial waste), and waste containing organic components. About 350,000 tonnes of this waste is generated in the country every year.

As from 1 March 2022, new rules for the management of hazard class 1 and 2 waste came into force in Russia. FSUE FEO (an enterprise of ROSATOM), which has been appointed federal operator responsible for the management of hazard class 1 and 2 waste, collects, transports, processes, recycles and treats these types of waste across Russia. As from 1 March, waste-generating enterprises that have their own hazard class 1 and 2 waste management capacities are registered in the federal state information system for tracking hazard class 1 and 2 waste and monitoring its management (FGIS OPVK) and submit information on the entire life cycle of hazardous waste, from its generation to the confirmation of its processing at specific facilities. Waste-generating enterprises that do not have their own hazard class 1 and 2 waste management capacities are registered in the FGIS OPVK system as from 1 March and conclude a contract with the federal operator, which provides the full range of the relevant waste management services on a turnkey basis.

At year-end 2022, about 59,000 users were registered in the system, including 34,400 waste-generating organisations, as well as operators providing hazardous waste transportation and management services.

In addition, as part of the Federal Project, ROSATOM is developing infrastructure for hazard class 1 and 2 waste processing, namely a network of environmental technology parks, which will be equipped with the best state-of-the-art safe technological solutions.

The Corporation has started to build seven modern industrial facilities (environmental technology parks), four of which will be built at chemical weapons destruction sites, while the remaining three are greenfield facilities. The environmental technology parks will have a total throughput of 350,000 tonnes of waste, which will help to address the national shortage of capacities for the processing of these classes of waste.

In fact, this will provide a resource base for a new circular economy in Russia. The design and selection of process lines is underpinned by the principle that recycling is a priority: two thirds of all waste will be recycled, and the resulting materials will be commercialised. The first two environmental technology parks in the Kurgan and Saratov Regions are scheduled to be put into operation by the end of 2023. In 2024, the Corporation will launch environmental technology parks in the Kirov Region and the Udmurt Republic, as well as greenfield facilities in the Irkutsk, Tomsk and Nizhny Novgorod Region.

For details, see the chapters 'Business Development Report' and 'Safety Report'.

1.5. INTERNATIONAL COOPERATION

Key results in 2022

- 17 intergovernmental agreements were concluded, including an intergovernmental agreement with Belarus on cooperation in SNF management.
- Official ceremonies were held to mark the start of concreting at power units No. 1 and 2 of El Dabaa NPP in Egypt and power unit No. 4 of Akkuyu NPP in Turkey.
- A meeting of the President of the Russian Federation Vladimir Putin with the IAEA Director General Rafael Grossi was arranged. A series of interdepartmental consultations with the IAEA on ensuring the safety and security of Zaporozhye NPP were arranged.
- The Corporation and organisations in the industry took part in major industry events held under the auspices of the IAEA, including the IAEA General Conference and the Nuclear Harmonisation and Standardisation Initiative launched by the IAEA Director General.

ROSATOM's international activities are aimed at expanding the international legal framework governing the peaceful use of nuclear energy and at cooperating with government agencies of foreign countries and international organisations in order to promote Russian nuclear technologies and enable the Russian nuclear industry to consolidate its position on the global nuclear energy market.

In 2022, these efforts were carried out amid unprecedented large-scale illegitimate sanctions imposed by the West. ROSATOM prioritised matters related to all aspects of nuclear safety and security and focused on fulfilling all its international commitments and meeting contractual schedules agreed with customers.

1.5.1. Expanding the international legal framework for cooperation and supporting major overseas projects

In 2022, ROSATOM continued to take steps to expand the international legal framework for cooperation and to provide support for major overseas projects.

17 intergovernmental and interdepartmental agreements were signed (18 in 2021; 16 in 2020).

Despite the special conditions related to external restrictions and the epidemiological situation, ROSATOM fulfils all its international commitments to build Russian-design nuclear facilities abroad.

ROSATOM cooperated with the Federal Customs Service of Russia to facilitate uninterrupted product exports in order to fulfil its commitments as part of international projects.

During the pandemic, employees were rotated at overseas NPP construction sites in Bangladesh, Belarus, Egypt and Turkey according to schedule. Before pandemic-related restrictions on the crossing of Russia's border were lifted, about 16,000 people were transported across the border in cooperation with the Office of the Government of the Russian Federation, the Russian Ministry of Foreign Affairs, the Border Service of the Federal Security Service of the Russian Federation and other agencies.

Cooperation with key foreign partners

Asia

China

Political support continued to be provided for the implementation of the strategic package for Russian-Chinese cooperation, including the construction of power units No. 7 and 8 of Tianwan NPP, power units No. 3 and 4 of Xudabao NPP and the Chinese experimental fast neutron reactor (CFR-600), as well as the supply of nuclear fuel for these five reactors.

As part of efforts to expand bilateral cooperation, provisions on continued serial construction of NPPs equipped with VVER reactors in China, development of cooperation on fast neutron reactors and the closed nuclear fuel cycle, SNF reprocessing, RAW management and basic science were incorporated into the Road Map for High-Quality Development of Russian-Chinese Trade in Goods and Services by 2024 adopted during the visit of the President of the Russian Federation Vladimir Putin to China in February 2022.

On 29 August 2022, the 26th meeting of the Nuclear Subcommittee under the Russian-Chinese Commission on Preparing Regular Meetings of the Prime Ministers was held via video conferencing.

India

Support was provided for the ongoing projects to build power units No. 3–6 of Kudankulam NPP. The development of the legal framework was initiated in order to expand strategic partnership with the Indian party in the sphere of nuclear power and industry and the peaceful use of nuclear energy for non-energy applications.

ROSATOM suggested to the Indian party that cooperation should be established as part of existing international commitments on joint projects such as serial construction of Russian-design NPP power units with high-power VVER reactors in India, construction of Russian-design small NPP power units in India, construction of a Nuclear Research and Technology Centre based on a Russian-design high-power research reactor in India, cooperation in the NFC, etc.

Bangladesh

ROSATOM continued to implement the project to build the country's first nuclear power plant, Rooppur NPP. In October 2022, an official ceremony was held at the NPP site as the reactor vessel was moved into final position at power unit No. 2.

Expert teams started to discuss the specifications for the project to build a Russian-design high-power research reactor in Bangladesh.

Myanmar

Intergovernmental memoranda were signed on the provision of training for Myanmar's nuclear specialists and on shaping a positive public opinion on nuclear energy in Myanmar.

An interdepartmental road map for nuclear cooperation in 2022 and 2023 was signed. The document sets out specific steps to expand the bilateral legal framework for cooperation, develop a project to build a small NPP, develop the country's nuclear infrastructure and provide training and education for local personnel.

CIS

Armenia

A Comprehensive Programme of Russian-Armenian Cooperation on Energy and Non-Energy Projects was signed in April 2022 as part of the official visit of the Prime Minister of the Republic of Armenia Nikol Pashinyan to Russia. The document reflects the parties' intention to continue to upgrade the NPP currently in operation and further explore opportunities for the construction of new Russian-design nuclear power units in Armenia.

Belarus

ROSATOM continued to provide support for the construction of power unit No. 2 of the Belarusian NPP.

ROSATOM provided assistance to the Belarusian party in implementing the national strategy for the management of SNF from the Belarusian NPP, which involves building a national RAW repository. An intergovernmental agreement on cooperation in SNF management was signed.

The discussion of the project to build a Nuclear Research and Technology Centre based on a multipurpose nuclear research reactor in Belarus and energy storage projects continued.

Kazakhstan

An Indicative Road Map for the Implementation of Key Activities for 2022 and 2023 as Part of the Project to Build a Large NPP in Kazakhstan was signed; the document outlines stages of work focused on engineering surveys, the assessment of nuclear infrastructure, gaining public acceptance for nuclear power, and the drafting of the relevant intergovernmental agreement.

A memorandum of cooperation in personnel training for Kazakhstan's nuclear power industry and related industries was signed.

Kyrgyzstan

A memorandum of cooperation in the construction of a small NPP in Kyrgyzstan and the road map for the implementation of the project were signed. The documents stipulate specific steps in the development of the small NPP construction project, including the pre-feasibility study, the development of nuclear infrastructure, personnel training and gaining public acceptance for nuclear power.

Europe

Turkey

An official ceremony was held to mark the start of concreting in the reactor building of power unit No. 4 of Akkuyu NPP.

A Memorandum of Understanding was signed by the Ministry of Treasury and Finance of the Republic of Türkiye, ROSATOM and Akkuyu Nuclear JSC; the document is aimed at building and securing long-term financial reserves for project implementation on the terms and conditions that are acceptable to both parties.

As agreed by the Presidents of Russia and Turkey, in late 2022, working consultations were held with the Turkish party concerning a project to build a new nuclear power plant, Sinop NPP, in Turkey.

Hungary 	As part of the project to build Paks II NPP, a Road Map of Key Activities for 2022 and 2023 was signed. It defines the scope of work and the timing of activities to be implemented in order to start the concreting at power unit No. 5 of Paks II NPP. The Regulations on the Joint Steering Committee (JSC) established pursuant to the Russian-Hungarian intergovernmental agreement on cooperation in the peaceful use of nuclear energy were signed. The document sets out the goals and objectives, the composition and the procedure for holding JSC meetings to address strategic issues related to the implementation of the agreement, including the project to build Paks II NPP.
Serbia 	Preparations continued as part of the three-phase project to build a Centre for Nuclear Science, Technology and Innovation in Serbia. A package of documents was prepared in order to establish a joint venture which involves the Russian party developing the business plan and the financial and economic model for the project.
Middle East and North Africa	
Egypt 	Official ceremonies were held to mark the start of concreting at power units No. 1 and 2 of El Dabaa NPP in July and November 2022. The Russian Ministry of Foreign Affairs assisted in opening a branch of the Ministry of Manpower of Egypt in the vicinity of the NPP construction site; the branch will be responsible for issuing work permits to Russian and foreign specialists in Egypt.
Latin America	
Bolivia 	Support was provided for communication concerning bank guarantees between JSC State Specialised Design Institute, which acts as the general contractor for the project to build a Nuclear Research and Technology Centre in Bolivia, and Bolivian partners. ROSATOM assisted in organising and holding a meeting of the joint working group on personnel with the Bolivian Ministry of Energy in October 2022.
Nicaragua 	A road map was signed for establishing cooperation between Russia and Nicaragua in the peaceful use of nuclear energy. The document formalises agreement on the next steps in developing a legal framework for cooperation, building a Nuclear Research and Technology Centre in Nicaragua, personnel training for the country's nuclear industry, developing nuclear infrastructure and implementing joint geothermal, hydropower and wind power projects.
Central and Southern Africa	
Burundi 	A road map was signed for establishing cooperation between Russia and Burundi in the peaceful use of nuclear energy. The document stipulates specific steps to be taken by both parties between 2022 and 2024 in order to explore potential projects focused on non-energy applications of nuclear energy in Burundi and assess the prospects for nuclear power generation in the country.
Zimbabwe 	A memorandum of cooperation was signed; the document stipulates measures aimed at human resource development for the nuclear industry of the Republic of Zimbabwe.

1.5.2. Cooperation with international organisations

Despite a challenging global political situation, ROSATOM continued to participate in international organisations and forums in order to contribute to developing international rules and standards on nuclear power.

Commitments to pay contributions to the IAEA and the OECD NEA were met in full using funds from the federal budget.

Implementation of the industry-wide programme to train Russian personnel for international organisations continued in cooperation with the IAEA, the World Association of Nuclear Operators (WANO) and the ITER Organisation. In 2022, three Russian specialists from the pool of experts formed as part of the programme were hired by specialised international organisations.

International Atomic Energy Agency (IAEA)

In 2022, ROSATOM's cooperation with the IAEA was focused primarily on ensuring the safety and security of Zaporozhye NPP (ZNPP). Preparations were made for a meeting between the President of the Russian Federation Vladimir Putin and the IAEA Director General Rafael Grossi; several rounds of interdepartmental consultations were held with the IAEA, including in the context of the establishment of a nuclear safety and security protection zone around ZNPP and the permanent presence of IAEA experts at ZNPP.

ROSATOM played a key role in the events of the 66th session of the IAEA General Conference. Resolutions adopted following the conference accommodate the interests of the Russian nuclear industry.

ROSATOM's experts participated in all specialised international conferences and meetings held by the IAEA. 1,370 Russian experts participated in more than 380 events held by the IAEA (due to the pandemic, some of them were held online). 25 events under the auspices of the IAEA were held in Russia (including in the online format).

On the initiative of ROSATOM, the Government of the Russian Federation made a decision to make contributions towards the implementation of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) run by the IAEA from 2023 through 2025, which will enable the Russian Federation to retain its status as a major donor under the project.

Financing and participation of Russian organisations in major IAEA projects continued as part of the Technical Cooperation Programme, the Nuclear Security Fund, the Russian Safeguards Support Programme and the Programme of Action for Cancer Therapy.

JSC Rosenergoatom and the IAEA launched a joint project to translate IAEA safety standards into Russian.

Work was underway as part of the Nuclear Harmonisation and Standardisation Initiative launched by the IAEA Director General.

In order to promote Russian approaches to formulating international legal norms governing the construction and operation of nuclear facilities, ROSATOM in cooperation with the Russian Ministry of Foreign Affairs and the Federal Environmental, Industrial and Nuclear Supervision Service of Russia (Rostekhnadzor) participated in the assessment of applicability of existing IAEA safety standards to small modular reactors initiated by the IAEA. Proposals for amendments to these standards taking into account the special characteristics of Russian-design nuclear installations were drafted and presented at the meetings of the relevant IAEA committees in June 2022.

Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (OECD NEA)

Although the OECD Council decided to suspend Russian membership in the OECD NEA as from 11 May 2022, Russia continued to participate in a number of joint projects and international institutions under the auspices of the OECD NEA which are relevant to the Russian nuclear industry and which maintain a professional and non-politicised attitude.

ROSATOM sought to maintain the highest possible level of cooperation with the OECD NEA, including the payment of Russia's membership fee in order to enable Russia to regain the status of a full OECD NEA member in the future.

Commission of the CIS Member States on the Peaceful Use of Nuclear Energy (Atom-CIS Commission)

As part of the implementation of the CIS Intergovernmental Target Programme for Remediation under the auspices of the Atom-CIS Commission, assistance was provided to the Kyrgyz and Tajik parties in ensuring the safety of former uranium mining facilities. In Kyrgyzstan, the construction of infrastructure required for the decommissioning of dilapidated tailings dams has been completed at remediation sites. In Tajikistan, measures forming part of the Programme are being implemented ahead of schedule.

The implementation of the Action Plan under the Agreement on Cooperation between the CIS Member States to Ensure Preparedness in the Event of a Nuclear Accident continued. An Agreement on Information Exchange between the CIS Member States during Radiation Monitoring was drafted; the agreement is aimed at integrating national alert systems.

A Nuclear Infrastructure Development Programme of the CIS Member States and the relevant implementation plan were prepared and approved.

ROSATOM's experts actively participated in the work of the Council of Executives of Nuclear Safety Regulators in the CIS Countries and Organisations Providing Scientific and Technical Support.

To support talented students from the CIS member states studying 'nuclear' disciplines, ROSATOM launched a scholarship programme.

IAEA EVENTS HELD IN RUSSIA

1.5.3. Strengthening the nuclear non-proliferation regime and export control

In 2022, ROSATOM took steps to enhance the efficiency of the export control system in the industry.

In 19 organisations of ROSATOM involved in international trade, 34 export control specialists underwent training and obtained certification from the FSTEC of Russia in accordance with Article 24.1 of Federal Law No. 183-FZ of 18 July 1999 on Export Control.

Seven organisations of ROSATOM piloted the DIRECT.Compliance information system for managing export control processes. It is expected that, following testing, in 2023, the information system will be rolled out in the industry on an industrial scale.

ROSATOM continued to improve the Reference Book on the KKS System, which is a systematised framework for equipment identification used in NPP design, and to develop a mechanism for the use of the Reference Book by the Federal Customs Service of Russia in order to optimise customs clearance procedures.

318 draft international contracts (arrangements, agreements) were reviewed in accordance with the Uniform Industry-Wide Procedure for Organising Export Control in ROSATOM. The findings of the review were sent to organisations in the industry.

ROSATOM provided support for the participation of the Russian delegation in the Nuclear Suppliers Group (NSG). Proposals for amending the NSG control lists were reviewed.

Pursuant to the order of the Government of the Russian Federation dated 16 July 2022, ROSATOM provided expert support in the sphere of the peaceful use of nuclear energy for the Russian interdepartmental delegation at the Tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons held at the UN headquarters in New York between 1 and 26 August 2022. During the event, emphasis was placed on Russian approaches to the development of large-scale nuclear power generation, fast reactors, closing the NFC, mobile NPPs, as well as the operation of the International Uranium Enrichment Centre in Angarsk.

1.5.4. Developing the network of ROSATOM's representative offices affiliated with embassies and trade missions abroad

ROSATOM's representatives continued to work in Russian embassies and trade missions and under the Permanent Mission of the Russian Federation to International Organisations in Vienna (Austria). In 2022, overseas representatives worked in 13 foreign countries and supported ROSATOM's overseas projects. This involved engaging with the governments of the host countries on a wide range of issues, including support for high-level negotiations, and rotation and vaccination of employees involved in overseas construction projects.

1.5.5. Challenges in the reporting period and mechanisms for addressing them

In 2022, ROSATOM jointly with the relevant ministries and government agencies took steps to consolidate Russia's position on the global nuclear energy market and promote Russian nuclear technology abroad. These efforts were carried out amid growing pressure on the Russian Federation, including sanctions imposed by unfriendly countries, which significantly transformed the external environment for the operation of the Russian nuclear industry.

In order to ensure business continuity of ROSATOM and its organisations, the main emphasis was placed on measures to minimise the impact of sanctions on the Russian nuclear industry and develop a resilient business model in the new environment.

1.5.6. Plans for 2023 and beyond

ROSATOM will continue to develop the international legal framework to enable the Russian nuclear industry to secure its foothold in its traditional countries of operation and to enter the market in new countries.

The Corporation will continue to cooperate in personnel training for international organisations with the IAEA, the ITER Organisation and WANO.

ROSATOM plans to intensify its efforts (including work with specialised international organisations and institutions) to make nuclear power more acceptable for society and shape a positive public perception of it.

1.6. PERFORMANCE OF GOVERNMENT FUNCTIONS

1.6.1. Performance of the Nuclear Weapons Division

Fulfilment of the state defence order

The operations of ROSATOM's Nuclear Weapons Division (NWD) as part of the state armament programme and the state defence order (hereinafter referred to as SDO) are aimed at maintaining Russia's nuclear capabilities (in terms of both their scope and quality) at a level that ensures the implementation of Russia's nuclear deterrence policy.

ROSATOM's NWD organisations fulfilled the SDO for 2022 in full.

Operations in the civilian sector

NWD organisations contribute to the manufacture of civilian products and help to ensure Russia's technological sovereignty. In 2022, the integrated KPI target for new products was exceeded by 44.1%. In 2022, revenue of NWD organisations from new products (outside the scope of the Corporation) totalled RUB 74.21 billion, while the 10-year portfolio of orders for new products (outside the scope of the Corporation) reached RUB 173.50 billion.

In order to increase the share of high-technology civilian products in the revenue of NWD enterprises to 50% by 2030, the NWD has revised scenario assumptions for planning the ramp-up of production of high-technology civilian products by the NWD in the medium term and until 2030 taking into account changes in the global geopolitical environment.

As part of efforts to promote technological sovereignty and diversify the operations of NWD organisations, 10 product strategies were developed for new businesses in 2022, with the target for revenue until 2030 set at RUB 225.5 billion.

NWD organisations closely cooperate with all of ROSATOM's Divisions and contribute to the implementation of product strategies and strategic programmes, including Electric Mobility, Hydrogen Energy, Additive Manufacturing, and Automated Process Control Systems.

Measures to improve the performance of NWD organisations

ROSATOM's NWD is a leader in terms of identification and registration of intellectual property rights over R&D results. In 2022, 222 decisions were made concerning the form of legal protection of intellectual property (IP), including 142 inventions, 23 utility models, 21 trade secrets, three industrial designs, four integrated circuit layouts and 29 computer software programs.

46 items of intellectual property were commercialised, including the TIANOX device for inhaled nitric oxide therapy, the LOGOS software suite and components for ITER.

Other developments in the sphere of NWD operations, including contribution to Russia's technological sovereignty

In 2022, consolidated revenue from other products of NWD enterprises totalled RUB 106.5 billion.

GRI 3-3

Proposals were formulated and effective and adequate representation of Russian interests was ensured as part of the work of the UN Committee on the Peaceful Uses of Outer Space with regard to matters related to nuclear power sources (this included attendance and presentations at the 59th session of the Scientific and Technical Subcommittee, the 61st session of the Legal Subcommittee and the 65th session of the Committee, as well as multiple intersessional meetings of the Working Group on the Use of Nuclear Power Sources in Outer Space). ROSATOM's representatives participated in the drafting of a final report on the outcomes of the multi-year work plan of the Working Group on the Use of Nuclear Power Sources in Outer Space.

Strategies for new businesses are being implemented in the following areas: Security Systems, Machine Tool Industry, Laser Technology, Superconductivity, New Materials for Electrical Engineering, Large Electrical Machines, Special Medical Equipment, Power Converters and Electronics, Automotive Electronics, etc. Furthermore, growth targets have been set for high-technology civilian products of the NWD, and a pool of projects has been formed.

On 23 December 2022, 10 TIANOX devices for inhaled nitric oxide therapy were donated to the Vishnevsky Central Military Clinical Hospital.

1.6.2. Law drafting

The Corporation contributed to the transformation of legislation necessitated by the need to protect Russia's national interests due to hostile actions of foreign governments and international organisations. It also participated in the development of mechanisms for supporting the economy, including the simplification of permitting and licensing procedures established by Russian legislation and defining the special features of the legal regime applied to the procurement of goods, work and services for government and municipal needs, fulfilment of the SDO, urban planning and development, etc.

The relevant bills were reviewed by the Corporation as part of both its participation in the meetings of the Legislative Commission of the Government of the Russian Federation and the review of laws and other regulations submitted for approval.

In order to centralise the powers related to managing the Northern Sea Route (NSR), including the deployment of icebreakers, in ROSATOM and establish a single NSR navigation management centre at the federal state budgetary institution (FSBI) controlled by the Corporation, ROSATOM drafted and supported the adoption of Federal Law No. 184-FZ of 28 June 2022 on Amending Article 5.1 of the Merchant Shipping Code of the Russian Federation and the Federal Law on State Atomic Energy Corporation Rosatom.

This Federal Law has also enabled the development of a flexible permitting mechanism for regulating navigation along the NSR, which involves not only issuing and revoking permits but also suspending, renewing and amending them, which, in turn, makes it possible to take into account climate change to enable safe navigation amid growing maritime traffic along the NSR and an increase in vessel size and capacity, and provides optimal conditions for consignors.

Overall, in the reporting year, the Corporation reviewed about 400 bills, amendments, drafts of official comments and opinions of the Government of the Russian Federation, as well as other legislative initiatives affecting various aspects of operations of ROSATOM and its organisations, including the following federal laws:

1. Federal Law No. 268-FZ of 14 July 2022 on Amending the Federal Law on Industrial and Consumer Waste and Certain Laws of the Russian Federation, which clarifies individual provisions concerning the management of hazard class 1 and 2 waste by waste-generating organisations themselves.
2. Federal Law No. 541-FZ of 19 December 2022 on Amending the Urban Development Code of the Russian Federation and Article 18.1 of the Federal Law on the Protection of Competition, which is aimed at lowering administrative barriers and speeding up the design, construction (renovation) and commissioning of not only certain nuclear facilities, but also healthcare, energy, production and transportation facilities using X-ray equipment and inspection systems, as well as facilities where sealed radionuclide sources are used for production and research.
3. Federal Law No. 510-FZ of 5 December 2022 on Amending the Federal Law on Internal Sea Waters, Territorial Sea and Contiguous Zone of the Russian Federation, which regulates matters related to foreign naval vessels and other government vessels sailing in Russia's internal waters along the NSR.
4. Federal Law No. 172-FZ of 11 June 2022 on Amending the Federal Law on the State Defence Order, which is aimed at providing optimal conditions for rapidly placing the SDO by requiring contractors and general contractors responsible for product supplies under the SDO, as well as entities for which the acceptance of the SDO or the conclusion of contracts is mandatory (single suppliers (contractors) to provide information on product prices under the SDO at the request from the public contracting authority or the general contractor.
5. Federal Law No. 210-FZ of 28 June 2022 on Amending Articles 8 and 12 the Federal Law on the State Defence Order, which has enabled the Government of the Russian Federation to determine standard terms and conditions of SDO contracts.
6. Federal Law No. 159-FZ of 11 June 2022 on Amending Article 1 of the Federal Law on the Procurement of Goods, Work and Services by Certain Types of Legal Entities, which addresses legal gaps in regulation in the course of procurement from related parties by customers with a complex vertically integrated structure.
7. Federal Law No. 160-FZ of 11 June 2022 on Amending Article 3 of the Federal Law on the Procurement of Goods, Work and Services by Certain Types of Legal Entities and the Federal Law on the Contract System of the Federal and Municipal Procurement of Goods, Work and Services, which is aimed at preventing conflicts of interest between the bidder and the customer in the course of procurement for government and municipal needs and for the needs of certain types of legal entities.
8. Federal Law No. 390-FZ of 7 October 2022 on Amending the Federal Law on Industrial Policy in the Russian Federation, which formalises approaches to determining the cost of construction of sea-going, inland and mixed type (river/sea) vessels with funding provided fully or partially from the federal budget, the budgets of constituent entities of the Russian Federation and local budgets.
9. Federal Law No. 395-FZ of 7 October 2022 on Amending the Federal Law on Departmental Security Services, which clarifies the scope of activities of in-house security services and the categories of facilities protected by in-house security services, and takes into account the special features of protection of the facilities of ROSATOM and its organisations, etc.

In 2022, the Corporation continued to participate in the drafting of the new versions of the Code on Administrative Offences and the Procedural Code of the Russian Federation and in the reform of supervision and control activities (the 'regulatory guillotine') by participating in working groups on energy, the environment and the use of natural resources, construction, housing and utilities, and intellectual property.

BILLS REVIEWED BY ROSATOM

Plans for 2023

ROSATOM's plans for 2023 and beyond in the sphere of law drafting include the following:

- Revising the Corporation's powers and functions, including those pertaining to the management of federal property;
- Improving Russian legislation pertaining to federal government supervision of the use of nuclear energy;
- Improving the procedure for the transfer of movable and real property situated within the boundaries of priority development areas, including those established in closed administrative and territorial formations in the nuclear industry;
- Other areas for improving legal regulation affecting the interests of ROSATOM and its organisations, including legislation on the use of nuclear energy.

1.6.3. Government Programme 'Development of the Nuclear Power and Industry Complex'

In 2022, the Government Programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex' was being implemented.

The implementation of the Government Programme is aimed at supporting the achievement of national development goals set by the President of the Russian Federation.

The specifications of the Government Programme have been signed off by its Steering Board (minutes No. 2 of the meeting of the Steering Board of the Government Programme dated 23 December 2022) and approved under the resolution of the Prime Minister of the Russian Federation Mikhail Mishustin dated 30 December 2022. The specifications of structural elements forming part of the Government Programme were approved under the established procedure in December 2022.

All metrics of the Government Programme, as well as metrics, results and milestones of its structural elements approved in 2022, including those of federal projects forming part of the Comprehensive Programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024', were achieved in full.

The integral assessment of progress in the implementation of the Government Programme and its efficiency for 2022 stood at 99.96%.

1.6.4. Implementation of federal target programmes

In 2022, ROSATOM's organisations implemented measures forming part of two federal target programmes (FTPs).

Funding for the implementation of the FTPs (for the part of their scope on which information is publicly available)	Amount, RUB '000
Total funding, including:	44,339,407.7
From the federal budget	22,009,685.6
From extra-budgetary sources	22,329,722.1

1.6.5. State property management and restructuring of non-core assets

Summary of property of ROSATOM and its organisations

As at 31 December 2022, ROSATOM kept records of the following assets and property:

- Property transferred to ROSATOM as asset contributions of the Russian Federation pursuant to resolutions of the President of the Russian Federation and the Government of the Russian Federation;
- Assets of joint-stock companies whose shares are partly owned by the Russian Federation, with ROSATOM exercising the relevant shareholder powers on behalf of the Russian Federation;
- Assets of limited liability companies in whose authorised share capital ROSATOM has interests;
- Assets of ROSATOM's private institutions;
- Assets of federal state unitary enterprises with regard to which ROSATOM exercises ownership powers;
- Assets of joint-stock companies whose shares are owned by ROSATOM.

Real property owned by ROSATOM's organisations is recorded in the Automated Property Management System of ROSATOM (APMS).

As at 31 December 2022, the records of real property of nuclear organisations in the APMS covered 394 organisations, including 13 federal state unitary enterprises (FSUEs) with an authorised capital totalling RUB 323,615.41 million.

The APMS contains information on items of real property and the relevant documents; all real property over which ROSATOM and its organisations have proprietary rights or which they own under the law of obligations are required to be recorded.

ROSATOM exercises ownership rights on behalf of the Russian Federation with regard to:

- Property under the economic management of federal state unitary enterprises included in the list approved by the President of the Russian Federation pursuant to Article 5 of the Law on State Atomic Energy Corporation Rosatom;
- Assets allocated to federal state unitary enterprises (government stockpiles of raw materials and fissionable materials managed in accordance with paragraph 1 of Article 12 of the Law on State Atomic Energy Corporation Rosatom and the Regulations on Government Stockpiles of Special Feedstock and Fissionable Materials approved by Decree No. 693-24 of the Government of the Russian Federation dated 19 August 2011).

ROSATOM's property

ROSATOM's assets have certain special characteristics. More specifically, in accordance with paragraph 9 of Article 3 of the Law on State Atomic Energy Corporation Rosatom, foreclosure of certain property of ROSATOM[1] is prohibited.

ROSATOM is authorised to exercise ownership rights with regard to federal property on behalf of the Russian Federation. Federal property under the economic management of federal state unitary enterprises is recorded on their balance sheet. Federal property acquired as part of the exercise of the rights of a public contracting authority is recorded in ROSATOM's budgetary accounting records.

Property of enterprises under ROSATOM's jurisdiction

As at 31 December 2022, there were 13 federal state unitary enterprises under ROSATOM's jurisdiction.

In 2022, none of ROSATOM's federal state unitary enterprises were reorganised.

To enable effective use of real property and protect the rights and legitimate interests of owners and holders of these rights, in 2022, ROSATOM monitored the registration of title to real property used by federal state unitary enterprises.

Performance of government functions related to state property management by ROSATOM in 2022 involved monitoring the registration of title to real property held by the Russian Federation by federal state unitary enterprises under ROSATOM's jurisdiction, as well as land regularisation.

In 2022, the Russian Federation registered its title to 90 items of real property (buildings and structures).

As at 31 December 2022, enterprises under ROSATOM's jurisdiction concluded a total of 310 agreements granting a lease of real property with a total floor space of 616,110 m².

1. According to the list approved by Decree No. 346 of the Government of the Russian Federation dated 6 May 2008 on Measures for Implementing Decree No. 369 of the President of the Russian Federation dated 20 May 2008.

According to reports of enterprises under ROSATOM's jurisdiction, as at 31 December 2022:

Total number of items of real property under the economic management of the enterprises, pcs.	13,372
Total floor space of the items of real property under the economic management of the enterprises, '000 m²	46,923.08
Initial book value of the items of real property under the economic management of the enterprises, RUB '000	316,210,402.64
Residual book value of the items of real property under the economic management of the enterprises, RUB '000	259,310,029.62
Total number of land plots used by the enterprises, pcs.	2,330
Total area of land plots used by the enterprises, hectares	90,645.34
Cadastral value of the land plots, RUB '000	248,986,460.66
Authorised capital of the federal state unitary enterprises, RUB million	323,615.41

Property of ROSATOM's organisations

34 non-core assets owned by joint-stock companies in which ROSATOM has a shareholding exceeding 25% were restructured in 2022. More specifically, 32 assets were sold; two assets were liquidated (written off). Proceeds from the sale of these non-core assets totalled RUB 358 million.

240 non-core assets owned by joint-stock companies in which ROSATOM has a shareholding totalling less than 25% and by companies whose shares are held by ROSATOM on behalf of the Russian Federation were restructured in 2022. More specifically:

- 56 assets were sold;
- 176 assets were transferred free of charge to the government and municipalities;
- 8 assets were liquidated (written off).

Proceeds from the sale totalled RUB 278.16 million.

As at 31 December 2022, ROSATOM's organisations concluded a total of 2,670 agreements granting a lease of real property with a total floor space of 3,256,960 m².

According to reports of ROSATOM's organisations, as at 31 December 2022:

Total number of items of real property owned by the organisations, pcs.	28,287
Total floor space of the items of real property on the balance sheet of the organisations, '000 m²	53,106.06
Initial book value of the items of real property, RUB '000	951,530,619.26
Residual book value of the items of real property, RUB '000	734,372,707.19
Total number of land plots used by the organisations, pcs.	4,730
Total area of land plots used by the organisations, hectares	88,980.48
Cadastral value of the land plots, RUB '000	159,700,726.56

1.7. DEVELOPMENT OF THE NORTHERN SEA ROUTE

1.7.1. ROSATOM's powers related to development and operation of the Northern Sea Route

Key results in 2022

- Targets for the Northern Sea Route Development Federal Project were achieved. Cargo traffic totalled 34.1 million tonnes (against a target of 32 million tonnes).
- The second follow-on multipurpose nuclear icebreaker, *Ural*, was accepted into service.
- The Federal State Budgetary Institution Northern Sea Route General Administration was established.
- The scope of surveys along the NSR reached an all-time high in modern Russian history: seafloor topography surveys covered 45,158 linear kilometres.
- The development of a digital ecosystem for the NSR was initiated.

ROSATOM has been assigned the functions of the infrastructure operator of the Northern Sea Route (NSR). Its responsibilities include managing navigation along the NSR, building infrastructure facilities, providing navigational and hydrographic support and ensuring the safety of navigation in the challenging Arctic environment.

The Corporation supervises the implementation of the Northern Sea Route Development Federal Project, which forms part of the Comprehensive Plan for Upgrading and Expanding Core Infrastructure until 2024[1], and manages the Northern Sea Route 2030 Federal Project forming part of the Government Programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex'.

The Corporation participates in the implementation of the Integrated Action Plan to Enforce the Principles of the State Policy of the Russian Federation in the Arctic until 2035 and the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 (hereinafter referred to as the Plan), as well as an initiative for social and economic development of the Russian Federation until 2030 titled 'Year-Round Northern Sea Route', as approved by Order No. 2816-r of the Government of the Russian Federation dated 6 October 2021.

In addition, the Corporation participates in the implementation of the NSR Infrastructure Development Plan until 2035 approved by Order No. 2115-r of the Government of the Russian Federation dated 1 August 2022. The Plan outlines a large scope of measures ranging from the development of infrastructure for large-scale investment projects and preparations to enable transit navigation along the NSR to addressing healthcare issues and providing personnel for navigation in the Arctic.

The Federal State Budgetary Institution Northern Sea Route General Administration (NSR General Administration FSBI) was established in August 2022. Its principal objective is to manage navigation along the Northern Sea Route. The institution is tasked with:

- Providing icebreaker support and escorting vessels along the NSR;
- Developing navigation routes for vessels and deploying the icebreaker fleet along the NSR taking into account the hydrometeorological situation, navigational and ice conditions;
- Issuing, suspending, renewing, amending and terminating permits for navigation along the NSR.

1. Developed in accordance with Decree No. 204 of the President of the Russian Federation on National Goals and Strategic Objectives of the Russian Federation until 2024 dated 7 May 2018.

1.7.2. Escorting vessels and handling cargo traffic along the Northern Sea Route

Russia owns the world's only nuclear-powered icebreaker fleet and has a long track record in the construction and operation of nuclear icebreakers. The nuclear-powered icebreaker fleet managed by ROSATOM participates in projects in the Arctic that are strategically important for Russia's economic development.

As at 31 December 2022, the nuclear-powered icebreaker fleet included:

- Three Project 22220 nuclear icebreakers equipped with a RITM-200 integral reactor unit whose power exceeds 80,000 h.p.: *Arktika* (put into service in 2020), *Sibir* (put into service in 2021) and *Ural* (put into service in 2022);
- Two nuclear icebreakers with 75,000 h.p. two-reactor nuclear propulsion units: *Yamal* and *50 Let Pobedy*;
- Two nuclear icebreakers with a 50,000 h.p. one-reactor nuclear propulsion unit: *Taymyr* and *Vaygach*;
- *Sevmorput*, a nuclear-powered LASH carrier with a 40,000 h.p. one-reactor nuclear propulsion unit;
- *Imandra* and *Lotta* floating maintenance bases;
- *Serebryanka*, a motor vessel intended for liquid RAW management and SNF transportation; *Rossita*, a motor vessel used for SNF and RAW transportation; and *Rosta-1*, a radiation monitoring vessel;
- The fleet providing port services to gas tankers in challenging ice conditions:
- Two ice-class tugboats, *Pur* and *Tambey*;
- Two icebreaking tugboats, *Yuribey* and *Nadym*;
- A port icebreaker, *Ob*.

Under the Northern Sea Route Development Federal Project, cargo traffic along the NSR is projected to reach 80 million tonnes per year by 2024. By 2030, cargo traffic may increase to 150 million tonnes per year. The total capacity of seaports situated along the NSR should reach 83 million tonnes per year by 2024 and 115 million tonnes per year by 2030.

In the reporting year, the targets set for the Federal Project were met ahead of schedule, with cargo traffic totalling 34.1 million tonnes (against a target of 32 million tonnes), including 24 million tonnes transported by vessels escorted by nuclear icebreakers.

Maritime traffic along the NSR between 2020 and 2022

Indicator	2020	2021	2022
Number of vessels, pcs.	497	712	726
Total gross tonnage, million tonnes	34.9	49	39

In February 2022, the flagship multipurpose nuclear icebreaker, *Arktika*, escorted low-ice-class vessels (the *Inzhener Trubin* and *Polar King* motor vessels) from the east to the west. This is the first time in the history of Arctic navigation that this has been done at this time of year. This voyage has demonstrated that the Corporation is ready to escort Arc5 ice-class vessels along the entire length of the Northern Sea Route at this time of year.

In 2022, the Corporation was selected by the Ministry for the Development of the Russian Far East and Arctic to undertake subsidised near-coastal voyages from European Russia to the Far Eastern regions and back. As part of this task, in 2022, two round-trip voyages were made from ports in European Russia to Far Eastern ports and back.

1.7.3. Construction of new icebreakers and the auxiliary fleet

To handle the growing cargo traffic along the Northern Sea Route, ROSATOM is upgrading its icebreaker fleet on a large scale.

In the reporting year, the second follow-on Project 22220 multipurpose nuclear icebreaker, *Ural*, was accepted into service; it is equipped with a RITM-200 integral reactor unit with propulsion power totalling 60 MW (more than 80,000 h.p.).

By year-end 2022, two more Project 22220 multipurpose nuclear icebreakers, *Yakutia* and *Chukotka*, were under construction; they are scheduled to be commissioned in 2024 and 2026 respectively. In the reporting year, an official ceremony was held to mark the launch of the third follow-on multipurpose nuclear icebreaker, *Yakutia*.

In the Far East, the construction of a unique Project 10510 icebreaker, *Rossiya*, with propulsion power totalling 120 MW (more than 160,000 h.p.) is underway. This icebreaker will enable year-round operation in the High Arctic, mainly in its eastern sector, which is characterised by the most challenging ice conditions.

The construction of a floating maintenance dock for Project 22220 multipurpose nuclear icebreakers is underway (the construction was started in June 2021). Under the terms of the contract, the construction, including the delivery of the floating dock to the port of Murmansk, will take 29 months.

The construction of a fleet of port vessels to provide towing services at the offshore liquefied natural gas (LNG) transshipment facility continued in the reporting year. The terminal will enable efficient transportation of LNG produced as part of Arctic LNG 2 and other projects by facilitating its transshipment from Arc7 ice-class LNG carriers onto other vessels. To enable the continuous operation of the offshore LNG transshipment facility, five Arc4 ice-class tugboats will be built.

Extending the service life of icebreakers

In 2022, steps were taken to validate the extension of the service life of nuclear-powered vessels that are currently in operation; this involved inspecting safety-critical systems and equipment in accordance with the Programme of Preparations for an Extended Service Life developed for each nuclear icebreaker.

Sections of steam generators were repaired on the *Yamal*, *50 Let Pobedy* and *Taymyr* nuclear icebreakers and the *Sevmorput* nuclear-powered container ship.

Two reactor cores were reloaded on the *Yamal* nuclear icebreaker.

Maritime traffic along the Northern Sea Route is growing year by year. Service life extension measures enable the Corporation to fulfil its contractual obligations.

Nuclear and radiation safety

In the course of operation of its nuclear-powered icebreaker fleet, ROSATOM attaches great importance to environmental safety and preserving marine and coastal ecosystems. Accordingly, in 2022, ROSATOM continued to take steps in order to put the fundamental principles of the Uniform Industry-Wide Environmental Policy into practice and accomplish specific environmental objectives related to minimising the environmental footprint, including addressing 'nuclear legacy' issues.

In the reporting year, 19 spent fuel assemblies (SFAs) previously stored in the SNF storage caissons of the *Lepse* floating maintenance base were removed from the special storage site, loaded onto a special train and sent to FSUE Mayak Production Association for processing.

Site	Number of removed TUK-108/1 transportation packages with SNF from nuclear submarines, pcs.	Number of transportation packages loaded onto special trains and sent to FSUE Mayak Production Association for processing, pcs.	Placed into temporary storage, pcs.
Andreev Bay	42	42	0
Village of Gremikha	10	5	5

Systematic implementation of the environmental policy enables ROSATOM to monitor activities in the sphere of environmental protection and environmental safety, focus on environmental issues and implement timely corrective measures to address them in order to ensure compliance with environmental laws.

Digitisation

Enterprises continued the transition to prioritised use of Russian software: the transition to the use of the Astra Linux user-friendly operating system and the My Office software suite was completed. Similar changes were made with regard to software required for the operation of IT infrastructure (database management systems, virtualisation systems, etc.). Targets for the procurement and use of Russian software were met. The work will be continued in 2023 and 2024.

The development of an initiative to build an information system for maintenance planning was started; it is aimed at reducing the lead time for the maintenance and repairs of nuclear icebreakers, enhancing control over compliance with the maintenance and repair schedule, enabling efficient planning of the maintenance and repairs of nuclear icebreakers, and making this process more controllable and transparent.

1.7.4. Navigational and hydrographic support and construction of port infrastructure

Navigational and hydrographic support of navigation along the NSR

In 2022, navigational and hydrographic support for navigation along the NSR was provided under the Northern Sea Route Development Federal Project, which forms part of the Comprehensive Plan for Upgrading and Expanding Core Infrastructure until 2024, in accordance with the Plan of Navigational and Hydrographic Support (NHS) of Navigation along the Northern Sea Route, in Seaports Located along the Northern Sea Route and in Port Approaches for 2022 (hereinafter referred to as the NHS Plan) approved by ROSATOM and coordinated with the Federal Agency for Maritime and River Transport.

In 2022, the scope of surveys along the NSR reached an all-time high in modern Russian history. During the 2022 summer/autumn navigation season, seafloor topography surveys covered a total of 45,158 linear kilometres. Although the hydrometeorological situation and ice conditions posed significant challenges to navigation in 2022, all targets set for hydrographic operations in the NHS Plan were met.

In the future, surveys will continue at a rapid pace in order to increase the number of recommended routes along the NSR.

In accordance with the NHS Plan, in 2022, standalone power sources were installed on nine light beacons, 137 sea buoys were installed and removed, and maintenance of 188 onshore aids to navigation was carried out.

In 2022, 18 onshore beacons situated along the Yenisei River were upgraded and equipped with a system for monitoring the operation of lighting and optical equipment. A control station was installed in Saint Petersburg.

The infrastructure of seven stations of the GLONASS/GPS global navigation satellite system (GNSS) situated on the coast and on islands along the NSR was maintained, operated and developed, including six GNSS monitoring and correction stations on Oleny Island, Cape Sterlegov, Andrey Island, Stolbovoy Island, Kamenka Island and in the estuary of the Indigirka River, as well as the control station in Dikson.

An extensive upgrade of the *Grigoriy Mikheyev* research vessel was successfully completed in the reporting year. This involved replacing main equipment on the vessel and improving its habitability.

A government contract was secured for the technical upgrade of the second research vessel, *Petr Kottsov*. Old equipment is being dismantled, and preparations are being made for the installation of new equipment. The completion of the work and the handover of the vessel to the customer are scheduled for 2023.

The third research vessel, *Alexey Maryshev*, is being prepared for an upgrade; the work is scheduled to start in 2023.

A new Ice3 class Project E35.G hydrographic survey boat, *Yury Babayev*, and two Ice3 class Project BLV03 buoy tenders, *Vsevolod Peresypkin* and *Aleksandr Parfenov*, were accepted into service.

Pursuant to Decree No. 499 of the Government of the Russian Federation dated 31 March 2021 on Budget Investment Using Federal Budget Allocations for the Construction of an Arc7 Ice-Class Flagship Vessel, a government contract was secured and the construction of an Arc7 ice-class buoy tender for hydrographic surveys was started. The vessels are designed to operate in ports situated along the NSR, enable safe navigation, develop port infrastructure, and to position, service and deliver navigation and radio equipment and specialists to onshore facilities.

1.7.5 Construction and management of infrastructure facilities of the Northern Sea Route

Utrenniy terminal for LNG and stable gas condensate

In 2022, despite the tight construction schedule, challenging climatic conditions and a short period of ice-free navigation, construction work started in 2020 at the facilities of the Utrenniy terminal for liquid natural gas (LNG) and stable gas condensate that are under federal ownership (the Arctic LNG 2 project) was completed in full.

As part of dredging in the basin and the approach canal of the Utrenniy terminal (site No. 2 of the seaport of Sabetta), more than 24 million m³ of material was excavated.

The construction of the Southern and Northern Ice Protection Structures with a total length of more than 4.4 kilometres was successfully completed. In order to build the ice protection structures, a total of 5,759 piles were driven. The volume of hydraulic structures embedded in concrete totalled 155,000 m³.

In the reporting year, a navigation safety system was built, and the construction of a building for government inspection services, including a checkpoint on the Russian border, was completed.

The Corporation started dredging in the basin of the Utrenniy terminal and the construction of ice protection structures in 2019 and in the autumn of 2020 respectively.

The Utrenniy terminal should become fully operational in 2023.

Construction of the basin for the cargo berth and the canal of an offshore coal terminal at the Syradasayskoye deposit

In 2022, design documentation was prepared for facilities under federal ownership as part of the project to build the basin for the cargo berth and the canal of an offshore coal terminal at the Syradasayskoye deposit. The project involves building facilities under federal ownership, including dredging the basin of the cargo berth from the natural depth to the level of minus 16.0 metres according to the Baltic Height System (BHS) to enable the docking and handling of design vessels (*Admiral Schmidt* and *Vitus Bering*-class bulk carriers) at the cargo berth, and dredging the canal intended for loaded vessels leaving the terminal in order to increase its depth to minus 16.2 metres in the BHS. The proposed operations were approved by the Federal Agency for Fishery; a positive opinion was obtained following a state environmental expert review. The design documentation is undergoing a state expert review, including the verification of construction cost estimates; the work is scheduled to be completed in 2023.

Plans for 2023 include securing a government contract and meeting physical targets for the scope of work as part of the project to build the basin for the cargo berth and the canal of an offshore coal terminal at the Syradasayskoye deposit[1].

Hydrometeorological monitoring system

In 2022, design documentation was prepared for a system for the monitoring of hydrometeorological factors affecting navigation safety within the Sea Canal in the Gulf of Ob and on the approaches to it. The proposed operations were approved by the Federal Agency for Fishery, and a positive opinion was obtained following a state environmental expert review. The design documentation is undergoing a state expert review, including the verification of construction cost estimates; the work is scheduled to be completed in 2023.

Construction of infrastructure for the placement of MFPUs and construction of a marine terminal on Cape Nagloynyn

The Corporation jointly with LLC GDK Baimskaya is implementing an investment project to develop the Baimskaya Ore Zone (in accordance with Comprehensive Plan No. 14480p-P51 dated 28 December 2021, as approved by the Deputy Chairman of the Government of the Russian Federation, Representative of the President of the Russian Federation in the Far Eastern Federal District Yury Trutnev).

1. In accordance with Order No. 4404-r of the Government of the Russian Federation dated 31 December 2022.

In 2022, the required front-end engineering and design work was completed for facilities under federal ownership forming part of onshore and hydraulic structures of the marine terminal in order to build infrastructure for the placement of FPUs on Cape Nagloynyn in the seaport of Pevek. The proposed operations were approved by the Federal Agency for Fishery; a state environmental expert review and a state expert review of the design documentation, including the verification of construction cost estimates, are underway; the work is scheduled to be completed in 2023.

Plans for 2023 also include securing a government contract for the construction of infrastructure for the placement of FPUs and for the construction of facilities under federal ownership forming part of the adjacent cargo terminal on Cape Nagloynyn in the seaport of Pevek. Plans for 2023 include completing the design work and obtaining an opinion following a state expert review of the design documentation, including the verification of construction cost estimates.

Under the government contract for construction to be secured for the project, construction materials are to be purchased and delivered to the construction site along with construction machinery in 2023.

Maintenance dredging along the NSR

Maintaining the specified (design) characteristics of a basin shaped earlier is a major priority, given the need to provide the required conditions for navigation. Accordingly, maintenance dredging is carried out on an annual basis as part of statutory activities, which involve repairs, maintenance and upgrades of existing and construction of new hydraulic structures and other port facilities, including transshipment facilities and terminals along the NSR.

In 2022, maintenance dredging was carried out in order to ensure safe navigation in the basins of the seaport of Sabetta and the Utrenniy terminal, with 1.11 million m^3 of material dredged.

Plans for 2023 include excavating 1.48 million m^3 of material as part of maintenance dredging in the basins of the seaport of Sabetta and the Utrenniy terminal.

Digitisation of navigational and hydrographic support

Efficient and timely performance of the tasks assigned to the Corporation in the sphere of navigational and hydrographic support along the NSR requires a high degree of process automation and digitisation focused primarily on hydrographic surveys (seafloor topography mapping) and the processing of their results, as well as generating and updating navigational data and maps to enable safe navigation and business operations along the NSR.

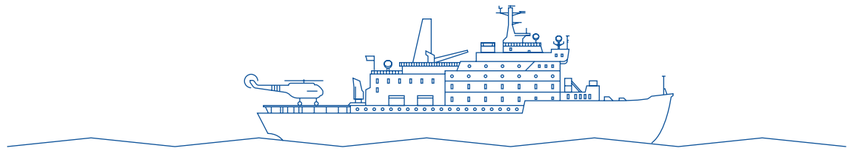
The Corporation has modern automated hydrographic systems based on multibeam echo sounders, which enable seafloor topography mapping along the NSR. Seafloor topography data are collected and processed and reports are prepared using state-of-the-art licensed software, such as QPS Qinsy, QPS Qimera 2 and Civil 3D. This equipment and software make it possible to conduct hydrographic surveys along the NSR, process the relevant data and prepare reports within the shortest possible time frame and to a high standard in accordance with the requirements of Publication S-44 of the International Hydrographic Organisation (IHO), *Standards for Hydrographic Surveys*.

Reports on the findings of hydrographic surveys provide a basis for compiling and updating digital maps and navigational information, including in the form of electronic navigational charts (ENCs) and digital reference datasets (DRDSs) covering the NSR that are compliant with applicable IHO standards. This is done using state-of-the-art software, dKart Editor.

In 2022, a set of ENCs comprising 259 cells and covering the entire NSR was kept up to date.

The Corporation is the only organisation in Russia that compiles digital cartographic information in the form of DRDSs compliant with Annex A of IHO Publication S-65, *High Density (HD) ENC Production and Maintenance Guidance*, adopted by the IHO in 2020 and provides it to mariners. DRDSs are created for individual areas of the NSR for which official ENCs do not provide bathymetric details and depth contours that are sufficient for save navigation and vessel manoeuvring and the official ENC producer is unable to promptly adjust them (e.g. for seaport areas and approaches to them where there are areas of minimal under-keel clearance and/or vessel manoeuvrability is restricted). In 2022, 31 new DRDSs were created, and all DRDSs comprising a total of 313 cells were kept up to date.

The ENCs and DRDSs are provided to mariners and updated in strict compliance with the requirements of IHO Publication S-57, *IHO Transfer Standard for Digital Hydrographic Data*, and IHO Publication S-63, *IHO Data Protection Scheme*. In 2022, a total of 46 large-capacity vessels, primarily LNG tankers and nuclear icebreakers, as well as the Marine Operations Headquarters, were provided with up-to-date ENCs and DRDSs. DRDSs for the Gulf of Ob, including the Sea Canal and the basin of the seaport of Sabetta, are the most sought-after by mariners and are updated annually based on seafloor topography data.



1.7.6. Navigation management along the Northern Sea Route

Pursuant to Federal Law No. 184-FZ of 28 June 2022, the Merchant Shipping Code of the Russian Federation has been amended to grant powers related to navigation management along the NSR to ROSATOM.

To do so, the Federal State Budgetary Institution Northern Sea Route General Administration (NSR General Administration FSBI) has been established by Order No. 2019-r of the Government of the Russian Federation dated 23 July 2022; its primary objective is to manage navigation along the NSR.

NSR General Administration FSBI comprises the Marine Operations Headquarters (which is responsible for providing icebreaker support, developing navigation routes along the NSR and escorting vessels along these routes, as well as deploying nuclear icebreakers along the NSR) and the Department of Licensing Activities (which is responsible for issuing permits for navigation along the NSR, including their suspension, renewal, amendment and termination, and the provision of information on the hydrometeorological situation, navigational and ice conditions along the NSR).

NSR General Administration FSBI has been authorised to issue permits for navigation along the NSR, suspend, renew, amend and terminate such permits[1].

In the reporting year, a new version of the Rules of Navigation along the NSR dated 21 September 2022 came into force, whereby permits for navigation along the NSR are issued by ROSATOM or its subordinate organisation.

Between 29 June[2] and 31 December 2022, ROSATOM and NSR General Administration FSBI reviewed 750 applications for navigation along the NSR.

The Council of the NSR Shipping Participants and the Interdepartmental Commission on NSR Navigation Management were established in 2022. The Council discusses and formulates proposals for improving the efficiency of communication and cooperation between investment project operators, shipping companies transporting cargo along the Northern Sea Route and ROSATOM as the NSR infrastructure operator. In 2022, cargo traffic along the NSR totalled 34.117 million tonnes. In 2022, cargo traffic along the NSR exceeded the target set for the Northern Sea Route Development Federal Project by more than 2 million tonnes. An increase in cargo traffic along the NSR driven by Russian companies in 2022 totalled 966,000 tonnes, or 3% compared to 2021.

The growth of cargo traffic throughout 2022 was driven primarily by LNG transportation. LNG transportation increased by 1.2 million tonnes (1,258,000 tonnes) compared to 2021; container traffic increased by 226,000 tonnes, while bulk cargo traffic grew by 109,000 tonnes. Cargo traffic associated with infrastructure construction for the projects of Russian customers also continues to grow. In 2022, the first three batches of coal mined at the Syradasayskoye deposit were shipped. More than 100,000 tonnes of commodities were shipped eastwards along the NSR. In addition, in 2022, a programme of subsidised near-coastal voyages was implemented. The *Sevmorput* nuclear-powered LASH carrier made two round-trip voyages from ports in European Russia to Far Eastern ports. In 2023, the programme of subsidised round-trip voyages will be continued.

On instruction from the Russian President Vladimir Putin, in 2022, ROSATOM, the Ministry for the Development of the Russian Far East and Arctic and major Russian consignors signed trilateral agreements providing for the construction of the necessary infrastructure along the NSR and the handling of annual cargo traffic. Projections of cargo traffic between 2030 and 2035 reflected in the agreements are higher than those set in the NSR Development Plan until 2035 approved by Order No. 2115-r of the Government of the Russian Federation dated 1 August 2022. This reflects the huge potential of the NSR and its development prospects. Seven nuclear-powered vessels operate along the NSR to provide icebreaker support for Arctic investment projects, including three Project 22220 icebreakers that are the most powerful in the world: *Arktika*, *Ural* and *Sibir*.

Preparations are underway for launching year-round eastward navigation along the NSR.

Experimental voyages are made eastwards from the port of Sabetta in order to gain experience in escorting vessels of this class, develop the relevant tactics and study the hydrometeorological and ice conditions for navigation along the eastern section of the NSR for vessels of this kind.

The launch of year-round navigation along the NSR will enable a significant increase in cargo traffic along this route and will provide access to new promising markets, helping to ensure Russia's economic security.

1. Pursuant to Order No. 1/22-NPA of ROSATOM dated 2 August 2022.
2. Date of official publication of Federal Law No. 184-FZ of 28 June 2022.

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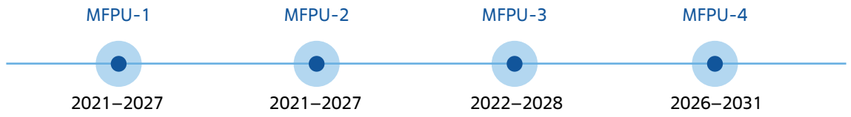
1.7.7. New areas of activity

Power ships based on modernised floating power units

The implementation of the comprehensive plan for the investment project to develop the Baimskaya Ore Zone continued. ROSATOM will supply four (three plus one) modernised floating power units (MFPUs) based on RITM-200S reactor units with installed capacity of up to 110 MW each.

Construction time frame:



In 2022, the MFPU design stage was completed. The engineering design for the MFPUs was successfully presented to ROSATOM's R&D Board No. 1. The development of working designs was initiated.

LLC GDK Baimskaya, a company of KAZ Minerals Group, is the investor in the project to develop the Baimskaya Ore Zone. The Baimsky Mining and Processing Plant is expected to start production by the end of 2027; its ore processing capacity is projected at 70 million tonnes per year. JORC resources at the Peschanka deposit, which is situated within the boundaries of the Baimskaya Ore Zone, are estimated at 9.9 million tonnes of copper and 16.6 million ounces of gold.

Environmental monitoring along the NSR

In 2022, further progress was made on the project to conduct comprehensive studies and environmental safety monitoring above and below water along the NSR in line with global best practices. The project is focused on near-coastal and transit Arctic shipping, as well as NSR port infrastructure at the construction and operation stage.

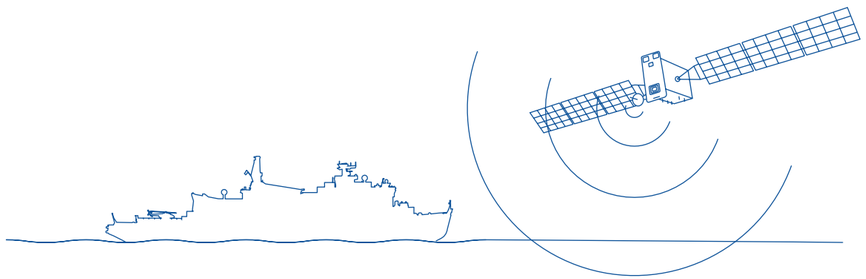
Specialists from the Marine Research Centre of Lomonosov Moscow State University carried out environmental monitoring at 50 sites along the Northern Sea Route; digital services for environmental safety monitoring of the NSR based on remote sensing data were tested and proved to be efficient.

The project will remain relevant as it supports sustainable development in the region; it will require a further scale-up amid the expansion of commercial operations in the Arctic and emerging new challenges related to climate change in the Arctic.

In 2022, the crew of the *Sevmorput* nuclear-powered container ship assisted a representative of the Murmansk Marine Biological Institute of the Russian Academy of Sciences (MMBI RAS) with data collection along the NSR. The ship went from Saint Petersburg to Petropavlovsk-Kamchatsky via Murmansk. Studies conducted during the voyage were focused on assessing the status of populations of sea mammals, birds and polar bears along the entire length of the Northern Sea Route. Cooperation with ROSATOM's enterprises has enabled Russian scientists to carry out a full-scale observation of key components of ecosystems across the Arctic from the Barents Sea to the Chukchi Sea for the first time in 15 years. This will make it possible to assess their current status and build models in order to forecast their further development for the coming decades.

1.7.8. Plans for 2023 and for the medium term

- To meet the targets set under the Northern Sea Route Development and NSR 2030 Federal Projects for cargo traffic and the total capacity of seaports situated along the NSR;
- To continue the construction of Project 22220 multipurpose nuclear icebreakers and the Project 10510 icebreaker;
- To commission the floating dock for Project 22220 multipurpose nuclear icebreakers;
- To commission five Arc4 ice-class tugboats;
- To complete the upgrade of the *Petr Kottsov* research vessel and put it into service;
- To complete the construction of the *Yury Osokin* hydrographic survey boat and put it into service;
- To update (keep up to date) 259 navigational charts covering the NSR; to update (keep up to date) 313 DRDSs. To compile 35 new DRDSs; to maintain (upgrade) 319 aids to navigation and seven monitoring and correction stations;
- To provide navigational and hydrographic support along the NSR covering 45,252 kilometres;
- To maintain and operate GLONASS monitoring and correction stations;
- To additionally equip the border checkpoint in the seaport of Sabetta (in the Utrenniy terminal) with communications, security and special monitoring systems;
- To build the basin of section 4 of the berth in the Utrenniy terminal;
- To build facilities under federal ownership as part of the project to develop the Syradasayskoye coal deposit;
- To amend the design documentation and subsequently carry out dredging within the required scope as part of stage 2 of the renovation of the Sea Canal;
- To complete design work as part of the project to build an offshore coal terminal on Cape Nagloynyn in the seaport of Pevek and secure the relevant government contract for construction;
- To carry out maintenance dredging along the NSR;
- To commission the first two floating power units in the area of Cape Nagloynyn by 2027, with the third and fourth units to be commissioned by 2028 and 2031 respectively;
- To carry out environmental monitoring along the NSR.



1.8. IMPLEMENTATION OF THE ECOLOGY NATIONAL PROJECT

The Ecology National Project is a national project of the Russian Federation for the period from 2019 through 2024 aimed at creating a safe and comfortable living environment, dismantling the most hazardous legacy facilities that cause environmental damage and developing a system for hazardous waste management.

As part of the Ecology National Project, ROSATOM is responsible for the implementation of the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project and participates in the implementation of the Clean Country and Preservation of Lake Baikal Federal Projects.

1.8.1. Implementation of the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project

As part of the Federal Project, ROSATOM is developing an integrated system for hazard class 1 and 2 waste[1] management:

- An information system for tracking this waste and monitoring its management;
- The relevant waste management infrastructure.

As from 1 March 2022, FSUE FEO (an organisation of ROSATOM), which is the federal operator responsible for the management of hazard class 1 and 2 waste, arranges safe waste transportation and management on a turnkey basis for waste-generating enterprises that lack the relevant capacities.

In 2022, about 59,000 users were registered in the federal state information system for tracking hazard class 1 and 2 waste and monitoring its management (FGIS OPVK), which was put into operation in December 2021. Thus, at year-end 2022, 34,400 waste-generating organisations, as well as operators providing hazardous waste transportation and management services were operating in the digital environment.

The main principles underlying the operation of the digital platform include the monitoring of environmental safety and public health, proper government record-keeping of hazard class 1 and 2 waste management across its life cycle, and offering all market players a convenient 'one-stop shop' solution enabling them to monitor processes in real time on any device.

The system has been integrated with information systems such as the ESIA Gosuslugi integrated identification and authentication system, the Nalog 3 automated information system, GLONASS and the PTK Goskontrol hardware and software system for government supervision, which eliminates the need for double data entry.

The FGIS OPVK system has made it possible to establish a federal framework for the management of hazard class 1 and 2 waste in electronic form, which will inform development forecasting models for the industry.

ROSATOM's key task as part of the Federal Project is to build seven environmental technology parks. Four of these industrial facilities are to be built at former chemical weapons destruction sites in the Kirov, Kurgan and Saratov Regions and the Udmurt Republic, while the remaining three are greenfield facilities that will be built in the Irkutsk, Tomsk and Nizhny Novgorod Regions.

1. Hazard class 1 and 2 waste includes mixtures of inorganic salts, oxides, hydroxides, acids (waste from the metals, manufacturing and mechanical engineering industries), mercury-containing waste (mercury-vapor lamps and mercury thermometers, as well as mercury-containing industrial waste); effluents from industrial enterprises, organic waste, mixed and composite organic and inorganic waste.

The environmental technology parks will have a total throughput of 350,000 tonnes of waste, which will help to address the national shortage of capacities for the processing of highly hazardous waste. This will provide a resource base for a new circular economy in Russia.

The design and selection of process lines is underpinned by the principle that recycling takes priority over waste treatment: more than two thirds of all waste will be recycled, and the resulting materials will be commercialised.

As part of the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project, in 2022:

- Preparatory, construction and installation work was carried out in the Saratov and Kurgan Regions (the Gorny and Schuchye facilities); main steel structures were assembled; the construction of new buildings and deliveries of process equipment were started. In addition, construction was started in the Kirov Region and the Udmurt Republic (the Maradykovsky and Kambarka facilities); preparatory work was carried out;
- Positive opinions following state expert reviews and construction permits were obtained for industrial facilities to be built in the Irkutsk and Tomsk Regions (the Vostok and Western Siberia facilities); construction contracts were concluded, and preparatory work was started. A contract was concluded for the development of design documentation and the construction of the RG Centre industrial facility in the Nizhny Novgorod Region.

The seven state-of-the-art environmental technology parks are scheduled to be commissioned by the end of 2024.

1.8.2. Implementation of the Clean Country Federal Project

As part of the Clean Country Federal Project, ROSATOM is working to mitigate environmental risks posed by legacy sites in the Leningrad and Irkutsk Regions.

Krasny Bor landfill remediation

The Krasny Bor landfill was in operation between 1968 and 2014; it was used as an environmental facility enabling smooth operation of industrial enterprises in Leningrad (Saint Petersburg) and the Leningrad Region. The landfill has an area of 67.4 hectares, including a 46.7-hectare waste storage area. It was used for the disposal of both liquid and solid hazard class 1 to 4 industrial toxic waste. During the operation of the landfill, 70 landfill cells were built by 2014; they contain 1.7 million tonnes of highly toxic waste. There are also other sources of contamination at the site that make a negative impact on the environment and the local community; these include soil from temporary storage sites and unused or contaminated utility systems (pipelines, pontoons, fire hydrants, etc.).

The following work was performed in 2022 under government contract No. 2/2022EI dated 25 April 2022 for the reparation of historical environmental damage caused by the Krasny Bor landfill:

- Detailed designs were developed;
- The construction of a sheet pile retaining wall was started as part of the construction of a cut-off wall;
- The landfill site was prepared for the technical stage of remediation;
- A surface runoff collection tank was built;
- Foundations were prepared for the construction of buildings for the collection and treatment of surface runoff and for an office and amenity building;
- Bund walls around open landfill cells were reinforced.

The construction phase was initiated on 25 April 2022 as part of ROSATOM's Days in the Federation Council of the Federal Assembly of the Russian Federation.

The reparation of historical environmental damage at the landfill site involves building a 3.5-kilometre-long buried multi-layer cut-off wall around the landfill body and the treatment of 340,000 m^3 of liquid and paste-like waste stored in open landfill cells. The waste will be treated using a unique technology and dedicated infrastructure for the handling of complex waste. As a result, the contents of the open landfill cells will be treated to ensure that they meet statutory limits for discharge into a fishery.

Residual liquid waste will be treated using a lithification plant, with secondary waste processed into a safe adaptive geocomposite material, which will be used for the subsequent site rehabilitation.

The rehabilitation will involve the construction of a multipurpose landfill cap and topsoil restoration, as well as the construction of storm water runoff and leachate drainage and treatment systems.

The site will become completely safe by 2025.

Remediation of the former Usolyekhimprom industrial site

The work carried out by ROSATOM on instruction from the President of the Russian Federation is unique in terms of scope and technology. The work is supported by ROSATOM's established safety culture and expertise in radioactive waste management, as well as the use of unique innovative solutions for the decommissioning of challenging industrial facilities.

Top-priority measures implemented by ROSATOM have made it possible to lift the state of emergency in Usolye-Sibirskoye. In parallel with the implementation of the top-priority measures, a comprehensive site remediation project has been developed. Positive opinions have been obtained for key facilities following state expert reviews.

In 2022, the first stage of work involving the dismantling of 204 buildings and structures was completed four months ahead of schedule. Furthermore, cost savings were achieved, enabling the dismantling of an additional 37 facilities.

ROSATOM is aware of the complexity of tasks facing it and the scale of site contamination; accordingly, it actively cooperates with the Russian Academy of Sciences and leading specialised research institutes.

Overall, the remediation of the industrial site will involve dismantling 368 buildings, structures and utility lines with a total structural volume of 6.1 million m^3. Construction waste generated during the dismantling will be crushed, and the resulting inert materials will be used for insulation during the remediation of the sludge dump.

To prevent the leakage of pollutants beyond the boundaries of the landfill site with groundwater, the project involves the construction of a cut-off wall.

The remediation of a 200-hectare sludge dump containing 3.6 million m^3 of sludge from chemical plants will involve creating levelling and horizontal waterproofing layers to ensure secure waste isolation.

Work on the 660,000 m^3 municipal landfill will involve the shaping of the landfill body and waterproofing.

The remediation of a system of sludge ponds will involve the dismantling of capital facilities and utility networks.

The elimination of an oil lens will involve the treatment of oil-contaminated soil through biodegradation of petroleum products.

In 2026, the site will become safe and suitable for setting up new manufacturing operations.

1.8.3. Implementation of the Preservation of Lake Baikal Federal Project

Remediation of the site of the Baykalsk Pulp and Paper Mill

ROSATOM is implementing a project aimed at environmental improvement of Lake Baikal, which involves reducing the area of land with a high and extremely high level of environmental contamination. The project involves work at three sites that pose a hazard to the ecosystem of Lake Baikal:

- The Solzansky landfill (108.5 hectares; 4,212,500 m³ of waste);
- The Babkhinsky landfill (45.3 hectares; 2,382,000 m³ of waste);
- The site of the former wastewater treatment facilities, including industrial spaces where black liquor is stored (35.27 hectares; 290,000 m³ of liquid containing black liquor).

OJSC Baykalsk Pulp and Paper Mill (OJSC Baykalsk PPM or BPPM) is situated on the southern shore of Lake Baikal in the Slyudyansky District of the Irkutsk Region. The enterprise was put into operation in 1966. Two landfill sites were built for waste disposal (the Solzansky and Babkhinsky landfills), where a series of storage tanks were installed. Over more than 40 years of operation of the mill, more than 6 million tonnes of industrial waste, mainly lignin sludge (insoluble solid fibre residue from the pulping process), were accumulated in 13 landfill cells. In addition, the captive CHPP of the enterprise produced a large amount of ash as a result of coal combustion. Solid household waste and construction waste was also dumped into the landfill cells. A major environmental hazard is also posed by black liquor, which is stored mainly at BPPM's wastewater treatment facilities.

Top-priority measures have been implemented at the BPPM site to lower the water level above the sludge layer. To do so, local wastewater treatment facilities have been installed; utility networks have been built for collecting water above the sludge layer from the landfill sites and discharging treated water into the centralised sewerage system of the town of Baykalsk. These measures have helped to prevent an environmental catastrophe that could have damaged the unique ecosystem of Lake Baikal, namely the overflow of sludge water and contamination of Lake Baikal with hazardous waste from OJSC BPPM.

In 2022, the water level above the sludge layer in landfill cells was lowered by 60 centimetres. About 70,000 m³ of sludge water was treated and transferred to municipal wastewater treatment facilities in Baykalsk. Positive opinions were obtained following state expert reviews of design documentation for the reparation of historical environmental damage at the site of the former wastewater treatment facilities of the Baykalsk Pulp and Paper Mill and the Babkhinsky landfill, which makes it possible to start the work.

Design work for the Solzansky landfill has been suspended in order to carry out additional evaluation of technological solutions (R&D), in accordance with the decision of the Government of the Russian Federation.

Introduction of new technologies

A unique system of geochemical barriers has been developed jointly with Lomonosov Moscow State University to prevent the leakage of pollutants into the environment.

The innovative approach developed by specialists from Lomonosov Moscow State University for the treatment of contaminated groundwater involves building a wall made from a reactive material across the contaminated stream. Contaminated groundwater is filtered by passing through the wall as a result of a natural gradient.

The construction of a cut-off wall with a high sorption capacity will make it possible to:

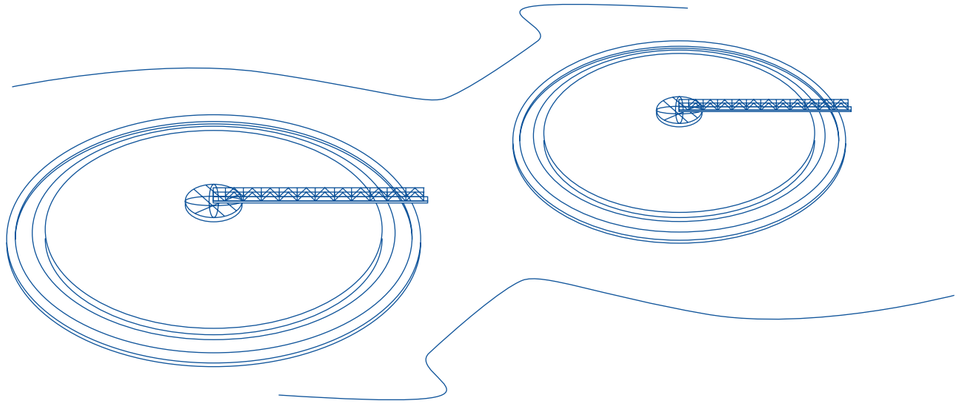
- Prevent the leakage of pollutants with groundwater and protect the Angara and Belaya Rivers from contamination;
- Gradually clean up the site as the soil will be rinsed by precipitation and the washed-out pollutants will be absorbed by the geochemical barrier;
- Prevent underground contamination.

Plans for 2023 and until 2030

In 2023, ROSATOM will continue to build infrastructure facilities to enable the safe management of hazard class 1 and 2 waste. The Gorny and Schuchye sites will be commissioned in December 2023.

By the end of 2024, all seven industrial facilities will be operational.

In 2023, the Corporation will continue to take steps to repair environmental damage caused by legacy sites. Measures to repair historical environmental damage at the Krasny Bor landfill site are scheduled to be completed in 2025; work in the Usolye-Sibirskoye municipality and at the Babkhinsky landfill of OJSC BPPM is scheduled for completion in 2026, while work at the site of the central wastewater treatment facilities is to be completed in 2027.



1.9. DIGITAL TRANSFORMATION

Key results in 2022

- 10 pilot projects were implemented in the sphere of end-to-end digital technologies and data management, with benefits totalling RUB 105.88 million.
- An international version of the Logos product was developed.
- Multi-D products were included in the Unified Register of Russian Computer Software and Databases.
- The Multi-D ESB product was launched on the market.

1.9.1. Uniform Digital Strategy

The Corporation is implementing a Uniform Digital Strategy (UDS). ROSATOM was the first Russian state-owned corporation to approve a strategy of this kind in 2018. The UDS is regularly updated taking into account changes in the internal and external environment. Key stakeholders in the implementation of the UDS include ROSATOM's organisations, as well as partner companies that are potential consumers of ROSATOM's digital products, and the Government of the Russian Federation, which monitors the implementation of the Digital Technology Federal Project forming part of the Digital Economy National Programme. All organisations managed by ROSATOM contribute to the digitisation of the nuclear industry.

Digitisation supports the achievement of ROSATOM's strategic goals and is a driver of ROSATOM's business efficiency. In 2022, the Digitisation Unit took active steps to develop a new ROSATOM 2030 Digital Vision following an update to ROSATOM's 2030 Vision. In accordance with the updated ROSATOM 2030 Digital Vision, the UDS is scheduled to be updated in 2023; it will incorporate the requirements of federal executive authorities.

The ROSATOM 2030 Digital Vision prioritises the achievement of the following digitisation goals in the industry by 2030:

- Accomplishing 100% of tasks set by the government;
- ROSATOM as a global technological leader;
- A 10-fold increase in digital revenue;
- Digital technologies/solutions developed by ROSATOM to be applied in 30 countries worldwide;
- 100% of products to be supplied by ROSATOM's businesses with a high level of digital maturity;
- 100% quality of digital services;
- The share of routine operations to be reduced to 0%;
- The share of people using or adopting digital technologies in their work to reach 100%;
- 5% share in the Corporation's EBITDA.

In 2023, extensive methodological activities and expert work will be initiated in order to provide a regulatory, methodological and scientific framework for digitisation in the industry and support the achievement of the goals set in the ROSATOM 2030 Digital Vision and the UDS.

In addition, in 2023, the Corporation plans to launch a dedicated internal communication campaign in order to communicate the goals set in the ROSATOM 2030 Digital Vision to every employee in ROSATOM's Divisions and organisations in line with their specialisation and to increase their engagement in the implementation of the 2030 Digital Vision.

Economic benefits

Digitisation is one of the most important drivers of ROSATOM's business efficiency. The Corporation is actively developing an approach based on a comprehensive assessment of effectiveness of IT projects in the nuclear industry.

In 2022, the uniform methodological framework for calculating benefits from the implementation of IT projects was updated; a list of mandatory projects was compiled, and ROSATOM's portfolio of IT projects was revised. In 2023, the Corporation plans to continue to provide training in project impact assessment for managers, to continue the audit of IT projects with a focus on evaluating their effectiveness and to implement large-scale IT projects for the benefit of government customers, large businesses and the independent IT market.

To unlock the significant potential of digitisation as a driver of the Corporation's business efficiency, ROSATOM will develop an approach to increasing the level of digital maturity[1] of existing processes in its organisations which involves applying digital tools in the manufacture of all core products in the industry.

Strategic partnership with AT Consulting

On 5 March 2022, LLC Rusatom Digital Solutions (a company of ROSATOM) and JSC AT Group (the holding company of AT Consulting Group) announced the establishment of a strategic partnership to address digitisation tasks. The alliance aims to pool the competences of the two companies in order to develop competitive digital products and solutions both for domestic customers, including government agencies, and for the international market.

During the first year of the Corporation's strategic partnership with JSC AT Group, all key growth targets set for the digital business were achieved. By working together, the companies achieved a number of extra synergies. The Corporation became a major player on the system integration market as an IT company and was offered an opportunity to participate in breakthrough government and intergovernmental initiatives thanks to having a professional IT integrator in its team, while JSC AT Group enhanced its industrial practice by participating in joint projects with ROSATOM.

Digital hierarchy

In 2022, the digital hierarchy was in place in 20 Divisions and 69 key organisations. To maintain a high professional level of chief digital officers (CDOs) managing digitisation initiatives in the Divisions and key organisations, a pilot assessment of their professional and technical competences was carried out. Based on its results, in 2023, the Corporation plans to develop a personalised list of training courses for each CDO who has undergone the assessment.

Digitisation programmes in the Divisions

Digitisation programmes in the Divisions are a key tool for the decomposition of the goals of the Uniform Digital Strategy. In 2022, the Corporation approved a methodological framework for developing and updating digitisation programmes in the Divisions, which currently underpins the implementation of programmes in 18 of ROSATOM's Divisions.

1. Digital maturity assessment forms part of the monitoring of progress in digitisation in organisations within ROSATOM's scope of consolidation as part of the industry-wide Digitisation function.

1.9.2. Participation in digitisation in Russia

Digital Economy

ROSATOM actively participates in the implementation of the Digital Economy National Programme. ROSATOM is a founder of the Autonomous Non-Profit Organisation Digital Economy, which is involved in managing the implementation of the Digital Economy National Programme[1]. The Corporation performs the functions of a competence centre for the Digital Technology Federal Project forming part of the Digital Economy National Programme[2] and is a contractor responsible for individual deliverables under the Digital Technology Federal Project. The Corporation has also been assigned responsibility under letters of intent signed with the Government of the Russian Federation for the development of individual high-technology areas, including New Industrial Software (previously New Production Technologies).

In addition, ROSATOM's representatives are members of working groups on federal projects forming part of the Digital Economy National Programme under the Autonomous Non-Profit Organisation Digital Economy. ROSATOM and its organisations actively participate in initiatives launched by the Government of the Russian Federation to replace foreign software in key sectors of the Russian economy in order to achieve technological sovereignty.

Participation in the implementation of systemic measures to ensure the technological independence of the Russian economy

In 2022, ROSATOM and its organisations actively participated in the implementation of Instructions No. MM-P10-10127 of the Prime Minister of the Russian Federation Mikhail Mishustin dated 16 June 2022. This involved initiating a set of large-scale systemic measures at the federal level in order to replace foreign solutions and software used in the industry with Russian analogues in prioritised areas with financial assistance from the government. The measures were implemented in cooperation with major customers in the industry and independent Russian developers.

In order to align software supply and demand in the industries, the Government of the Russian Federation established industrial competence centres responsible for replacing imported digital products and solutions, including hardware and software systems, used in key sectors of the economy (hereinafter referred to as ICCs), as well as competence centres responsible for developing Russian system-wide and applied software in order to replace foreign analogues that are currently in use (hereinafter referred to as DCCs) involving leading Russian companies.

Nuclear organisations actively participated in the work of 23 ICCs and DCCs.

In addition, ROSATOM's Director General Alexey Likhachev headed the ICC for General Mechanical Engineering of the Industry Committee on Mechanical Engineering under the Russian Ministry of Industry and Trade.

As a result of initiatives implemented by ROSATOM and its organisations, 13 projects were submitted as part of the work of eight ICCs and were granted the status of particularly significant, including in terms of future government support. IT solutions to be developed and implemented as part of these projects are scalable across entire industries and are critical for ensuring the technological sovereignty of Russian enterprises.

ROSATOM as the competence centre for the Digital Technology Federal Project participated in updating regulatory documents of the Government of the Russian Federation defining the procedure for providing financial assistance from the government for projects focused on developing and implementing Russian IT solutions.

1. The relevant regulations were approved by Decree No. 234 of the Government of the Russian Federation dated 2 March 2019 on the System for Managing the Implementation of the National Programme 'Digital Economy of the Russian Federation'.
2. Pursuant to Decree No. 234 of the Government of the Russian Federation dated 2 March 2019.

In 2023, ROSATOM plans to actively participate in the implementation of projects focused on the development and implementation of IT solutions by the Corporation's enterprises as part of large-scale programmes implemented by the Government of the Russian Federation in order to replace imported solutions; it also plans to continue working to improve laws and regulations on government support measures.

New industrial software

In order to provide a single platform for cooperation between industrial software developers/integrators, industrial enterprises adopting industrial software, as well as software testing centres and the expert community, in March 2022, ROSATOM jointly with the Russian Ministry of Digital Development, Communications and Mass Media and the ICT Competence Centre established a Competence Centre for New Production Technologies (hereinafter referred to as CC NPT) as a standalone division of the ICT Competence Centre.

Based on projects submitted by 16 industry committees and 33 associated industrial competence centres, the road map for the development of a separate high-technology area, New Industrial Software[1], was updated. On 29 December 2022, an updated letter of intent was signed with the Government of the Russian Federation in order to develop the New Industrial Software high-technology area.

The road map for New Industrial Software is to be implemented in 2023; this includes securing support for the relevant projects through the Russian Information Technology Development Foundation (RITDF), expanding the list of particularly significant projects run by ICCs and subsequently updating the road map.

1.9.3. End-to-end digital technologies and data management

The end-to-end digital technology development and data management (EDT&DM) programme is a key part of ROSATOM's Uniform Digital Strategy as it provides technological capabilities for the implementation of other prioritised initiatives.

Since 2021, the Corporation has been taking steps to transform the End-to-End Digital Technologies and Data Management subsidiary programme into an investment programme. As part of these efforts, in 2022, a new area, the Lean Smart Plant, was included in the programme; an inventory of the programme's components was compiled; projects categorised as 'mandatory' were approved; investment indicators of the programme until 2030 were updated.

10 PROJECTS IMPLEMENTED IN THE SPHERE OF END-TO-END DIGITAL TECHNOLOGIES AND DATA MANAGEMENT

1. Approved under the resolution of the Government of the Russian Federation on 14 December 2022.

As part of the programme, in 2022:

- The Corporation recorded the first documented direct quantifiable benefits from the programme's components since its launch totalling RUB 105.88 million;
- 12 digital RPS benchmarks (lean smart) were developed;
- As part of the development of laboratories of the International Research Centre for Advanced Nuclear Technologies, as well as a joint laboratory at the Obninsk Institute for Nuclear Power Engineering (a branch of NRNU MEPhI), educational programmes including activities focused on working with digital solutions were developed and implemented at Far Eastern Federal University;
- The number of organisations in the industry that apply technologies/sub-technologies included in the EDT list in their operations reached 50 (or 4% of the total number of organisations in the industry for which the application of included in the EDT list is feasible);
- The number of organisations that have developed and are implementing a road map for achieving the target status of a 'digital' enterprise in terms of EDTs that they apply reached 51 (or 42% of the total number of organisations in the industry for which the application of technologies/sub-technologies included in the EDT list is feasible);
- Five projects focused on rolling out the successful components of the EDT&DM programme were included in the programme;
- Intellectual property rights over a prototype text mining solution developed jointly with JSC RASU based on natural language processing technologies were registered, and plans for its commercialisation were formulated.

The level of digitisation of an enterprise directly contributes to an increase in its margins and profit, which has necessitated the development of a universal methodology for determining whether both individual businesses and the industry as a whole have made sufficient progress in digitisation. In 2022, a methodology for assessing the level of digitisation was proposed; it is based on a detailed assessment of the possibility of digitisation of processes involved in the manufacture of core products in the industry. Plans for 2023 include providing methodological support for the development of the programme in the industry, including the approval of local regulations on the methodology for calculating indicators for the monitoring of progress in increasing the level of digital maturity of processes and products in the industry.

In addition, in 2023, the Corporation plans to develop local regulations on data management in the industry, create 15 digital RPS benchmarks, achieve an increase in direct quantifiable benefits by at least 60%, and implement pilot projects in order to test the readiness of technological solutions and assess potential benefits from their implementation in nuclear organisations in the future.

1.9.4. Digital products

LLC Rusatom Digital Solutions and LLC Security Code have established a strategic partnership to develop Russian software and hardware solutions in the sphere of information security. The alliance aims to pool the capabilities and competences of the parties in order to accelerate the development of Russian information security products and enhance the country's technological sovereignty in this area.

The participants will develop synergies between their solutions and products in order to scale Russian sovereign software and hardware solutions both in Russia and abroad.

ROSATOM has updated its approach to building its portfolio of digital products; the new approach takes into account not only existing digital developments in the industry and unique knowledge of end-to-end processes but also market objectives and needs and is relevant to the prioritised sectors of the Russian economy.

The digital portfolio includes a variety of custom tools, products and services for the development of comprehensive solutions, including opportunities for establishing consortiums and partnerships and engaging third-party developers.

The development of ROSATOM's digital product portfolio is focused on the following key areas: mathematical modelling; enterprise and production management; digital infrastructure; design and construction; information security and digital physical security.

Mathematical modelling

In 2022, 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. The latest stages in the development of new software solutions, Logos EMR and Logos Atom, were completed.

An international version of the Logos product was developed and presented at the ATOMEXPO 2022 International Forum. It is expected that Logos will soon be launched on the global engineering software market.

Financial targets for the commercialisation of Logos in the industry and on the Russian market have been met.

On instruction from the Prime Minister of the Russian Federation Mikhail Mishustin, a number of industry-wide implementation projects have been developed in the established industrial competence centres; these are focused on the Logos product and other software solutions developed by the Consortium of Russian Developers of CAD/CAE Systems. Four of them have been approved by the Presidium of the Government Commission of the Russian Federation on Digital Development and the Use of Information Technology to Improve the Quality of Life and the Business Environment.

The first National Student Competition in Mathematical Modelling was held in 2022. More than 300 students from 45 Russian universities participated in this event.

A strategic conference on mathematical modelling and engineering software was held in December 2022. The conference has become one of the largest top-level meetings of players in the Russian industrial software market: it was attended by more than 300 developers and users of industrial software across a wide range of industries, including the aerospace, nuclear, automotive and transportation industries, shipbuilding, engine manufacturing, mechanical engineering, the fuel and energy sector, as well as science and academia.

Enterprise and production management

The Corporation's updated digital product portfolio 4.0 includes the following products:

- The Atom Mind industrial predictive analytics system;
- Data analytics products: Almaz ETL and Almaz Monitoring.

The Atom.RITA, Atom Mind and My Voice digital products have been included in the Register of Russian Software compiled by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation.

In November 2022, the Atom.RITA product was launched on the market. This is a platform designed for developing and managing software robots that enable business process automation by reproducing user actions in web applications and software programs installed on workstations.

In September 2022, a contract for the supply of the Dedal-Scout digital product was concluded with a Russian company.

Digital infrastructure

As part of a programme to develop a geographically distributed disaster-resilient network of data centres of ROSATOM, the Corporation operates and continues to develop the data centres that it has built/acquired: the Kalininsky Data Centre at Kalinin NPP, the Xelent Data Centre in Saint Petersburg and the StoreData Data Centre in Moscow. In 2022, the construction of the first stage of the Innopolis Data Centre was started in Innopolis (Republic of Tatarstan), and a decision was made to implement a project to build a modular data centre, Arktika, at Kola NPP.

Plans for 2023 for this area include:

- Commissioning the first stage of the Innopolis Data Centre;
- Starting design work for the second stage of the Xelent Data Centre;
- Acquiring a data centre in Moscow with a capacity of up to 4,000 rack spaces;
- Completing the design of the Arktika Modular Data Centre at Kola NPP.

JSC TVEL has produced telecommunications equipment and has developed software for the first switch models, which has been included in the Register of Russian Software. In 2023, the equipment is scheduled to be included in the register of telecommunications equipment of Russian origin.

The Atom.Port configuration management system has been included in the Unified Register of Russian Computer Software and Databases; it is a system for the automated migration and management of mixed (hybrid) workstation infrastructure based on operating systems of the GNU/Linux and Microsoft Windows families.

Design and construction. Multi-D digital products

Multi-D Docs & Resources (MDDR) is electronic document management and resource planning software that does not rely on imported technology.

A strategy for the development of JSC ASE's digital product and its sales on the foreign market has been approved; the product has been launched on the market.

Products forming part of the Multi-D product line (Multi-D Platform and Multi-D Project) have been included in the Unified Register of Russian Computer Software and Databases.

The Multi-D ESB product has been launched on the market; it is an enterprise service bus facilitating centralised and standardised event-driven communication between various modules of the Multi-D Platform and external systems.

The Multi-D Platform product development team has been transferred from JSC ASE to Private Institution Cifrum in order to continue to develop this product and associated business modules taking into account market needs outside the industry.

Plans for 2023 for this area include:

- Approving and launching a revenue-generating project focused on the Multi-D Platform product;
- Rolling out release 3.0 and launching the product on the market;
- Concluding partner agreements with developer companies on the use of the Multi-D Platform during custom development of information systems;
- Formulating and approving a strategy for BIM product development based on the Multi-D Platform.

Plans for 2023

In 2023, the Corporation will continue to develop its digital portfolio.

The priority is to develop the commercial potential of the digital product portfolio. This includes:

- Developing and implementing integrated digital solutions and providing digital services;
- Continuing to promote the customer-centric approach to the development of the digital portfolio to supplement the existing methodology: products and solutions in the digital portfolio will be aimed at achieving business objectives of customers and will be aligned with market trends;
- Strengthening ROSATOM's positions in promising product areas through strategic partnerships and M&As.

1.10. RESEARCH AND INNOVATIONS

Key results in 2022

- ROSATOM updated its Innovative Development and Technological Modernisation Programme until 2030.
- The Digital Science IT project won an award in the Corporate Research Management System of the Year category at CNews FORUM 2022.
- 37 integrated technological projects and 143 R&D initiatives forming part of ROSATOM's Consolidated Industry-Wide Plan of R&D Topics were underway.
- The number of international applications filed and patents obtained in the reporting year totalled 244.

1.10.1. Implementation of ROSATOM's Innovative Development and Technological Modernisation Programme

Pursuant to a resolution of the Government Commission for Economic Modernisation and Innovative Development of Russia (minutes No. 24 dated 14 July 2022), in 2022, ROSATOM updated its Innovative Development and Technological Modernisation Programme until 2030 (the IDP)[1].

As part of the update, the IDP was expanded to include projects supporting the implementation of national programmes and projects, initiatives focused on hydrogen energy, development of the Russian Arctic, etc. As part of the exercise of its regulatory powers, in 2021 and 2022, ROSATOM launched and supported the adoption of critical legislative initiatives aimed at addressing prioritised strategic tasks and promoting the development of various areas of business of the Corporation and its organisations, namely:

- Radioactive waste management;
- Expansion of shipping along the Northern Sea Route;
- Supervision and control;
- Management of hazard class 1 and 2 waste;
- Sustainable transition to clean energy, development of low-carbon hydrogen energy and state-of-the-art equipment for the energy industry, and addressing the strategic task of reducing the carbon footprint.

In order to develop and apply various approaches and techniques for qualitative and quantitative analysis of outcomes of innovation activities of nuclear organisations and use a proper evidence base for reviewing and assessing innovations and selecting the most effective innovation tools, in 2022, ROSATOM approved the Uniform Industry-Wide Methodological Guidelines for Rating Innovation Activities and Rewarding ROSATOM's Organisations Based on the Ratings. In addition to promoting innovation activities carried out by ROSATOM's organisations, identifying areas for improvement and enabling rapid development of innovation processes in the organisations, innovation ratings assigned to nuclear organisations will play an important role in informing management decisions.

1. Minutes No. 24 of the meeting of ROSATOM's Management Board dated 14 July 2022.

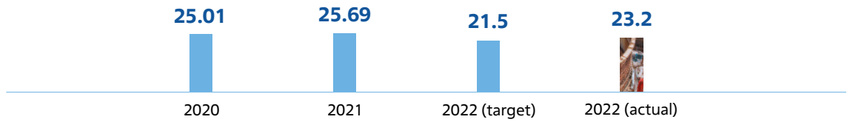
On 1 and 2 December 2022, the Corporation held an industry-wide conference titled 'Innovation Management in ROSATOM' organised jointly with the Rosatom Technical Academy. The conference was focused on approaches to developing the innovation potential in the nuclear industry and practical tools for enhancing R&D management.

In 2022, ROSATOM made significant progress in developing and promoting the innovation ecosystem (including a digital environment). The Digital Science IT project won an award in the Corporate Research Management System of the Year category at CNews FORUM 2022. The Innovation Management industry-wide function was updated. The Programme to Promote R&D and Innovation was successfully implemented.

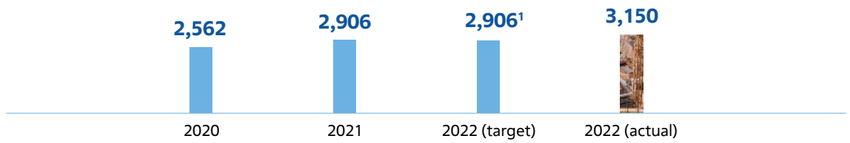
37 integrated technological projects supporting R&D and technological development in strategic areas of national importance and prioritised industry-specific areas, digitisation of the economy and modernisation of existing technologies were being implemented in 2022 as part of the IDP. 21 'process' projects supported effective R&D, technology and innovation management.

Performance indicators in the sphere of innovation between 2020 and 2022

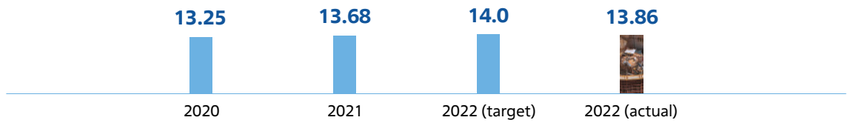
Share of innovative products and services in the total sales of products and services across the industry, %



Number of items of intellectual property: foreign patents obtained by ROSATOM, submitted and registered applications for foreign patents, registered trade secrets (know-how) (cumulative total), pcs.



Research and development costs as a percentage of the output of innovative products and services (no more than), %



1. In accordance with ROSATOM's updated Innovative Development and Technological Modernisation Programme until 2030 (for the civilian sector), taking into account provisional patenting rules adopted by ROSATOM.

1.10.2. Comprehensive Programme ‘Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024’

In 2022, ROSATOM continued to implement the Comprehensive Programme ‘Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024’ (CP DTTS). CP DTTS deliverables, targets and milestones for 2022 have been achieved in full.

All results produced in 2022 as part of the Comprehensive Programme help the Russian Federation to achieve technological leadership in the use of nuclear energy and contribute to the development of other industries.

Implementation of Federal Project U1 ‘New Nuclear Power Industry, Including Small Nuclear Reactors for Remote Areas’ included in the CP DTTS

In 2022, a state environmental expert review was carried out for the placement of a small NPP based on a RITM-200N reactor; supporting materials for the licence for the placement of the NPP were prepared, and the engineering design was developed for the RITM-200N reactor unit.

1.10.3. Proryv (Breakthrough) Project aimed at closing the nuclear fuel cycle

In addition, as part of Federal Project U1 ‘New Nuclear Power Industry, Including Small Nuclear Reactors for Remote Areas’ included in the CP DTTS, ROSATOM is implementing the Proryv (Breakthrough) Project, which is aimed at developing fast neutron reactors and closing the nuclear fuel cycle. It will result in the development of technologies that will help to solve the problem of radioactive waste accumulation and make nuclear power plants more cost-effective.

In 2022, construction and installation work was completed at utility facilities forming part of a plant that will produce new-generation fuel, namely dense mixed uranium/plutonium fuel for fast neutron reactors.

The first stage of a training and information centre forming part of the Pilot and Demonstration Energy Facility (PDEF) was commissioned as part of the Proryv Project.

As part of the construction of the world’s first Generation IV power unit with the inherently safe BREST-OD-300 fast reactor, the construction of a unique test bench for the reactor coolant pump (RCP) of the BREST-OD-300 reactor was completed at the site of JSC SCP. The construction of the test bench is a mandatory requirement for the validation of the innovative BREST-OD-300 lead-cooled fast neutron reactor unit. The actual head and flow characteristics of the RCP of the reactor unit can only be measured on a specialised test bench.

A prototype shielded inert glovebox was manufactured and assembled at the site of JSC SCP. This glovebox is a unique experimental facility designed for the validation of technologies for manufacturing and operating large-size sealed inert-atmosphere equipment and for the testing of pilot SNF pyroprocessing equipment.

OF THE BN-800 REACTOR CORE AT A POWER UNIT OF BELOYARSK NPP WAS LOADED WITH MOX FUEL

Field simulation tests of a mock-up of transportation packaging for spent fuel assemblies from the BREST-OD-300 reactor were carried out to simulate external impacts.

93% of the BN-800 reactor core at a power unit of Beloyarsk NPP was loaded with MOX fuel.

Implementation of the Federal Project ‘Construction of Modern Experimental Test Facilities for the Development of Technologies for a Two-Component Nuclear Power Industry Based on a Closed Nuclear Fuel Cycle’

In 2022, the construction of two 2,000 m^3 water tanks for the MBIR multipurpose fast neutron research reactor (the MBIR nuclear research facility) was completed. The construction of a drainage pumping station for the MBIR nuclear research facility was completed. The engineering design was developed for reverse steam generator modules.

On 22 April 2022, the MBIR vessel was delivered to the site in Dimitrovgrad.

Implementation of the Federal Project ‘Development of Controlled Thermonuclear Fusion Technologies and Innovative Plasma Technologies’

In 2022, design solutions were developed and work was started on the following:

- The technical upgrade of a pilot superconductor production site;
- The renovation of buildings 124 and 125, including the development and installation of test benches for electric propulsion engines and for a powerful neutron source (stages 1 and 2);
- The renovation of the TSP thermonuclear facility (stage 1).

Modules of electric propulsion engines for future-generation spacecraft with a maximum power of 250 kW were developed; they are based on clusters of new-generation Hall-effect and ion thrusters.

Key components of a mock-up of a diode-pumped laser fusion driver module that is unique in the world were developed; a mock-up of a diode emitter was produced and tested.

A set of R&D activities was carried out in order to produce a preliminary design of a tokamak with reactor technologies (TRT) in 2024; it will serve as a full-scale prototype of a future nuclear fusion reactor/neutron source.

Implementation of the Federal Project 'Development of New Materials and Technologies for Advanced Energy Systems'

In 2022, a preliminary design was developed for a hardware and software platform for managing additive manufacturing equipment used for the production of parts from ceramic and polymer composite materials.

A pilot batch of the first Russian-made ultra-high-strength carbon fibre was produced using industrial equipment.

Two 3D printers for the production of parts from ceramic and polymer composite materials were developed and produced.

The first Russian three-axis scanner that is unique in the world was developed and produced. It helps to control temperature and modulate the properties of materials during crystallisation as part of the selective laser melting process, which makes it possible to manage the structure of materials during 3D printing.

Implementation of the Federal Project 'Design and Construction of Reference Power Units of Nuclear Power Plants'

In 2022, the reactor vessel was moved into final position at power unit No. 1 of Kursk NPP-2.

Concreting of the floor slab for the reactor coolant pump was completed at power unit No. 2 of Kursk NPP-2.

Preparation for the commissioning of Kursk NPP-2, which comprises two power units with VVER-TOI reactors, was 37.48% complete.

1.10.4. International projects

In 2022, ROSATOM continued to participate in the development of unique 'mega science' research facilities: the International Thermonuclear Experimental Reactor (ITER) and the Facility for Antiproton and Ion Research in Europe (FAIR).

ITER (International Thermonuclear Experimental Reactor) project

The research and engineering megaproject to build the International Thermonuclear Experimental Reactor (ITER) is the key technological platform for the fusion power industry of the future.

In 2022, work was performed in accordance with the current detailed ITER construction schedule; equipment manufactured as part of Russia's commitments was delivered to the ITER Organisation, including four gyrotron systems for plasma heating and a 200-tonne poloidal field coil. As at year-end 2022, a total offset was received amounting to 49.22% of Russia's total in-kind commitments.

In-cash commitments to the ITER Organisation for 2022 were met.

Russian representatives participate in all events and activities of the ITER Organisation. More than 60 Russian specialists are members of the ITER Organisation and work on the project.

Project to establish the Facility for Antiproton and Ion Research in Europe (FAIR)

In 2022, the Russian delegation participated in all meetings of the FAIR Council and the Administrative and Finance Committee. However, due to the current geopolitical situation, Germany has unilaterally suspended R&D cooperation with Russia. On 22 September 2022, European delegates to the FAIR Council voted to revoke all resolutions assigning equipment manufacture to Russian suppliers. Pursuant to this resolution, the FAIR Management Board notified Russian suppliers of the termination of contracts concluded earlier. In these circumstances, in 2022, Russia made no contribution towards the construction of FAIR.

International Research Centre Based on the MBIR Multipurpose Fast Neutron Research Reactor (IRC MBIR)

As part of Federal Project U2 'Construction of Modern Experimental Test Facilities for the Development of Technologies for a Two-Component Nuclear Power Industry Based on a Closed Nuclear Fuel Cycle' included in the CP DTTS, the construction of the MBIR multipurpose fast neutron research reactor is underway at the site in Dimitrovgrad. Due to the technologies used in the project and close cooperation between researchers and construction personnel, MBIR construction is ahead of schedule.

Simultaneously, the International Research Centre Based on MBIR (IRC MBIR) is being developed. Russian and foreign partners are granted access to the MBIR reactor based on a legal framework that is unique for the Russian market and research projects, namely the IRC MBIR Consortium Agreement. This approach enables the flexible use of reactor capabilities. The pooling of research capabilities of different countries as part of a multilateral research programme should provide a foundation for promoting fast reactor technology on the global market, with Russia as an undisputed technological leader in this area.

In June 2022, the IRC MBIR Advisory Board (the IRC MBIR body responsible for scientific research) held a meeting. More than 80 scientists, experts and executives from more than 30 leading research centres in Russia and friendly countries, as well as international organisations such as the IAEA and the Joint Institute for Nuclear Research (JINR), took part in the event in person and online.

Partners of the Centre include more than 20 foreign organisations; cooperation arrangements with some of them have already been put into practice. For instance, as part of the 12th ATOMEXPO 2022 International Forum in Sochi in November 2022, a legally binding document (a Term Sheet) was signed, establishing the procedure whereby a member from a CIS country joined the Consortium as a key member.

In 2022, MBIR was represented at the Fourth Russian-Chinese Energy Business Forum (held on the sidelines of the EXPO 2020 Forum in the UAE), the European Research Reactor Conference, the ATOMEXPO 2022 Forum and on other well-established platforms. In addition, an active dialogue is maintained with partners from the CIS and BRICS countries, the Middle East and Latin America on joining the International Research Centre Based on the MBIR Reactor.

Participation in the Generation IV International Forum (GIF)

By year-end 2022, 14 countries and organisations had signed the Charter of the Generation IV International Forum (GIF) and were official GIF members: Australia, Argentina, Brazil, the UK, Euratom, Canada, China, the Republic of Korea, the Russian Federation, the US, France, Switzerland, South Africa and Japan.

In 2022, GIF continued to operate in a challenging environment, given both the COVID-19 pandemic and the current global political situation. Russian nominated experts participated in all scheduled GIF events (more than 30 events) via video conferencing.

In 2022, Russian nominated experts participated in GIF events and meetings, including the work of its governing bodies, Working Groups and thematic activities focused on SFR (sodium-cooled fast reactors), SCWR (supercritical-water-cooled reactors), LFR (lead-cooled fast reactors), MSR (molten salt reactor systems) and VHTR (very-high-temperature gas-cooled reactors).

Russian representatives actively participated in a new GIF Task Force on Non-Electric Applications of Nuclear Heat.

Significant progress was made on the transition of LFR and MSR development from the stage of information exchange under a Memorandum of Understanding to the sharing of R&D outcomes under a System Arrangement, with Russian experts actively participating in the development of the LFR and MSR System Research Plans.

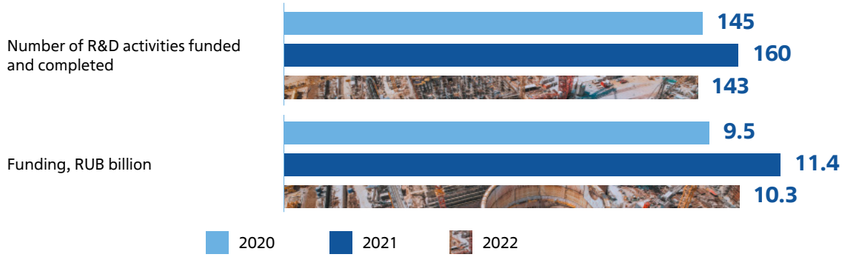
1.10.5. Plan of R&D Topics of ROSATOM

The implementation of the Consolidated Industry-Wide Plan of R&D Topics (CIPT) is aimed at promoting scientific and technological development in areas prioritised by ROSATOM, including VVER technology, small-scale reactors, new materials, hydrogen energy, thermonuclear fusion, superconductivity, nuclear medicine, etc.

The R&D Plan builds on ROSATOM's Business Strategy until 2030 and is aligned with the list of promising business areas of the holding companies of ROSATOM's Divisions/incubated businesses as part of prioritised R&D areas and industry-wide and national research and technology programmes, taking into account the outperformance of the product/technology being developed by ROSATOM over existing analogues in terms of their technical characteristics, as well as the findings of benchmarking, patent search and technology readiness assessment conducted by ROSATOM and the commitment to accelerating research and development.

Every year, despite external challenges, ROSATOM maintains the amount of its own funds allocated for R&D focused on prioritised areas of scientific and technological development as part of the CIPT at a high level; this provides opportunities for the development of promising solutions and their subsequent practical application.

Amount of R&D funding provided by ROSATOM



1.10.6. Cooperation on scientific research with research institutions and universities

In order to leverage additional research and technical capabilities for developing both traditional and new business areas, ROSATOM continues to engage with its key partners: universities, organisations of the Russian Academy of Sciences, other third-party research institutions, small and medium-sized businesses.

Cooperation in the sphere of research and education takes various forms: research conducted under contracts, joint science and innovation projects, participation in scientific and technical expert reviews, joint research workshops, conferences and educational programmes.

Universities and research institutions actively participate in the implementation of ROSATOM's programmes such as the Comprehensive Programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2030', the Consolidated Industry-Wide Plan of R&D Topics, technological programmes aimed at developing new products and businesses, etc.

In order to promote cooperation, ROSATOM actively uses tools for cooperation between industry, science and education provided as part of the Science and Education National Programmes: world-class research and education centres, innovative science and technology centres, competence centres of the National Technology Initiative, the Priority 2030 academic leadership programme, etc.

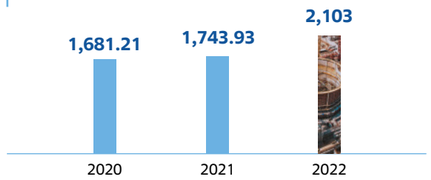
As part of a government programme titled 'Scientific and Technological Development of the Russian Federation', in 2022, an initiative was launched to establish advanced engineering schools at leading Russian universities. The aim of the project is to provide highly productive export-oriented sectors of the Russian economy with highly skilled specialists in order to achieve technological self-sufficiency and develop state-of-the-art high-technology products in partnership with Russian high-technology companies. ROSATOM's organisations (JSC SCP, JSC ETC GET, JSC ASE, JSC Afrikantov OKBM, JSC TVEL, JSC CDBMB, JSC RME Centrotech, JSC Greenatom, etc.) actively contributed to the establishment of Advanced Engineering Schools at Tomsk Polytechnic University, National University of Science and Technology MISIS, Alekseev Nizhny Novgorod State Technical University, Peter the Great St. Petersburg Polytechnic University and Lobachevsky National Research State University of Nizhny Novgorod. Advanced Engineering Schools supported by organisations in the industry specialise in materials science, additive manufacturing and end-to-end technologies, smart energy systems, nuclear engineering and high-energy-density systems, and digital engineering.

In the reporting year, ROSATOM continued to implement the Greater Sarov project focused on developing the National Centre for Physics and Mathematics (NCPM).

The project to establish the NCPM in Sarov is being implemented by ROSATOM jointly with the Russian Academy of Sciences, the National Research Centre Kurchatov Institute, Lomonosov Moscow State University, the Joint Institute for Nuclear Research (an international intergovernmental organisation), etc. As part of research cooperation, 2,193 researchers from 55 research and educational institutions took part in the NCPM Research Programme in 2022. In 2022, the NCPM hosted seven science schools, workshops and conferences, including three schools for young researchers and specialists focused on various tracks of the NCPM Research Programme, as well as 42 events involving various stakeholders of the Programme.

In 2022, more than 30 universities were involved in ROSATOM's research and innovation projects. In 2022, the volume of orders for R&D performed by universities totalled RUB 2.1 billion. Key participants of research and innovation projects include NRNU MEPhI, National University of Science and Technology MISIS, Alekseev Nizhny Novgorod State Technical University, Lobachevsky National Research State University of Nizhny Novgorod, Peter the Great St. Petersburg Polytechnic University, Tomsk Polytechnic University, Bauman Moscow Technical University, Moscow Power Engineering Institute, the Ural Federal University, Moscow State University of Civil Engineering and Lomonosov Moscow State University.

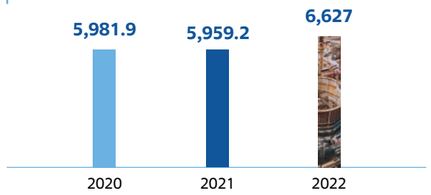
Funding of R&D projects carried out by universities at the request of ROSATOM and its organisations between 2020 and 2022, RUB million



In 2022, the volume of orders for R&D performed by research institutions outside the industry totalled RUB 6.6 billion. More than 50 third-party research institutions were involved in ROSATOM's R&D projects, including the National Research Centre Kurchatov Institute, the Nuclear Safety Institute of the Russian Academy of Sciences (IBRAE RAN), the Joint Institute for Nuclear Research, the Joint Institute for High Temperatures of the Russian Academy of Sciences, the Institute of Problems of Chemical Physics of the Russian Academy of Sciences, the Ioffe Institute of the Russian Academy of Sciences, the Budker Institute of Nuclear Physics of the Siberian Branch of the Russian Academy of Sciences and the Institute of Applied Physics of the Russian Academy of Sciences.

Under the cooperation agreement between the Corporation and the Russian Foundation for Basic Research (RFBR), the joint competition for the best interdisciplinary basic research projects on the interaction of electromagnetic radiation with matter as a basis for new techniques for material modification and development of materials operating under extreme conditions continued to be held in 2022. The objective of the competition is to support experimental and theoretical research aimed at obtaining basic scientific knowledge that can provide the foundation for tackling practical tasks facing the Corporation. Following the competition, projects focused on the relevant topics received funding totalling RUB 200 million.

Funding of R&D projects carried out by research institutions at the request of ROSATOM, RUB million



In 2022, ROSATOM participated in the Technological Breakthrough Award organised by the Platform for National Technology Initiative, the Agency for Strategic Initiatives (ASI), the Foundation for National Technology Initiative's Projects Support and University 2035. The Technological Breakthrough Award is presented to researchers, product developers and project team leaders for an important contribution to developing Russian technology businesses and for major achievements in the country's technological development. Five of ROSATOM's projects (projects run by JSC TVEL, JSC ZiO-Podolsk, JSC Rosenergoatom, JSC Smart City Digital Platforms and Solutions and JSC VNIIAES) won awards in the Technological Breakthrough in Nuclear Power and Industry category.

1.10.7. Knowledge management system

In order to establish uniform knowledge management principles and approaches of ROSATOM and its organisations, a Uniform Industry-Wide Knowledge Management Policy has been approved by Order No. 1/1361-P of ROSATOM dated 17 October 2022. The aim of ROSATOM and its organisation in the sphere of knowledge management is to create an environment for transforming corporate knowledge into a strategic resource that will enable them to make their products and services more competitive and achieve technological leadership; this involves:

- Enhancing the commercial appeal of ROSATOM and its organisations on the Russian and foreign markets by accumulating and leveraging knowledge and experience in order to gain a competitive advantage;
- Improving the operational and cost efficiency of ROSATOM and its organisations by efficiently using knowledge and intellectual capital;
- Making business processes in ROSATOM and its organisations more efficient and agile and accelerating their development by leveraging knowledge.

Key elements of the knowledge management system include scientific and technical evaluation and the development of expert communities, which help to accelerate the circulation of knowledge in the industry and support the development of a system of in-house consultancies covering both general matters related to scientific, technical and technology evaluation of a given focus area and specialised matters, such as patent examination, technical and economic reviews, etc.

In order to enhance the role of industry expertise in the sphere of research, technology and innovation, in 2022, steps were taken to develop the Single Industry Expertise Centre and expand the scope of its activities; the Centre was directly involved in organising expert reviews, monitoring and developing expertise, and developing the expert network (a network of experts and expert organisations).

In 2022, in the Automated Expert Database information system (AED IS), which forms part of the Digital Science system of services:

- Existing data were verified and updated and new data were entered on 150 experts;
- Data on 490 expert reviews carried out as part of the CP DTTS in 2021 were entered in the Expert Review Collection section;
- The integration of the AED IS with the information system of the Common Information Space of the CP DTTS was initiated.

Knowledge management in ROSATOM's organisations supports the implementation and improvement of a system for preserving critical knowledge.

In order to preserve and visualise knowledge, abilities, skills and personal professional experience of experts involved in the Proryv Project, a scientific and technical competence mapping survey was carried out in 2022, which made it possible to:

– Visualise the components of intellectual capital of the project;
– Incorporate not only explicit but also implicit critical knowledge accumulated by experts while performing their professional tasks into training programmes for specialists in the nuclear industry;
– Plan HR management processes pertaining to recruitment, training, competence maintenance and professional development of specialists.

54 experts from responsibility centres of the project took part in the survey. The mapping included identifying the functions of the responsibility centres that are of key importance for accomplishing the project objectives.

On 1 November 2022, the CNews Conferences Business Communications Agency and CNews Analytics with support from the Ministry of Digital Development, Communications and Mass Media of the Russian Federation held the 15th annual event titled 'CNews FORUM 2022: Information Technology of Tomorrow', which involved a discussion of key topical issues related to information and communications technology, innovative technologies, and approaches to the implementation of IT projects. The forum was attended by representatives of federal executive authorities, businesses, government agencies and major IT companies, as well as independent experts and analysts. The programme of the forum included the 12th Annual CNews AWARDS, where ROSATOM's IT project titled 'Digital Science System of Digital Services' won an award in the Corporate Research Management System of the Year category.

In 2022, ROSATOM continued to maintain and populate its electronic library of R&D information (hereinafter referred to as the R&D e-library). The collection of scientific and technical documentation digitised by the Private Enterprise Central Archive of the Nuclear Industry, which comprises R&D materials under 122 government contracts and three agreements for 2014 and 2015, was processed. Metadata on 2,724 documents classified using three classification systems of the R&D e-library were entered in the local collection of R&D reports.

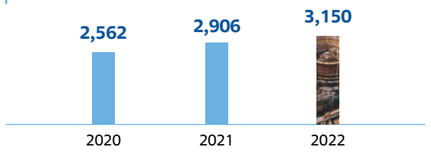
1.10.8. Intellectual property management

In 2022, protection of the industry's key products and technologies abroad remained the main priority of the intellectual property management system.

The number of international applications filed and foreign patents received in 2022 totalled 244.

The following results were achieved in the reporting year:

Number of items of intellectual property[1]



– As part of its efforts to improve the methodological and regulatory framework for intellectual property management at all stages of its life cycle, ROSATOM approved provisional rules and ensured optimal legal protection of intellectual property created by ROSATOM and its organisations;
– Arrangements for the management of intangible assets and tangible R&D results as part of projects included in the CP DTTS were approved for pilot testing;
– ROSATOM started to form intellectual property portfolios for federal projects included in the CP DTTS on a systematic basis;

1. Changes in the number of foreign patents obtained by ROSATOM, applications submitted and registered under the established procedure, registered trade secrets (know-how) reflecting the commercialisation and expansion of the scope of application of research findings in the nuclear industry between 2020 and 2022 (as a cumulative total).

– A digital model was developed and uniform industry-wide methodological guidelines were drafted for assessing the initial value of intellectual property created under government contracts for research and development;
– Eight workshops on intellectual property were held.

1.10.9. Long-term priorities in the sphere of scientific development

Innovative development priorities in the nuclear industry are informed by prioritised areas approved by ROSATOM's Strategic Council and formalised in the Government Programme 'Development of the Nuclear Power and Industry Complex', the CP DTTS and other government programmes of the Russian Federation involving ROSATOM.

Key priorities in the sphere of scientific development in the nuclear industry include the following:

– Transitioning to a new technological platform for the development of the nuclear power industry by building on a two-component structure based on fast and thermal-neutron reactors and a CNFC;
– Designing and developing modern experimental test facilities in order to develop technologies for the two-component nuclear power industry based on the CNFC;
– Developing the required range of small nuclear power plants of sufficient capacity for various applications, including heat and power supply to remote regions, high-potential heat generation and hydrogen production for industry, and seawater desalination;
– Conducting research and development focused on controlled thermonuclear fusion technologies (including laser-induced fusion and applied laser technologies), innovative plasma technologies, new materials and technologies for advanced energy systems, and high-temperature superconductivity technologies;
– Building infrastructure for hydrogen-based nuclear technologies for environmentally friendly hydrogen production in order to enable its widespread use as a product, as a source of energy, an energy storage medium and a component of industrial technology;
– Building state-of-the-art infrastructure for high-technology treatment of socially significant diseases; promoting comprehensive development of radiotherapy and nuclear medicine; developing and introducing new diagnostic and therapy methods;
– Developing a system for managing unique technological capabilities of ROSATOM's organisations and expanding their links with the capabilities of Russian research and educational institutions;
– Performing a market and technology analysis and competitive analysis in order to identify promising areas for the innovative development of the nuclear industry;
– Upgrading existing technologies, including in order to increase the output of innovative products and reduce their cost and the lead time;
– Participating in building state-of-the-art research and development and innovation infrastructure, including participation in the formation and development of a network of unique 'mega science' research facilities, the establishment of world-class research and educational centres, etc.;
– Establishing a competitive digital company with a strong presence on the Russian and global markets;
– Participating in the Science National Project, including expanding cooperation with universities and research institutions on R&D and the manufacture of innovative products using unique test facilities;

– Developing personnel training and professional development mechanisms in ROSATOM's organisations; expanding the motivation system for encouraging innovation and the study and sharing of best practices;
– Developing leadership skills and managerial competences, including for career planning and executive succession planning purposes;
– Improving the performance of collective expert and advisory bodies, etc.

1.10.10. Research Division: performance in 2022

Key results in 2022

– Revenue from new products of JSC Science and Innovations makes up about 50% of total revenue.
– Over five years, revenue from new products of JSC Science and Innovations increased six-fold.

JSC Science and Innovations (the holding company of the Research Division) is the key nuclear organisation responsible for scientific research.

Three units focused on specific disciplines have been set up within JSC Science and Innovations: the Physics and Energy Unit, the Electrophysics Unit, and the Chemical Technology Unit; an Industry-Wide Competence Centre for Intellectual Property Management (an IP operator) has been established.

An important area of operations for JSC Science and Innovations is the development and commercialisation of the Division's technological competences, the search for and structuring of technologies and their subsequent sale on the domestic and foreign markets.

Twelve companies within the Research Division are directly involved in R&D and innovation activities.

In 2022, institutes forming part of ROSATOM's Research Division met all key targets set for three federal projects included in the comprehensive programme titled 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024' (CP DTTS).

SHARE OF REVENUE FROM NEW PRODUCTS OF JSC SCIENCE AND INNOVATIONS IN TOTAL REVENUE

As part of the **second federal project** included in the CP DTTS (U2 'Construction of Experimental Test Facilities for the Development of Technologies for a Two-Component Nuclear Power Industry Based on the Closed Nuclear Fuel Cycle'), all R&D activities were completed under government contracts concluded with institutes forming part of ROSATOM's Research Division for research and safety analysis of the MBIR research reactor, the validation of service life extension of the BOR-60 reactor and the validation of innovative radiochemical techniques.

As part of the **third federal project** included in the CP DTTS (U3 'Development of Controlled Thermonuclear Fusion Technologies and Innovative Plasma Technologies'), an in-vessel component for first-wall protection and a lithium limiter designed for use in experiments on the Russian T-15MD tokamak (a research fusion reactor built by the National Research Centre Kurchatov Institute), which can operate in steady-state mode with forced cooling and external liquid lithium supply, were developed and produced. Experiments were conducted on the T-11M small tokamak to study the impact of lithium dust injection on plasma parameters. All these devices are necessary and important for protecting the first wall of a tokamak against a high-energy particle flux and operating the T-15MD tokamak in a mode with the highest parameters. Apart from the research reactor at the National Research Centre Kurchatov Institute, the new protection technology will also be applied at the tokamak with reactor technology (TRT), which is being developed as a full-scale prototype of the future nuclear fusion reactor and will enable researchers to take a step closer to successfully conducting experiments in clean and safe energy generation and building a fusion demonstration reactor.

Technical specifications and design documentation were developed and a permit was obtained for the renovation of the TSP thermonuclear test facility with a total area of 88,500 m^2; it is necessary for building the power supply infrastructure of the TRT, which will serve as a full-scale prototype of the future nuclear fusion reactor. Construction and installation work was started.

As part of R&D focused on the development of compact high-intensity neutron sources, specialists designed and built a laboratory prototype of a plasma accelerator for a neutron source based on plasmoid collisions. A diagnostic facility was built for measuring plasma parameters and neutron yield; experimental research was conducted to determine the parameters of the laboratory prototype of a plasma accelerator and its power unit. In 2022, pulsed power sources were designed and produced for a system for working gas pre-ionisation in the plasma accelerator; experiments were carried out with neutron detectors. These devices and experimental findings will provide a basis for a compact high-intensity neutron source designed for the testing of components of fusion reactors.

As part of the development of a prototype for a plasma jet engine, in 2022, a plasma accelerator with a system for working medium pre-ionisation was built; experiments were carried out to examine its energy balance with a high specific impulse, and methods were developed for extending the service life of its electrodes. Following the completion of the work in 2024, an engine prototype will be built with improved thrust and specific impulse outperforming alternative solutions in terms of jet power (300 kW), thrust (6 N) and specific impulse (100 km/s).

Working designs were produced for key systems and components of a mock-up of a laser fusion driver module; vacuum spatial filters were developed and examined, and a mock-up of a diode emitter, a cryogenic fan with a flow channel and active components were produced. This work will result in the development of a unique research facility that will make it possible to study physical processes and phenomena that occur during diode pumping and cryogenic cooling of the active medium, model, study and test complex laser systems, and test laser subsystems and circuits in a wide range of operation. Scientific research in this area will help to develop world-class repetitively pulsed laser devices with a high average emission power.

Research focused on laser surface modification of metallic materials was completed. This included developing a laser shock hardening process, which eliminates internal stresses in metal samples, increases their fatigue resistance and durability without the need for subsequent machining. This enhances the strength performance of structural steel used in gas turbine components, with surface hardness increasing by a factor of 3.5 and surface roughness decreasing by 25%. A pulsed plasma jet device was developed for the treatment of complex-shaped parts.

As part of the **fourth federal project included in the CP DTTS (U4 'Development of New Materials and Technologies for Advanced Energy Systems'),** research is focused on three areas: the development of new materials and technologies for existing and advanced power generation units; the synthesis of superheavy elements and the study of properties of matter under extreme conditions (MEC); the development of a molten salt research reactor (MSRR).

More specifically, in 2022, specialists from ROSATOM's Research Division developed an accelerated testing method that makes it possible to shorten the development cycle of new materials three- or four-fold. Its efficiency has been demonstrated during the development of fuel elements made from deoxidised carbon fibre based on silicon carbide, and during the development of structural fuel materials for BR, BN and BREST reactors. Specialists from the Division also developed a technology and produced a pilot batch of blanks from a new type of high-strength austenitic steel. This steel will be widely used in the construction of small nuclear power plants. The project team produced stepped forgings of reactor vessels for water-cooled water-moderated reactors (VVER-SKD and VVER-S) from new high-strength lightweight materials. The key structural material was also selected and the selection was validated for the former, and industrial welding of vessel components of the latter unit was carried out. In addition, in 2022, two 3D printers were developed and produced that can be used to manufacture products from ceramic materials (using the FDM/LDM and SLA techniques) and polymer materials (using the FDM technique). This method significantly reduces the lead time for the required parts and helps to optimise production costs. JSC LUCH Research and Production Association, Research and Development Institute (Podolsk, Moscow Region) produced a single-crystal blank for a turbine disc that is 130 mm in diameter and 50 mm high from a refractory superalloy using the electron-beam additive process. The first Russian three-axis scanner that is unique in the world was produced. It helps to control temperature and modulate the properties of materials during crystallisation as part of the selective laser melting process, which makes it possible to manage the structure of materials during 3D printing.

Research on MEC carried out in 2022 involved building a test bench to study metal corrosion from simultaneous exposure to humid air and ionising radiation, reducing the required duration of experiments several thousand-fold. ROSATOM's specialists developed technology for introducing catalytic particles into a reactive medium, restoring the catalytic activity of activated particles, and producing passive catalytic recombiners for flameless hydrogen combustion. As part of a project to build a facility for the synthesis of new superheavy elements, radiochemical techniques were developed for producing isotopes of transplutonium elements to be used as target materials for the synthesis of new elements in the periodic table; these include a technique for remote production of cadmium-screened test targets containing heavy curium isotopes in gram amounts. By 2030, this work will enable the Joint Institute for Nuclear Research (JINR, Dubna, Moscow Region) to carry out experiments in the synthesis of new elements, which will make Russia a leader in this area.

As part of MSRR development, in 2022, one of the key stages, namely preliminary design, was completed. The first stage of the facility is to be built at the Mining and Chemical Plant (Krasnoyarsk Territory) by 2030. The new facility will become an experimental site for the testing of a technology for the incineration of long-lived radioactive waste.

As part of this federal project, by the end of 2024, the team expects to produce at least 11 new materials with higher strength and corrosion resistance and improved radiation properties for the same service life, as well as six samples of new equipment. By the end of 2030, the Division will start to manufacture products from basic materials on an industrial scale, which will enable it to design advanced energy systems using them.

International projects

In 2022, the Division fulfilled all its obligations to foreign customers under existing contracts carried out jointly with organisations in Europe, the US, Latin America and Asia and aimed at developing high-technology sectors, such as fusion power, improving the safety of nuclear technology, developing and improving new types of nuclear fuel and new materials.

In addition, contracts were concluded with new partners from China, India and Thailand for the supply of products manufactured by enterprises within the Research Division and for the provision of services and conducting high-technology experiments using Russian research facilities.

At the ATOMEXPO 2022 International Forum in November 2022, a research cooperation agreement was signed with the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan. Under the agreement, the parties will jointly implement projects and conduct R&D in the field of radiation materials science and astrophysics and will cooperate in order to develop technologies for the production of radionuclides for nuclear medicine.

In 2022, foreign revenue increased by 11% compared to 2021, while the volume of the portfolio of overseas orders exceeded projections by 12%. Overall, over the past five years, revenue from new products of the Research Division has increased six-fold, accounting for around 50% of total revenue.

Cooperation on scientific research with research institutions and universities

In 2022, ROSATOM's organisations became partners of seven advanced engineering schools established at various universities. More specifically, the Research Division supported the Advanced Engineering School 'Materials Science, Additive Manufacturing and End-to-End Technologies' of NUST MISIS. The School focuses on four breakthrough areas of science and education based on digital materials science: materials and technologies for the production of critical equipment, including nuclear engineering; digital technology, including additive manufacturing; digital materials science; precision casting; biomedical engineering and biofabrication. This cooperation will make it possible to train highly skilled specialists with a new mentality who have competences in the sphere of both digital materials science and data analytics and integrated project management and are able to accomplish tasks related to providing new materials for projects in the nuclear, aerospace and metals industries.

Intellectual property management

The Division continued to take steps to ensure legal protection of intellectual property of ROSATOM and its organisations in Russia and abroad. In 2022, specialists at the Industry-Wide Competence Centre for Intellectual Property Management (the IP operator) filed 52 foreign patent applications. Based on applications filed in previous years, 16 Russian and 153 foreign patents were obtained in 2022. Principal patented areas include key components and technologies for VVER reactors, radiopharmaceuticals based on medical isotopes, additive manufacturing technologies, and fuel assemblies for nuclear reactors for NPPs.

In addition, employees of the IP operator filed 13 Russian applications for inventions and utility models and six applications for state registration of computer software and databases as part of projects included in the Consolidated Industry-Wide Plan of R&D Topics (CIPT).

Overall, in 2022, the Division's specialists registered the rights over 624 items of intellectual property.

Development of technologies supporting the technological sovereignty of the Russian Federation

Institutes forming part of ROSATOM's Research Division consistently develop technologies and new products to ensure the country's technological sovereignty by developing and implementing solutions that do not rely on imported technology.

JSC Research Institute of Nuclear Materials (INM, Zarechny, Sverdlovsk Region) carried out reactor tests of fuel for a new type of high-temperature gas-cooled reactors (HTGRs) and the initial stage of comprehensive pre-irradiation and post-irradiation examination of micro-fuel elements, fuel compacts and matrix graphite. This research has helped to optimise the fuel fabrication technology for HTGRs.

Based on applications filed in 2022 for this type of research, in 2022, JSC INM obtained two Russian patents. Reactors of this type are intended to be used for more efficient hydrogen production.

At the request of TEPCO (Tokyo Electric Power Company, Japan), researchers at JSC INM validated the safety of storage of sorption columns used for the treatment of water contaminated with caesium-137, strontium-90 and tritium radionuclides (the water was used to cool damaged reactors at the Fukushima Daiichi NPP in March 2011).

Plans for 2023:

- To implement federal projects forming part of the CP DTTS;
- To implement research and technology projects as part of the Consolidated Industry-Wide Plan of R&D Topics: the Proryv (Breakthrough) Project (closing the nuclear fuel cycle based on fast neutron reactors); development of the modern nuclear power industry based on VVER reactors, small NPPs, SNF processing and multiple recycling of nuclear materials; projects focused on hydrogen energy, creating new and improving existing materials, nuclear medicine, superconductivity, laser, nuclear fusion and plasma technologies;
- To strengthen partnerships with business divisions and product integrators in the industry;
- To expand the product line, introduce new technologies, and commercialise research results supporting sustainable development of the Division and the nuclear industry as a whole.

1.11. PERFORMANCE OF DIVISIONS

1.11.1. Mining Division

Key results in 2022

- Revenue under RAS increased by RUB 1.5 billion (RUB 24.7 billion in 2022).
- The development of the Kolichkanskoye deposit in Buryatia began ahead of schedule.
- The first ore was recovered from deep areas of the Yubileynoye deposit.
- Positive opinions were obtained from FAI Glavgosexpertiza of Russia for the project to develop the Khokhlovskoye uranium deposit (JSC Dalur) and design documentation for the development of the Dybrynskoye deposit (JSC Khiadga), as well as for the construction of a mining and processing plant and port facilities at the Pavlovskoye lead and zinc deposit.
- The first stage of the Tugansk Ore Mining and Processing Enterprise specialising in the processing of ilmenite-zircon sands in the Tomsk Region was put into operation.

The Mining Division of ROSATOM (its holding company is JSC Atomredmetzoloto) ranks among the world's largest natural uranium producers.

The Division manages Russian uranium mining assets in the Zabaykalsky Territory (PJSC PIMCU), the Republic of Buryatia (JSC Khiagda) and the Kurgan Region (JSC Dalur).

In addition to uranium mining, the Division is actively developing non-uranium businesses, including scandium mining as a by-product (JSC Dalur), brown coal mining (PJSC PIMCU), gold mining (JSC Elkon MMP), the mining and processing of ilmenite-zircon sands (JSC Tugansk Ore Mining and Processing Enterprise), the development of lithium production at the Kolmozerskoye lithium deposit (LLC Polar Lithium), the design of an integrated production facility at the Pavlovskoye lead and zinc deposit, etc.

The Division has unique uranium mining capabilities; its enterprises perform a full range of operations, from geological exploration, design and pilot operation to the decommissioning of production facilities and land rehabilitation.

Map of assets of the Mining Division

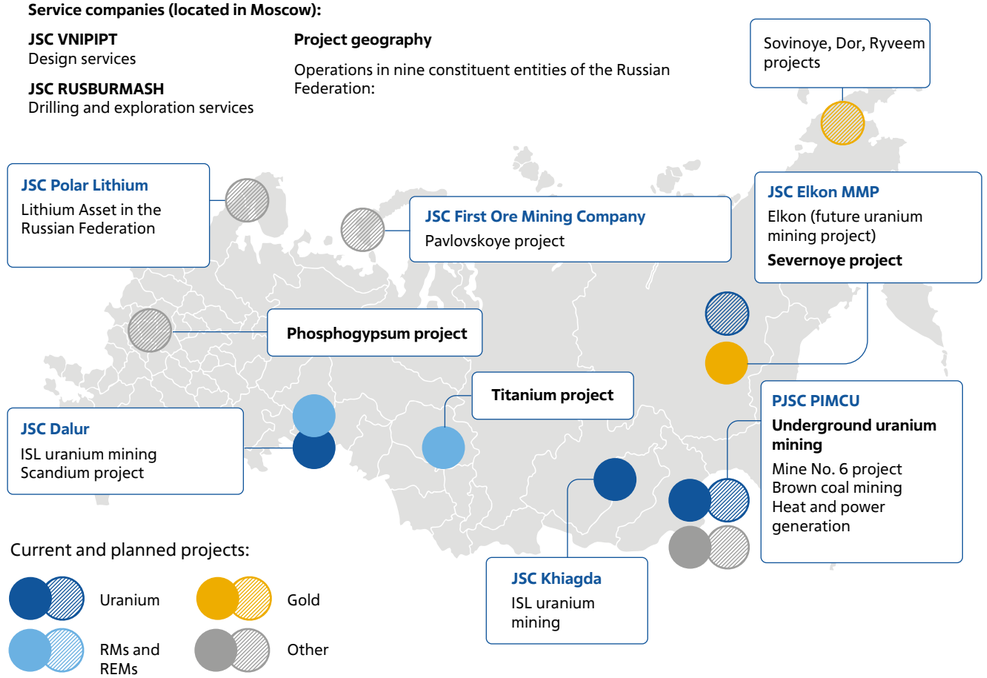
Service companies (located in Moscow):

JSC VNIPIPT
Design services

JSC RUSBURMASH
Drilling and exploration services

Project geography

Operations in nine constituent entities of the Russian Federation:



Key operating results

In 2022, the enterprises of the Mining Division produced 2,508 tonnes of uranium, which is 8% above the target.

PJSC PIMCU:

- The enterprise continued to develop the existing mines: the Yuzhny site of the Yubileynoye deposit of Mine No. 8 was developed;
- Two new high-performance ARAMINE diesel load-haul-dump (LHD) machines and two new drilling rigs were purchased;
- The programme for the third stage of renovation of the Sredneye tailings dump was completed.

Mine No. 6:

- Demothballing of facilities at Mine No. 6 was started; more than 2 million m³ of water was pumped out; work is underway to achieve the design targets for the quality of treated mine water;
- Construction of exploration and development shaft 19-RESh and the hoist building was started;
- The project focused on the technical upgrade of shaft 20V was submitted for industry expert review.

JSC Dalur:

- The construction of phase one facilities was completed at the pilot site of the Dobrovolnoye deposit;
- A positive opinion was obtained from FAI Glavgosexpertiza of Russia for the project to develop the Khokhlovskoye uranium deposit;
- The construction of stage one start-up facilities for the development of the Eastern ore body of the Khokhlovskoye deposit was completed; the 'digital' uranium mining technology (Smart ISL Mine) was rolled out across the entire ore body.

JSC Khiagda:

- The construction of stage one mining units was completed at the Kolichkanskoye deposit (units KI1.2-1.10);
- The development of the Dybrynskoye deposit was started; the construction of phase one infrastructure facilities was completed;
- The construction of field facilities was completed at the Vershinnoye deposit.

JSC RUSBURMASH:

- The enterprise continued to enhance construction capabilities at the construction sites of JSC Dalur and JSC Khiagda;
- As part of the fulfilment an industry-wide RPS order, the amount of time required to prepare for the mining of ore bodies at uranium deposits was reduced three-fold;
- The fleet of drilling rigs for the construction of process wells in ISL enterprises was expanded, including as part of import substitution.

JSC VNIPIPT:

- The enterprise received the status of the 2022 BIM Leader;
- A positive opinion was obtained from FAI Glavgosexpertiza of Russia for the Pavlovskoye project, which makes it possible to begin the expansion of Russia's footprint in the Arctic.

Contribution to the technological sovereignty of the Russian Federation

The development of production of rare and rare-earth metals (hereinafter referred to as RMs and REMs) is of critical importance for meeting the needs of high-technology industries in the Russian Federation. The key priority for the development of the industry is to replace imports, develop technologies and establish integrated production operations based on its own mineral resource base. To achieve this, a road map for the development of the Technology for New Materials and Substances high-technology area has been drafted, which includes a separate product area, Rare and Rare-Earth Metals. In accordance with the road map, it is intended that the share of imported products in total consumption in the Russian Federation will be reduced to zero by 2030.

In order to achieve the goals of developing the RM and REM product area, supplying resources for the production of flagship products and addressing gaps in the process chains for the manufacture of products based on titanium, zirconium, REM oxides, lithium and scandium, the Division is implementing the following projects:

- Lithium Asset in the Russian Federation: the development of lithium carbonate/hydroxide production at the Kolmozerskoye lithium deposit in the Murmansk Region;
- Phosphogypsum: the establishment of a facility for the production of REMs and gypsum products from phosphogypsum, including individual REM oxides;
- Titanium: the establishment of a mining and processing plant for the processing of ilmenite-zircon sands from the Tuganskoye deposit in the Tomsk Region to produce titanium and zircon concentrates;
- Scandium: the establishment of a facility for the production of scandium oxide and aluminium-scandium alloy as by-products at the industrial site of JSC Dalur.

The Mining Division is the successor to the world's largest network of raw materials enterprises in the nuclear industry created in the Soviet Union. During its recent history, ARMZ has not only retained the status of a world-class uranium mining enterprise, but has also laid the foundation for the development of a new high-technology industry in Russia, namely the production of rare and rare-earth metals. The current focus of ARMZ on the production of scandium, titanium and zirconium is only the first step in a long journey towards ensuring the self-sufficiency of the Russian Federation in raw materials and technologies. JSC Atomredmetzoloto is aware of the importance and complexity of the tasks facing it and is actively working to improve the quality of its own resource base and increase the efficiency of production processes.

Plans for 2023

The main objective of the Division in 2023 is to ensure that the uranium production programme is 100% fulfilled.

The Division will continue to expand the use of in-situ leaching, which is the most effective and environmentally safe mining technique. Plans include completing the construction of pilot site facilities at the Dobrovolnoye deposit. The Division will continue the construction of facilities at the Khokhlovskoye deposit and begin to design facilities for the Verkhne-Uksyanskoye deposit (JSC Dalur). The Division also plans to start uranium mining at the Dybrynskoye deposit (JSC Khiagda).

As part of construction at Mine No. 6 of PJSC PIMCU, the Division plans to reach the design capacity and meet the quality target for the pumping out of mine water, and start the construction of facilities at site 20V.

As the Krasnokamensk CHPP has become a subsidiary of the Mining Division, ensuring the reliable and safe operation of energy facilities will become one of the top priorities of PJSC PIMCU.

The preparation of a pre-feasibility study for the development of the Elkon Mining and Processing Plant is scheduled for 2023.

As part of new business development, in 2023, the Division plans to move to the industrial stage of development of the Severnoye deposit, which will result in a significant increase in gold production. Reserves are expected to be confirmed and entered in the register by the State Reserves Commission.

An important milestone in the development of the rare and rare-earth metals business in 2023 will be participation in the auction for mineral rights over the Kolmozerskoye deposit in the Murmansk Region. In 2022, the deposit formed part of the unallocated fund of the Ministry of Natural Resources and Environment of the Russian Federation. The development of this deposit will provide the Russian Federation with its own source of lithium feedstock. While there are three operating enterprises processing lithium feedstock, Russia does not have its own operating lithium mines and imports all lithium feedstock.

An important step towards developing an in-house technological solution for producing individual REM oxides will be the validation of design performance of a pilot REM separation plant and of the quality of the finished product as part of the Phosphogypsum project in 2023. The next stage will involve the development of a semi-industrial plant to ramp up REM production.

Production ramp-up to target capacity in the Tugansk Ore Mining and Processing Enterprise in 2023 will provide Russian producers with a domestic source of titanium and zirconium and will make it possible to validate design performance.

The implementation of new projects in the mining industry and related sectors will drive the growth of the Division's business and enhance its long-term social and financial sustainability.

For details, see 'Performance of the Mining Division in 2022'.

1.11.2. Fuel Division

Key results in 2022

- The Division's consolidated revenue totalled RUB 271 billion (up by 14.9% compared to 2021).
- Fuel for the CFR-600 reactor (China), which is under construction, was manufactured and shipped.
- Delivery of components for the BREST-OD-300 reactor vessel in Seversk was started.
- A contract was signed for the supply of modified fuel for the VVR-SM research reactor (Uzbekistan).
- The construction of a lithium-ion battery factory was started in the Kaliningrad Region.
- ROSATOM's second Additive Manufacturing Centre was opened.

ROSATOM's TVEL Fuel Company (hereinafter referred to as TVEL Fuel Company or the Company) is one of the world's largest producers of nuclear fuel. The Company is a monopoly supplier of nuclear fuel for all Russian NPPs, marine and research reactors in Russia. Fuel produced by the Company is used at NPPs in 15 countries, meaning that one in every six power reactors worldwide runs on this fuel. The Division comprises enterprises specialising in gas centrifuge production, uranium enrichment and nuclear fuel fabrication, as well as research and design organisations.

The Division is actively developing new businesses: metals production and energy storage systems, the chemical industry and 3D printing technologies. TVEL Fuel Company comprises industry integrators specialising in the decommissioning of facilities posing nuclear and radiation hazards, as well as in additive manufacturing and energy storage systems.

The Division is the main supplier of fuel for Russian-design VVER reactors abroad and has the necessary capabilities for the fabrication of nuclear fuel for PWR and BWR reactors and its components from reprocessed uranium (in cooperation with Framatome), as well as fuel pellets for BWR and PHWR reactors. TVEL Fuel Company has developed and started to supply PWR fuel assemblies designed in-house, TVS-Kvadrat. The Division has globally unique capabilities for the production of fuel for fast neutron reactors: uranium fuel for the BN-600 and CFR-600 reactors and MOX fuel for the BN-800 reactor. In addition, pilot fuel assemblies with mixed nitride uranium-plutonium (MNUP) fuel, which is being developed by the Division for the innovative BREST-OD-300 reactor, are currently being tested in the BN-600 reactor (Beloyarsk NPP). The Division's enterprises also fabricate nuclear fuel and its components for Russian- and foreign-design research reactors around the world.

With enterprises located in 10 regions of the Russian Federation, the Division is able to effectively cooperate and collaborate with its partners on a wide range of issues and business areas. The social environment in the Division's regions of operation is influenced by the fact that some of its production facilities are based in closed administrative and territorial formations (CATFs): Seversk, Novouralsk and Zelenogorsk, and in the single-industry town of Glazov. These enterprises play a central role in the local economy and are major taxpayers.

Key operating results

Fuel for start-up core loading and for the first reloading of CFR-600, the first high-power fast neutron reactor currently under construction in China, was manufactured and shipped to the customer.

An engineering project aimed at introducing more advanced nuclear fuel, TVS-2M, was implemented at power unit No. 1 of Kudankulam NPP (VVER-1000).

The delivery of vessel components for the innovative BREST-OD-300 reactor to the power unit construction site was started: the support plate for the unique reactor was delivered to Seversk.

The programme of reactor tests for new materials for accident tolerant fuel (ATF) was expanded. The technology for the production of fuel pellets from uranium disilicide was developed; reactor tests of new VVER- and PWR-sized fuel elements with uranium silicide fuel were started.

The construction of a lithium-ion battery factory was started in the Kaliningrad Region. The first Russian 'gigafactory' with a capacity of 4 GWh per year will meet the demand of Russian electric vehicle producers for lithium-ion traction batteries; it will also supply stationary energy storage systems for the power grid.

LLC T-COM launched a workshop for the SKD assembly of telecommunications equipment at the site of the Moscow Polymetal Plant. The production of more than 70 models of managed switches was set up; the switches can be used for building or upgrading any segment of telecommunication networks.

Contribution to the technological sovereignty of the Russian Federation

The Division's enterprises contribute to the technological sovereignty of the Russian Federation in a number of areas, including metals production, special chemicals, energy storage systems, additive manufacturing, hydrogen energy, etc.

Metals production

- The range of titanium products for shipbuilding and the aircraft industry has been expanded;
- The first batch of bioceramic dental implants has been delivered in order to register the medical product and launch it on the Russian market;
- Serial batches of medical titanium bars and wire have been shipped to key domestic manufacturers of medical implantable products. These bars have been used to produce implants for osteosynthesis, maxillofacial surgery and products for the arthroplasty of large human joints;
- A new high-performance design of calcium injection wire has undergone industrial tests; the wire is supplied in batches to Russian metals enterprises;
- The production of a new range of injection wire for the iron and steel industry based on ferrotitanium for steel microalloying has been set up;
- Process parameters have been tested for the machining of rare-earth magnets and the application of a multilayer protective coating on them; a pilot batch has been manufactured, and samples of finished products have been sent for the required examination and testing. Permanent rare-earth magnets are used primarily in wind power generation and electric vehicles.

Special chemicals

In 2022, the first shipments of samples of battery-grade lithium hydroxide produced by JSC Angarsk Electrolysis Chemical Plant were initiated. The pilot plant for the manufacture of this product was launched in 2021. In the future, the Company plans to expand its sales footprint; work is underway to set up large-scale production.

Energy storage systems

In October 2022, the construction of Russia's first 'gigafactory' designed using state-of-the-art technologies was started in the Kaliningrad Region. The enterprise will start manufacturing world-class products, namely lithium-ion batteries (cells) and assemble them into battery modules. This will be the country's largest factory of this type; it will meet the demand of Russian electric vehicle producers for lithium-ion traction batteries and will also produce stationary energy storage systems for the power grid and for industrial enterprises. 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. If demand for the products is confirmed, the second and third stages of the factory may be commissioned.

In December 2022, a new assembly facility for lithium-ion energy storage systems was opened at the site of the Moscow Polymetal Plant (JSC MZP). The first samples assembled at the site were traction batteries for trolleybuses with an extended off-wire range designed to be used on intra-city routes in Saint Petersburg.

JSC MZP has set up mass production of batteries for electric vehicles and stationary energy storage systems. The capacity of the new production facility is 10 times higher than that of the pilot production site established in 2021. The annual output will total up to 150 MWh of batteries for stationary systems (the total capacity of manufactured devices) or about 2,000 traction batteries for electric vehicles.

Additive manufacturing

The first commercial delivery of an industrial 3D printer using the selective laser melting technology was made.

A pilot sample of a DMD printer based on two industrial robots and a positioner was put into operation; the relevant technology was developed, and a fragment of a partition for an in-vessel device of a VVER-TOI reactor was produced.

An integrated process chain for the printing of products involving heat treatment in a vacuum kiln, post-processing and 3D scanning was set up in Moscow.

Parts for the aircraft industry were printed from superalloys.

An automated additive manufacturing facility for repairs and production (MARPAK) was designed.

Digital products

The Division is working to fulfil the national task of replacing imported software and equipment for the Russian industry by supplying digital products to the market, as well as by making nuclear industry digitisation expertise available to manufacturing companies. The Division is developing four product areas: digital engineering, predictive analytics, robotisation and automation in enterprises, and telecommunications equipment.

In 2022, two digital products developed in the Division were included in the Unified Register of Russian Computer Software and Databases:

- The AtomMind information system for predicting product quality and the state of equipment: this is an industry digitisation platform that enables efficient equipment maintenance and repairs and product quality assurance using predictive analytics tools;
- Atombot.Procurement: the first digital product for procurement automation based on artificial intelligence and the use of software robots, which significantly increases the efficiency of procurement documentation management.

LLC T-COM (a company of the Division) has launched a workshop for the SKD assembly of telecommunications equipment at the site of JSC MZP. The production of more than 70 models of managed switches has been set up; the switches can be used for building or upgrading any segment of telecommunication networks. The company produces equipment using Russian software which is included in the register of domestic software. Key consumers are industrial, energy, telecommunications and nuclear industry enterprises, as well as research institutes, educational and healthcare institutions, etc.

In less than a year, the partner network of LLC T-COM has grown to 140 companies.

Customers for the Division's digital products are the largest players in the mechanical engineering, energy, metals, oil and gas, mining and other industries.

Plans for 2023

Nuclear fuel cycle:

- To manufacture and supply fuel for the initial loading of the first power units of Akkuyu NPP (Turkey) and Rooppur NPP (Bangladesh);
- To complete the first cycle and start the second cycle of pilot operation of accident tolerant fuel (ATF) at Rostov NPP;
- To manufacture experimental fifth-generation fuel assemblies (TVS-5) and deliver them to one of the Russian NPPs;
- To build an industrial plant for applying chromium coatings on zirconium alloy cladding of fuel elements at JSC Chepetsk Mechanical Plant;
- To develop optimised cores for the RITM-200M reactor used at floating power units;
- To manufacture MOX fuel assemblies containing minor actinides for the BN-800 reactor.

Additive manufacturing:

- To launch mass-produced 3D printers using metal powder compositions and wire materials on the market;
- To start batch production of stainless steel powders, superalloys and titanium alloys, and to continue to expand the network of additive manufacturing centres.

Energy storage systems:

- To open a new assembly site for the production of energy storage systems in the Technopolis park.

Digital products:

- To launch the AtomReverse product on the market. This is a digital service that combines engineering solutions for replicating and optimising equipment and its components. The product is intended for a wide range of Russian industrial enterprises from various sectors that operate sophisticated imported equipment and have encountered difficulties in upgrading, repairing and maintaining it.

Metals production:

- To expand calcium injection wire production capacities;
- To launch implantable products for osteosynthesis, prosthetic implants for the arthroplasty of large human joints and high-technology surgical instruments on the Russian market;
- To develop new types of conductor products based on copper-niobium and other alloys.

For details, see 'Performance of the Fuel Division in 2022'.

1.11.3. Mechanical Engineering Division

Key results in 2022:

- Mechanical engineering products were delivered to 18 NPPs.
- Consolidated revenue reached RUB 115 billion.
- The Division's share in the Russian power machine engineering industry increased to 43.2%.
- The RITM-200 reactor unit on the *Ural* nuclear icebreaker reached first criticality ahead of schedule.
- The Division supplied 85% of equipment for the first power unit of Akkuyu NPP (Turkey).

The Mechanical Engineering Division of ROSATOM (its holding company is JSC Atomenergomash) is one of the leading groups of mechanical engineering enterprises in Russia and the key supplier of main and auxiliary equipment for Russian-design NPPs under construction. The Mechanical Engineering Division forms part of ROSATOM and includes engineering and design centres, major power machine engineering enterprises and smelters, as well as research and materials science organisations. The Division's enterprises have supplied mechanical engineering products to 52 NPPs in Russia, Europe and Asia.

The Division is actively developing new businesses focused on solutions for the manufacture and supply of equipment for the thermal power industry, shipbuilding, the oil and gas industry, and the special steel market. Extensive production and technological capabilities of the Division's enterprises and expertise acquired over many years of improvement enable the Division to supply its customers with high-quality reliable equipment. JSC Atomenergomash has well-established manufacturing operations, which enables it to effectively participate in NPP construction projects and provide maintenance and upgrade services. Equipment produced by the Division is used at all Russian-design NPPs.

Technological advantages over competitors in the floating small NPP segment are underpinned by the availability of reference solutions for reactor units, marine solutions, production capacities and sustainable cooperation and are now fully leveraged in the construction of icebreakers and a whole family of floating power units (FPUs).

JSC Atomenergomash manufactures high-performance equipment for the Russian oil and gas industry. The Division's enterprises have a proven track record in the design and manufacture of equipment for the thermal power industry. As part of the Clean Country Federal Project, the Division has become the main producer of key process equipment for waste-to-energy plants.

Key operating results

JSC Atomenergomash has extensive capabilities for equipment manufacture and technologies for various sectors of the domestic industry. In addition to nuclear engineering, its enterprises contribute to ensuring reliable supplies of equipment for energy projects by providing national power machine engineering capabilities as they have smooth-running fully integrated production facilities for the manufacture of large-sized equipment for the gas, oil, chemical, metals and thermal power industries.

NPP turbine islands

The Division is developing its capabilities in the design of turbine islands with Arabelle turbines and the design of licensed equipment that forms part of the turbine islands; it adapts the documentation of foreign suppliers to align it with Russian standards and assists industry enterprises in organising the manufacture of licensed equipment.

The Division has adopted unique technologies for mechanical assembly of equipment for the turbine island with VVER-1200 water-cooled water-moderated power reactors for Akkuyu NPP (Turkey).

The following technologies have been developed and introduced as part of project implementation:

- Equipment manufacture for a low-speed steam turbine island for NPPs with VVER-1200 and VVER-TOI water-cooled water-moderated power reactors;
- Equipment manufacture for a high-speed steam turbine island for NPPs with VVER-1000 and VVER-1200 water-cooled water-moderated power reactors, including unique technologies for the drilling of deep holes in MSR[1], HPH[2] and LPH[3] vessels and for the press-fitting of heat exchange tubes into them;
- Manufacture of MSRs with cross-fin tubes.

Technologies under development include:

- Equipment manufacture for the turbine island for the pilot BREST-OD-300 power reactor unit with a lead-cooled fast neutron reactor;
- Equipment manufacture for the BN-1200 unit with a sodium-cooled fast neutron reactor, including unique technologies for the press-fitting of heat exchange tubes into reactor vessels with a high-pressure liquid jet.

Overlay welding machine

The Division has made a calculation that has helped to validate the 'leak-before-break' (LBB) concept by eliminating the intermediate weld at the junction of the main coolant line (MCL) and the reactor coolant pump (RCP). The application of this approach in design and the selection of materials prevents the complete destruction of a component with a through-wall crack without a pre-existing stable leak, which can be detected before the crack becomes critical in terms of instability.

The spherical body of the RCP, is to be made from metal with internal weld overlay cladding. The switch to a new metal for the RCP body has been necessitated by the introduction of requirements for the application of the LBB concept in Russian and international scientific and technical documentation. Certification tests of steel have shown that its properties are highly stable: its impact strength and mechanical characteristics do not change significantly after prolonged exposure and meet the relevant requirements.

For the weld cladding of the inner spherical surface of the RCP sphere body, an overlay welding machine was purchased and was put into pilot operation in the Division's enterprises at the end of 2022.

New pump type (RCP-1753)

An enterprise of JSC Atomenergomash has successfully completed life tests (with a total duration of 5,000 hours) of the prototype of a new type of pump unit, RCP-1753, developed using cutting-edge technologies. Its main feature is the water lubrication system for all pump and electric motor components, which eliminates the use of oil in the reactor compartment, thus significantly improving the fire safety of the reactor unit and the NPP as a whole. The purpose of the life tests was to confirm the reliability of the RCP-1753 pump during continuous operation and to verify the possibility of its shutdown for 72 hours under conditions that fully simulate an emergency loss of power at an NPP power unit.

This design has a number of advantages and improved characteristics compared to previous types of pump units, especially in terms of reliability and efficiency, and is unique in the world.

Gas and petrochemical industry

In the reporting period, Europe's first and the world's third test bench for critical liquefied natural gas equipment was put into operation.

The development of a line of LNG pumps was initiated; in addition, a project was launched to develop and manufacture LNG loading arms and spiral heat exchangers for LNG production using mixed refrigerants.

The development of equipment for the domestically developed Arctic Cascade 2 natural gas liquefaction process was started.

Contribution to the technological sovereignty of the Russian Federation

Nuclear power engineering facility with an HTGR

The global trend towards decarbonisation and carbon neutrality in energy supply for industry, transport and utilities can be supported through the development of hydrogen energy. Nuclear power engineering facilities (NPEFs) can make a significant contribution to large-scale hydrogen production, replacing fossil fuels with high-temperature heat from the HTGR, which will reduce methane consumption compared to conventional processes and prevent emissions of methane combustion products into the atmosphere. The use of energy from nuclear reactors is currently one of the main areas of focus in the global transition to hydrogen energy.

1. Moisture separator-reheater.
2. High-pressure heater.
3. Low-pressure heater.

Replacing imported software tools and services for product life cycle management and process control

A project has been launched to replace imported solutions for an automated information system for requirements, change and configuration management (AIS RCCM).

The information system makes it possible to manage engineering information (the regulatory framework, project requirements, technical documentation) throughout the life cycle of supplied equipment, track data versions, establish relationships, configure access rights, etc. The AIS RCCM is an integrated information environment of the Mechanical Engineering Division enabling customers and manufacturers to share technical data.

Digitisation of engineering information management processes can help to speed up the implementation of ongoing projects and significantly improve their quality. In addition, this approach is mandatory for the implementation of certain current overseas NPP construction projects.

Plans for 2023

Key objectives for 2023:

- To increase revenue from new products and sales in foreign markets;
- To carry out existing contracts and develop cooperation with foreign companies and industrial partners;
- To consolidate the Division's positions in target markets;
- To expand the range of equipment supplied by the Division and its sales footprint.

Nuclear power industry:

- To ensure the supply of key equipment and perform work as part of the construction of ROSATOM's new NPPs;
- To assess the possibility for the Mechanical Engineering Division to manufacture NPP equipment previously produced by enterprises outside the industry: multi-stud tensioners (MSTs) for main reactor joints and flange connectors of steam generators; inspection cavity equipment and embedded parts; main steam valve units; storage pool racks (for sealed fuel storage) and storage racks for fuel assemblies (for fresh fuel);
- To increase the volume of servicing contracts;
- To explore the possibility of supplying a wide range of equipment as part of the import substitution programme.

Gas and petrochemical industry:

- To produce and supply LNG pumps for the Arctic LNG 2 and Baltic GCC projects, produce and test pilot cryogenic LNG pumps for gas carriers;
- To implement the project to develop and manufacture LNG loading arms for the Baltic Gas Chemical Complex;
- To implement the project to develop and manufacture coil-wound heat exchangers for LNG production with mixed refrigerants for process lines supported by gravity-based structures (GBSs);
- To implement the project to develop and manufacture ethane evaporators for the Arctic Cascade 2 process.

Thermal power industry:

- To complete the supply of equipment for waste-to-energy plants and prepare the first two plants for commissioning;
- To develop the project to build a municipal waste incineration plant;
- To participate in tenders for the supply of equipment as part of the programme to upgrade thermal power facilities and for new construction projects.

Icebreaker fleet:

- To sign revenue contracts for the supply of equipment for follow-on nuclear icebreakers and auxiliary equipment (filters, heat exchangers, deck equipment), and large-sized castings;
- To complete the manufacture of castings of inboard struts (port and starboard) and ship them to the customer; carry out procurement procedures under the contract for the package supply of the nuclear propulsion unit for the *Lider* nuclear icebreaker (Project 10510).

Power ships based on modernised FPUs

The Division will continue the construction of FPUs. The project to provide power supply for the Baimskaya Ore Zone has given impetus for the development of an entire family of FPUs differing in terms of their capacity and applications (designed for use in the Arctic and in tropical regions), providing ample opportunities for the implementation of large-scale industrial projects.

For details, see 'Performance of the Mechanical Engineering Division in 2022'.

1.11.4. Engineering Division

Key results in 2022:

- The Division started the construction of El Dabaa NPP (power units No. 1 and 2) and new power units in China at Tianwan NPP (power unit No. 8) and Xudabao NPP (power unit No. 4).
- Construction is nearing completion and pre-commissioning is beginning at power unit No. 1 of Rooppur NPP in Bangladesh.
- Preparations are being made for connecting the second power unit of the Belarusian NPP to the grid.

ROSATOM's Engineering Division comprises leading companies in the nuclear industry: JSC Atomstroyexport (JSC ASE, Nizhny Novgorod), JSC Atomenergoproekt (the Joint Design Institute with branches in Moscow, Saint Petersburg and Nizhny Novgorod) and a number of subsidiaries.

Its key business areas include:

- Design and construction of large NPPs;
- Digital technologies for managing complex engineering facilities based on the Multi-D platform;
- Project management services and supply of NPP equipment.

Key operating results

In 2022, concreting of the nuclear islands was started at power unit No. 8 of Tianwan NPP and power unit No. 4 of Xudabao NPP in China (in February and May respectively).

In Egypt, a licence was obtained for the construction of power unit No. 1 of El Dabaa NPP, and concreting of its foundation slab was started. A construction licence was obtained, and an official ceremony was held to mark the start of concreting of the foundation slab of power unit No. 2 of El Dabaa NPP.

In August, a licence was obtained for the construction of power units No. 5 and 6 of Paks II NPP in Hungary.

Contribution to the technological sovereignty of the Russian Federation

Key factors supporting the Division's contribution to the technological sovereignty of the Russian Federation include its proven track record in project implementation, the ability to provide NPP customers with an integrated product, as well as competitive technologies supported by the improved design of reference NPPs based on Generation III+ reactors and rapid development of Generation IV fast neutron reactors.

The core business of the Division is focused on the design and construction of large NPPs equipped with VVER-1200 reactors. The improvement of NPP designs based on Generation III+ reactors and of the relevant construction processes, along with non-nuclear innovative technologies for the digitisation of core processes and functions makes a significant contribution to the development of the Division's business, Russia's technological self-sufficiency and energy security.

NPP cybersecurity

EPC contracts for the construction of Russian-design NPPs abroad stipulate that design documentation for the NPPs must incorporate cybersecurity requirements for computerised systems that are fully compliant with the standards of the International Atomic Energy Agency (IAEA), recommendations provided in standards of the International Electrotechnical Commission (IEC) and requirements of the industry regulator.

This area is becoming increasingly important for projects and operations as methods for cyberattacks on critical infrastructure facilities are evolving, which necessitates an improvement of tools and measures for ensuring nuclear and radiation safety and nuclear security.

To accomplish this objective, the Engineering Division has established a new project area: NPP Cybersecurity.

A set of documents has been developed for overseas NPP projects of JSC Atomenergoproekt, whereby the principles that help to mitigate the potential risk of cyberattacks are incorporated as early as at the NPP design stage. An NPP cybersecurity programme, a risk assessment methodology and a cybersecurity architecture plan have been developed. The Division has carried out an assessment of risks related to potential attacks that can undermine the nuclear and radiation safety and nuclear security of a facility and has taken into account the standards applied by multiple international organisations. 12 months of thorough work have resulted in the development of a defence-in-depth information security model.

In addition, in order to improve NPP safety and performance, an assessment of NPP productivity (availability analysis) has been performed using dedicated methodologies developed by JSC Atomenergoproekt; this has also enabled the Engineering Division to develop new project competences, such as NPP maintenance, repairs and operation, and NPP productivity assessment (availability analysis).

The Division has prepared a competence development plan for the period from 2023 through 2026, which includes developing university curricula for the training of specialists; a detailed analysis of the regulatory framework in ROSATOM's countries of operation; expanding the project portfolio; improving the regulatory framework in the Russian Federation; professional development of the Division's employees; research activities.

The Division plans to leverage the acquired competences not only in all future NPP projects in the industry, but also when upgrading operating NPPs as part of a regular safety assessment.

Participation in the Proryv Project

One of the Division's key focus areas in terms of the development of modern technologies that serve to enhance Russia's technological sovereignty and energy security is the closed nuclear fuel cycle (CNFC).

The Engineering Division is working on three NPP designs with fast neutron reactors (the Proryv Project): BN-1200M, BREST-OD-300 and BR-1200, which are inherently safe.

For details, see the website of the Proryv Project at www.proryv2020.ru.

Import substitution in the sphere of IT

In 2022, the Engineering Division was faced with new challenges: the need for accelerated implementation of a programme to replace imported computer-aided design and engineering information management systems as foreign platforms became unavailable. Accordingly, the Division initiated the following IT projects:

– A project to develop a network scheduling module that does not rely on imported solutions and is based on a platform developed in-house by the Joint Design Institute;

– Import Substitution in Information System Design. An Engineering Information Management (EIM) System for Capital Construction Projects;

– Import Substitution in Information System Design. A 2D and 3D Computer-Aided Design (CAD) System for Capital Construction Projects.

Import substitution in the sphere of R&D

In 2022, the Division carried out the following research and development activities aimed at import substitution:

– A methodology was developed for assessing the maturity of the requirements management process; patent research was carried out;

– The possibility of replacing imported materials with Russian analogues during the civil design of NPPs was assessed; technical specifications were drafted;

– Local production of ISO-compliant pipeline products was launched;

– Modern design standards and technologies were developed for the design, manufacture and assembly of safety class 2, 3 and 4 thin-walled pipelines in a standardised size range;

– A methodology was developed and tests of pipeline components and welded joints were carried out in the original state and after artificial ageing simulating the impact of 60 years of operation;

– The BARS 3.0 software suite was developed; it is designed for probabilistic safety assessment of nuclear installations and other nuclear facilities;

– Software was developed for functional units of an information system for managing the ageing of NPP structures, systems and components and their interfaces; materials testing was carried out on representative specimens of thermal and electrical equipment, concrete, cable products, instruments and controls and automatic equipment for NPPs, and their ageing mechanisms were examined.

Resource efficiency in NPP construction

– A wide range of R&D activities has been initiated to significantly reduce the consumption of materials and the effort expended during the manufacture of industrial building structures for NPPs;

– R&D activities have been initiated with a focus on comprehensive development of a high-speed concreting and reinforcement technique;

– Research focused on temporary roads has been completed; it is aimed at conserving resources during the construction and use of temporary roads for construction machinery during NPP construction. For the first time in operational practice, all temporary roads have been differentiated in terms of their purpose, service life and design, with the standardised design of Kursk NPP-2 used as an example; a regulatory document has been drafted that stipulates the construction technique for temporary roads involving the use of reusable prefabricated components and establishes the procedure for the handling of decommissioned pavement components;

– Decisions have been made to reduce the consumption of materials by using high-strength concrete and rebar, high-strength rolled steel and optimal design solutions during the construction of NPPs equipped with VVER reactors;

– Decisions have been made to reduce the effort expended during the construction of NPPs equipped with VVER reactors, primarily at the construction sites, in order to reduce the duration of construction through the application of industrial construction methods supported by the use of large-size prefabricated reinforcement units and reinforced formwork, including permanent formwork made of steel and steel fibre reinforced concrete, which are connected with loop rebar joints or threaded couplings after assembly (which eliminates the need for labour-intensive welded joints).

Plans for 2023:

– To reach key milestones for NPP construction projects in Russia and abroad;

– To ensure business continuity and promote international cooperation with potential customer partners.

For details, see 'Performance of the Engineering Division in 2022'.

1.11.5. Power Engineering Division

Key results in 2022

– Electricity output at Russian NPPs reached 223.4 billion kWh (102.5% of the target set by the Federal Antimonopoly Service of Russia).

– At the construction site of Kursk NPP-2, the reactor vessel was moved into final position at power unit No. 1, and concreting of the floor slab for the reactor coolant pump was completed at power unit No. 2.

– Design documentation for the construction of power units No. 3 and 4 of Leningrad NPP-2 was developed.

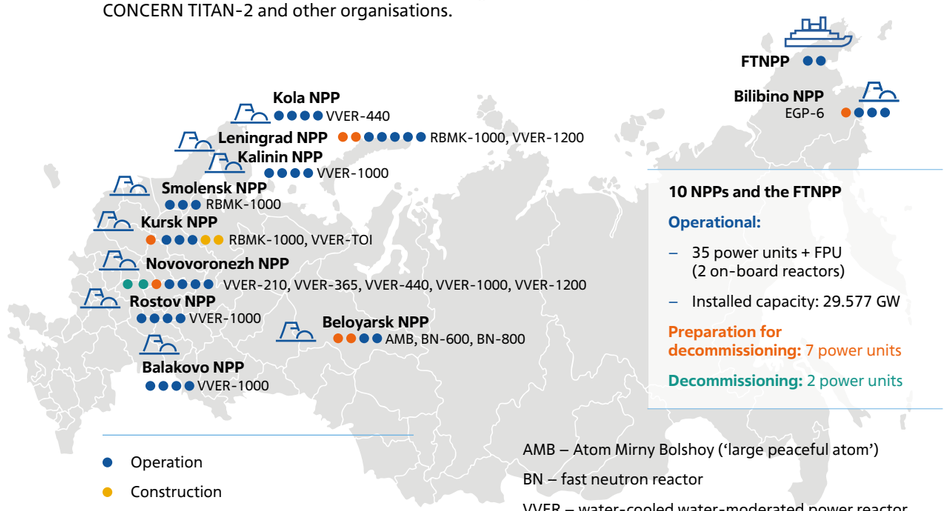
– Rosenergoatom's revenue from the sale of innovative products increased to RUB 199.7 billion (25% of the total revenue).

The Power Engineering Division of ROSATOM (its holding company is JSC Rosenergoatom) is the only NPP operator in Russia and a major player on the Russian electricity market.

The Division ranks first among major power generating companies in terms of the share in the total electricity output in Russia and is the second largest company globally in terms of installed NPP capacity.

The main business areas of the Division include power and heat generation at NPPs and the operation of nuclear facilities (nuclear power plants), radiation sources, and storage facilities for nuclear materials and radioactive substances, in accordance with Russian legislation.

The Division includes JSC Rosenergoatom (the central administration and branches, including 10 NPPs, the world's first FTNPP, as well as the Directorate of the Baltic Nuclear Power Plant under Construction, the Capital Projects Implementation Branch Office, the Technology Branch Office, the Pilot and Demonstration Engineering Centre for Decommissioning, the Pilot and Demonstration Engineering Centre for the Decommissioning of Power Units with Channel-Type Reactors, and the Akkuyu Engineering Centre), as well as 20 subsidiaries and more than 20 controlled entities, including JSC Atomenergoremont, JSC AtomTechEnergo, JSC VNIIAES, LLC Energoatominvest, JSC CONSYST, JSC Atomdata-Centre, JSC CONCERN TITAN-2 and other organisations.



10 NPPs and the FTNPP

Operational:

- 35 power units + FPU (2 on-board reactors)
- Installed capacity: 29.577 GW

Preparation for decommissioning: 7 power units

Decommissioning: 2 power units

- Operation
- Construction
- Decommissioning
- Preparation for decommissioning

AMB – Atom Mirny Bolshoy ('large peaceful atom')

BN – fast neutron reactor

VVER – water-cooled water-moderated power reactor

RBMK – high-power channel-type reactor

EGP – loop-type heterogenous power reactor

Key operating results

As at 31 December 2022, the Division operated 35 nuclear power units at NPPs and the power unit of the floating thermal nuclear power plant (FTNPP) with total installed capacity of 29.6 GW, including:

- 22 power units with VVER reactors (including 13 power units with VVER-1000 reactors, four power units with VVER-1200 reactors and five power units with different versions of VVER-440 reactors);
- 11 power units with channel-type reactors (eight power units with RBMK-1000 reactors and three power units with EGP-6 reactors);
- Two power units with sodium-cooled fast neutron reactors (BN-600 and BN-800).

In 2022, electricity output at NPPs totalled 223.4 billion kWh, or 102.5% of the balance target set by the Federal Antimonopoly Service (FAS) of Russia (217.9 billion kWh) and 100.4% of the actual electricity output in 2021 (222.4 billion kWh).

The NPP capacity factor stood at 86.2% in 2022. The share of electricity generation by Rosenergoatom's NPPs operating in the Unified Power System of Russia (UPS) in the total electricity generation within the UPS stood at 19.9%[1].

Electricity output exceeded the target set by the FAS of Russia due to the following factors:

- The reduction of duration of scheduled repairs at power units (by a total of 155 days);
- The operation of NPP power units above rated capacity.

Contribution to the technological sovereignty of the Russian Federation

ROSATOM's strategic goals include achieving global leadership in state-of-the-art technology.

In 2022, R&D funding as part of the Capital Investment Programme (CIP) totalled RUB 11,069.9 million.

In 2022, Rosenergoatom's revenue from the sale of innovative products increased to RUB 199.7 billion, which is more than 25% of its total revenue.

Key focus areas for Rosenergoatom's technological development include the following:

- Improving design solutions for conventional VVER technology;
- Optimising design solutions to increase the efficiency of the turbine island of NPP power units;
- Providing a rationale for the extension of the fuel cycle and operation in a load following mode for new NPP power units;
- Developing new low-waste technologies for liquid radioactive waste (LRW) management;
- Validating hydrogen explosion safety of NPP power units in the event of severe accidents;
- Developing new VVER technologies involving spectral reactivity control and supercritical coolant pressure in the primary circuit;
- Developing nuclear hydrogen technologies.

Practical development of new nuclear power generation technologies forms part of a Federal Project titled 'New Nuclear Power Industry, Including Small Nuclear Reactors for Remote Areas' included in the Comprehensive Programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024' (hereinafter referred to as the Federal Project and the Comprehensive Programme respectively)[2]. The goals of the Comprehensive Programme include supplying clean and affordable energy to remote areas of the Russian Federation, entering the growing global markets for closed-cycle technologies and fuel, as well as the market for small NPPs.

As part of the Federal Project, Rosenergoatom has initiated the testing of technologies for the use of MOX fuel in the BN-800 fast reactor at Beloyarsk NPP. By the end of 2022, 93% of the reactor core was loaded with MOX fuel, and in 2023, it will be fully loaded.

As part of the Federal Project, Rosenergoatom has initiated the development of a design for a two-unit NPP with a medium-power VVER spectral shift control reactor. Potential advantages of the design include the possibility of fully loading the core with MOX fuel, a reduction in the consumption of natural uranium, the possibility of eliminating the use of boron control during reactor operation at power, and a reduction in the amount of radioactive waste.

1. According to the report of JSC SO UPS on the operation of the UPS of Russia in 2022.
2. The Programme has been extended until 2030 by Decree No. 202 of the President of the Russian Federation dated 14 April 2022 on the Extension of the Comprehensive Programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024'.

Rosenergoatom plans to build a two-unit medium-power NPP at the Kola NPP-2 site, with power unit No. 1 to be commissioned in 2035 and with a potential for the future roll-out of such power units at new sites.

Plans for 2023

Production operations

The target for electricity generation at NPPs for 2023 has been set at 214.2 billion kWh (in line with the balance target of the Federal Antimonopoly Service of Russia and the target of the Government Programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex').

In 2023, Rosenergoatom plans to complete the conversion of the BN-800 reactor core at Beloyarsk NPP to MOX fuel.

Construction of new power units

NPP power units	Plans for 2023
Kursk NPP-2, power units No. 1 and 2	– To achieve a completion percentage of 50.72%; – To install diesel generators to ensure emergency power supply for safety systems in buildings 11-12UBN at power unit No. 1; – To complete the installation of equipment in the reactor pit at power unit No. 2.
Leningrad NPP-2, power units No. 3 and 4	To obtain a licence for the construction of nuclear facilities at power units No. 3 and 4.

International business:

- To reach key milestones in the construction of Akkuyu NPP (Turkey) and El Dabaa NPP (Egypt);
- To continue the commissioning of power unit No. 2 at the Belarusian NPP and power unit No. 1 at Rooppur NPP (Bangladesh);
- To ship the first batches of cobalt-60 produced at Smolensk NPP and Kursk NPP;
- To ensure that the Division's share in the global market for cobalt-60 for sterilisation reaches up to 30%;
- To carry out scheduled preventive maintenance of power units abroad, including the supply of the necessary equipment and provision of technical support by the personnel of Russian NPPs.

For details, see 'Performance of the Power Engineering Division in 2022'.

1.12. RESOURCE MANAGEMENT

1.12.1. Corporate governance

Corporate governance system

The corporate governance system in the nuclear industry is currently underpinned by the following key principles:

- Standardisation of governance in the organisations in the Russian nuclear power and nuclear weapons sectors, organisations of various legal forms specialising in nuclear and radiation safety, nuclear science and technology and personnel training, with due regard to the special characteristics of each enterprise and organisation;
- Removing non-operating and inactive organisations from the nuclear industry and eliminating redundant corporate ownership levels;
- Avoiding excessive expansion of the area of competence of corporate governance bodies of nuclear organisations and transferring a number of 'optional' issues to the level of cooperation between them based on regulatory documents adopted in the industry with regard to various groups of business processes;
- A division-based management model within the civilian part of the nuclear industry, which involves creating core business divisions of ROSATOM (e.g. the Mining, Fuel, Mechanical Engineering, Power Engineering and Engineering Divisions), as well as a number of business incubators and functional industry organisations whose holding companies own/manage various organisations in the nuclear industry, depending on their areas of business.

GRI 2-9

Governing bodies

Supervisory Board[1]

The Supervisory Board is ROSATOM's highest governing body (in accordance with Article 23 of Federal Law No. 317-FZ of 1 December 2007 on State Atomic Energy Corporation Rosatom, hereinafter referred to as the Law).

The Supervisory Board comprises nine members, including eight representatives of the President of the Russian Federation and the Government of the Russian Federation, as well as ROSATOM's Director General, who is a member of the Supervisory Board by virtue of his position.

GRI 2-10 The Chairman of ROSATOM's Supervisory Board is appointed by the President of the Russian Federation from among members of ROSATOM's Supervisory Board simultaneously with the appointment of the members of ROSATOM's Supervisory Board.

GRI 2-15 The Supervisory Board members, except for ROSATOM's Director General, are not permanent employees of ROSATOM. They may serve on ROSATOM's Supervisory Board while simultaneously holding public office in the Russian Federation, in a constituent entity of the Russian Federation or at the municipal level, as well as national or municipal civil service positions. ROSATOM's Director General may not simultaneously chair the
GRI 2-11 Supervisory Board.

GRI 2-12 The powers and functions of the Supervisory Board are stipulated in the Law. The Supervisory Board approves ROSATOM's business strategy and the long-term operational programme.

1. https://www.rosatom.ru/about/management/supervisoryboard/

There are no collective advisory bodies (committees) under the Supervisory Board.

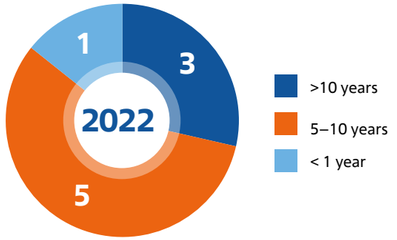
Out of the nine members of the Supervisory Board, one is female (accounting for 11% of the total number of Supervisory Board members).

The Supervisory Board members receive no salary or other remuneration for their participation in the work of the Supervisory Board.

In 2022, the following changes occurred in the composition of the Supervisory Board: one person was appointed to the Supervisory Board, while another was dismissed from the Supervisory Board.

GRI 2-16 In 2022, the Supervisory Board held 18 meetings, including two in-person meetings, and considered 39 issues.

Tenure of the members of the Supervisory Board (as at 31 December 2022), persons GRI 2-9

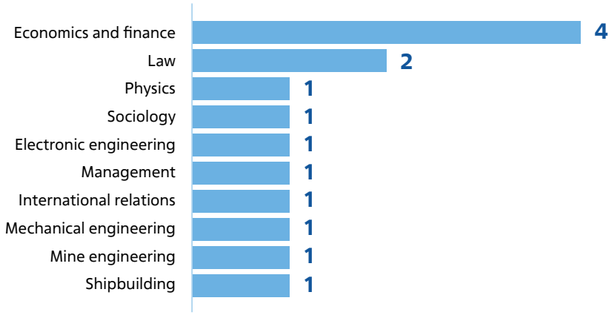


In 2022, the Supervisory Board approved the following:

- The report on progress against key performance targets of ROSATOM in 2021 (minutes No. 160 dated 25 April 2022);
- ROSATOM's key performance targets for the period from 2022 through 2024 (minutes No. 156 dated 16 February 2022);
- Key performance targets of federal nuclear organisations for 2022 (minutes No. 160 dated 25 April 2022);
- ROSATOM's annual report for 2021 (minutes No. 163 dated 28 June 2022).

In accordance with Article 25 of the Law, compliance with instructions from the Supervisory Board and its Chairman is monitored by the Director General of ROSATOM.

Educational profile of the members of the Supervisory Board[1]



1. The data take into account the fact that some members of the Supervisory Board hold more than one degree.

Director General of ROSATOM

GRI 2-11 The powers of the Director General are stipulated in the Law. ROSATOM's Director General is the Corporation's sole executive body and manages its day-to-day operations.

Alexey Likhachev is ROSATOM's Director General (appointed by Decree No. 527 of the President of Russia dated 5 October 2016).

The remuneration of the Director General is determined based on an evaluation of performance against KPI targets that apply to all employees of the Corporation.

ROSATOM's Management Board

The Corporation's Management Board is ROSATOM's collective executive body. The Corporation's Management Board includes ROSATOM's Director General, who is a member of the Board by virtue of his position, and other members of the Board. The work of ROSATOM's Management Board is managed by ROSATOM's Director General (paragraph 1 of Article 28 of the Law).

ROSATOM's Management Board exercises the following powers[1]:

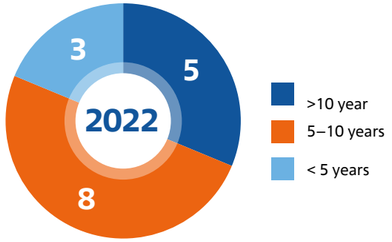
GRI 2-12

1) Submitting proposals concerning the Corporation's key performance indicators for the next year to the Supervisory Board for approval;
2) Defining the position of the shareholder (the Corporation) on matters related to the operations of joint-stock companies whose shares are owned by the Corporation, except for matters that fall within the competence of the Supervisory Board;
3) Defining, under the procedure established by the Government of the Russian Federation, the position of the shareholder, namely the Russian Federation, on behalf of which the Corporation exercises shareholder powers, on matters on the agenda of the general meetings of shareholders of joint-stock companies in the nuclear power industry whose shares are under federal ownership, except as stipulated by laws and regulations of the Russian Federation;
4) Drafting ROSATOM's business strategy, ROSATOM's long-term operational programme (including sustainability matters) and ROSATOM's financial plan, including defining the amount of expenditure and focus areas for allocations from ROSATOM's special reserve funds;
5) Formulating proposals for the allocation of ROSATOM's earnings;
6) Formulating proposals for the establishment of branches, the opening of representative offices and for the establishment of ROSATOM's entities;
7) Approving the list of projects to be financed using ROSATOM's special reserve funds;
8) Approving the procedure for contributing to ROSATOM's revenue a portion of earnings of enterprises under ROSATOM's jurisdiction that remains available after the payment of taxes, fees and other mandatory payments;
9) Approving ROSATOM's annual report before it is submitted to the Supervisory Board;
10) Approving the annual financial statements of ROSATOM's entities;
11) Exercising other powers conferred on ROSATOM's Management Boards by the Supervisory Board.

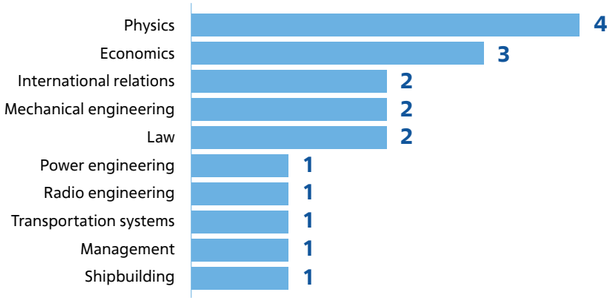
1. Article 29. Powers of the Management Board of the Corporation https://www.consultant.ru/document/cons_doc_LAW_72969/2f9a2cc0b742f12a669e30e81cbba087555c3116/

GRI 2-19 The Management Board comprises 16 members (100% of them are men). Members of the Management
GRI 2-20 Board receive no remuneration for serving on ROSATOM's Management Board.

Tenure of the members of ROSATOM's Management Board (as at 31 December 2022), persons



Educational profile of the members of the Management Board[1]



1. The data take into account the fact that some members of the Management Board hold more than one degree.

Criteria for appointment to the Management Board

In accordance with Article 28 'Management Board of the Corporation' of the Law, members of ROSATOM's Management Board are appointed and dismissed under the resolution of ROSATOM's Supervisory Board on the recommendation of ROSATOM's Director General. Members of ROSATOM's Management Board are permanent employees of the Corporation or employees of ROSATOM's organisations, joint-stock companies and their subsidiaries, as well as enterprises under ROSATOM's jurisdiction.

In 2022, there were no changes in the composition of the Management Board.

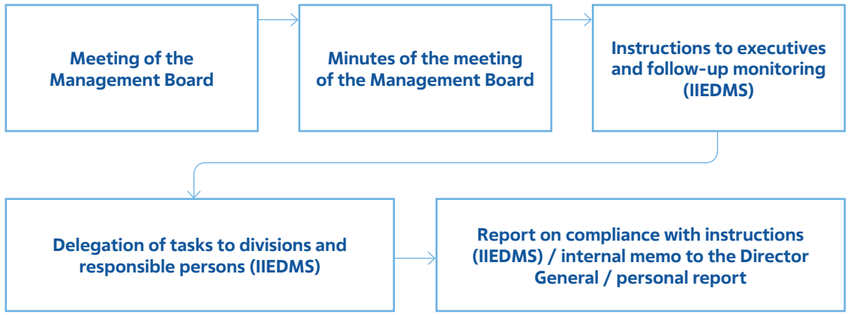
Meetings of the Management Board in 2022

In 2022, ROSATOM's Management Board held a total of 43 meetings (all by absentee voting) and considered 333 issues. Key issues included the following:

- Performance against ROSATOM's key performance targets in 2021;
- Approval of ROSATOM's key performance targets until 2025;
- Changes in ROSATOM's long-term operational programme;
- Approval of ROSATOM's Innovative Development and Technological Modernisation Programme until 2030 (for the civilian sector) (hereinafter referred to as the Programme) as amended in 2022, the annual report on the implementation of the Programme in 2021 and the medium-term plan for the implementation of the Programme for the period from 2022 through 2025.

Mechanisms for implementing the resolutions of ROSATOM's Management Board

Following a meeting of ROSATOM's Management Board, resolutions adopted at the meeting are recorded in the minutes.



Compliance with instructions from the Management Board is monitored by the Office of the Director General.

ROSATOM's financial and business operations are monitored by ROSATOM's Auditing Commission.

Collective and advisory bodies of the Corporation

In 2022, ROSATOM had about 30 permanent committees, boards and commissions, including the following:

- The Strategic Council;
- The Steering Board of the Proryv (Breakthrough) Project;
- The Council for Physical Protection;
- The Ethics Board;
- The Council for Information Technology Architecture;
- The Unified Commission for the Procurement of Goods, Work and Services for Government Needs under a Closed Procedure;
- The Central Procurement Commission;
- The Operations Committee;
- The Staff and Incentives Committee;
- The Executive Committee on the Development of the Technology for New Materials and Substances High-Technology Area in the Russian Federation;
- The Investment Committee;
- The Committee on the Standardisation of Technical Specifications;
- The Steering Committee on Overseas NPP Personnel Training;
- The Committee on the Restructuring of Non-Core Assets, Real Property and Equity;
- The Committee on Cost within International Sales;
- The Committee on Strategic Partnerships, Mergers and Acquisitions;
- The Committee on Venture Capital Financing;
- The Charity Committee;
- The Committee on Contracting within International Sales;
- The Risk Committee;
- The Science Committee;
- The Technical Committee of the Proryv Project;
- The Committee on Procurement Strategies;
- The Central Arbitration Committee (in procurement);
- The Committee on Pricing in the Construction of Nuclear Facilities.

Improving the corporate governance system

The Corporation continued to adopt regulations governing cooperation between ROSATOM and the holding companies of its Divisions, business incubators and functional industry organisations.

The industry-wide mechanism for the conclusion of corporate integration and cooperation deals by ROSATOM and its organisations was improved.

Key changes in the corporate structure in 2022

GRI 2-6

1. In order to promote the development of corporate volunteering and corporate social responsibility in the nuclear industry, the Autonomous Non-Profit Organisation Energy of Development was established. The Autonomous Non-Profit Organisation Energy of Development was founded by JSC ASE, JSC TVEL, JSC Rosenergoatom and JSC TENEX.
2. A nuclear organisation acquired a controlling stake in PJSC Quadra – Power Generation, one of Russia's largest regional power generation companies.
3. In order to develop the logistics business in the industry, JSC Atomenergoprom increased its stake in the authorised share capital of LLC MC Delo, and Delo Group increased its stake in Global Ports Investments PLC.
4. A nuclear organisation acquired shares in several subsidiaries in the Sales and Trading segment.
5. Business acquisitions were made in the Mechanical Engineering segment.
6. Other investments included investments in the industrial, energy and research sectors.

Non-arm's length transactions

In accordance with Federal Law No. 317-FZ of 1 December 2007 on State Atomic Energy Corporation Rosatom, the Supervisory Board approves non-arm's length transactions.

In 2022, ROSATOM's Supervisory Board approved eight non-arm's length transactions.

1.12.2. Risk management

Risk management system

In today's world, companies need dynamic and flexible risk management in order to promptly respond to changes in the external agenda. The industry-wide risk management system (RMS) is integrated into the Corporation's planning and management processes. The RMS is based on a continuous cyclical process of identifying, and assessing risks and managing those risks that can affect ROSATOM's short- and long-term performance and the implementation of its strategy.

The RMS is being developed in accordance with the approved Risk Management Development Programme for the period from 2019 through 2024.

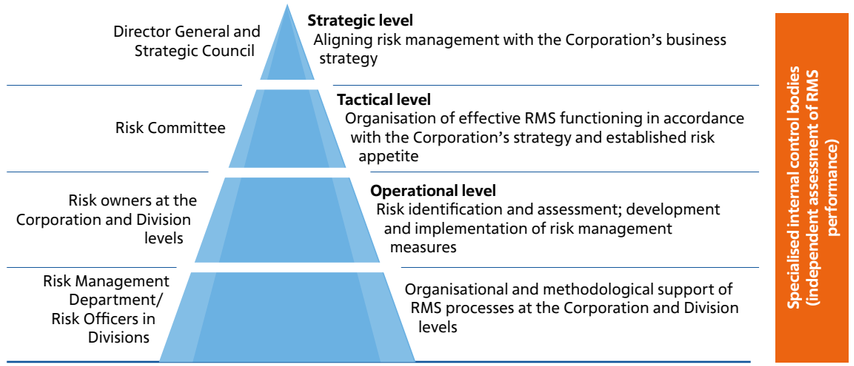
Results in 2022:

- The URAN (Risk Management: Analytics) Industry-Wide Risk Management System (URAN IRMS), an information system developed as part of project B-RM1-1 to build an Industry-Wide Risk Management System in ROSATOM, became fully operational;

- A list of key risk indicators was compiled, including a description, the calculation algorithm and frequency, sources of information and thresholds (baseline, warning and response thresholds);
- A system for early response to risks related to national and federal projects was in place;
- Key risks affecting ROSATOM's key financial and economic indicators (KPIs) were identified and assessed;
- Workshops, risk sessions and conferences were held to enable risk officers and employees within the hierarchy of the Risk Management function to share their experience; this included holding a roundtable discussion titled 'Risks and Opportunities: Responding to Challenges of the Global Economy' as part of the 12th ATOMEXPO 2022 International Forum.

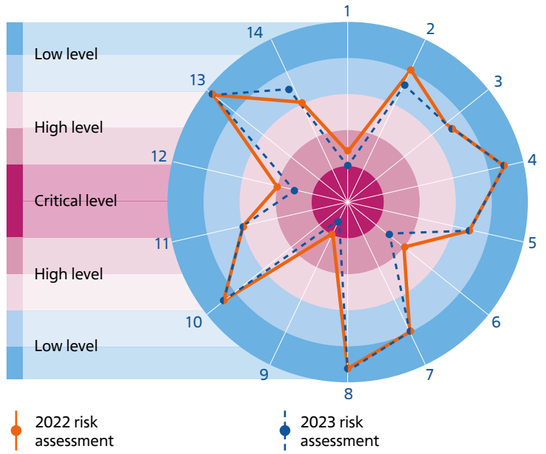
Risk management process in ROSATOM

Organisational model of the risk management system



Key business risks[1]

As part of the functioning of the RMS, a list of critical risks was compiled; risk owners were appointed; risks were assessed, and risk management measures were developed and implemented.



1. Currency risk
2. Interest rate risk
3. Credit risk
4. Liquidity risk
5. NFC product and service market risk
6. Electricity and capacity market risk
7. Risk of a decrease in power generation
8. HSE risks
9. Political risk
10. Risk of loss of and damage to assets
11. Reputational risk
12. Project risks
13. Climate risk (including environmental risk)
14. Social and political risks

Comprehensive risk management measures largely offset the negative impact of external factors on the implementation of ROSATOM's strategy.

1. The report does not contain an exhaustive description of all risks that may affect ROSATOM's operations; it only provides information on key risks.

Risk management outcomes in 2022

Change in estimated risk levels for 2023:

↑ increase ↓ decrease –·– no significant changes

ROSATOM's strategic goals[1]:

1. To increase the international market share
2. To reduce production costs and the lead time
3. To develop new products for the Russian and international markets
4. To achieve global leadership in state-of-the-art technology

Sustainability risks are presented in the table (see health, safety and environmental risks, climate and environmental risks, the risk of loss of and damage to assets, social and political risks in the regions of operation).

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
Financial risks			
1. Currency risk ↑ (Executives of ROSATOM's Divisions)	Adverse changes in exchange rates	**Management approaches:** – Applying currency clauses in commercial contracts and locking in exchange rates (where possible); – Switching to settlements with counterparties in the currencies of friendly jurisdictions; – Examining the possibility of switching to settlements with counterparties through banks in friendly jurisdictions; – Using long-term pricing mechanisms with counterparties; – Exploring opportunities for engaging Russian suppliers and contractors in order to reduce the foreign exchange position; – Continuously monitoring exchange rates to enable prompt decision-making to mitigate currency risk; – Setting the highest possible conversion rates when negotiating the terms of expense contracts; – Monitoring the terms of foreign currency payments under revenue contracts and expense contracts concluded as part of performance of revenue contracts; – Maintaining a balance of claims and liabilities denominated in foreign currencies (natural hedging). **Results:** An optimal ratio of assets and liabilities denominated in the same currency was maintained. Foreign currency liabilities were met without raising additional funds to compensate for exchange rate fluctuations. In 2022, the Corporation recorded foreign exchange gains on currency conversion transactions.	1 2 3

1. Sustainability risks are presented in the table (for details, see sections on climate, environmental, social and corruption risks).

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
2. Interest rate risk ↑ (ROSATOM's Treasury Department)	Adverse changes in interest rates, different timing of interest income and interest expenses	**Management approaches:** – Maintaining a balance of interest income and interest expenses in terms of timing and amounts; – Reasonable selection of interest rates (fixed or floating) for the expected maturity period. All things being equal, the Corporation prefers long-term fixed-rate loans with the option of penalty-free early repayment; – Floating-rate loans on which interest rates may be increased are refinanced using the intra-group liquidity pool. **Results:** The Corporation maintains a stable long-term loan portfolio. There was no significant increase in the risk level in 2022 due to the effective use of the risk management approaches described above. *For details, see the section 'Financial Management'.*	1 2 3
3. Credit risk –·– (ROSATOM's Treasury Department for banks; executives of ROSATOM's organisations for other counterparties)	Failure by counterparties to fulfil their obligations in full and on time	**Management approaches:** – Setting and monitoring limits for counterparty banks; – Using suretyship, guarantees, restrictions on advance payments in favour of external counterparties; – Monitoring the status of accounts receivable and the financial position of counterparties; – An internal counterparty solvency rating system. **Results:** Losses through the fault of counterparties were minimised.	1 2
4. Liquidity risk –·– (ROSATOM's Treasury Department, Heads of Divisions)	Lack of funds for the fulfilment of obligations by ROSATOM and its organisations	**Management approaches:** – Centralised cash management (cash pooling); – Rolling liquidity forecasts and cash flow budget; – Maintaining required amounts of open lines of credit with banks (funds committed by banks); – Reducing the period of keeping spare cash on bank deposits when this is advisable from an economic perspective; – Discussing matters related to state support with Russian federal executive authorities; – Active use of project financing instruments as part of implementation of projects and programmes by ROSATOM and its organisations; – Maintaining the credit rating assigned to the Corporation by the national rating agency JSC Expert RA. **Results:** ROSATOM maintained sufficient liquidity to repay liabilities on time, preventing unacceptable losses and reputational risk. *For details, see the section 'Financial Management'.*	1 3

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
Commercial risks			
5. Nuclear fuel cycle (NFC) product and service market risk –·– (Executives of the relevant Divisions of the Corporation)	Adverse changes in the pricing environment and demand on markets for natural uranium and uranium conversion and enrichment services	**Management approaches:** – Maintaining an optimal balance between market-focused and escalation pricing (benchmark price inflation) in contracts; – Embedding quantitative flexibility and options in contracts with suppliers to align purchase and sales volumes; – Discussing the volume of future orders with customers in advance; – Promoting products in new market segments; – Improving the technical and economic characteristics of nuclear fuel; developing new types of fuel; – Establishing partnerships in the form of joint ventures (JVs) with foreign suppliers of NFC products and services; – Using long-term pricing mechanisms; aligning pricing mechanisms used for procurement and those used in contracts with a high level of commodity risk; – Taking into account the current market performance and established operational limits in the course of operations; – Product supply diversification. Searching for partners in friendly jurisdictions; – Exploring opportunities for concluding additional commercial contracts on the spot market to mitigate the risk; – Accelerating product shipments, optimising working capital, including faster receipt of payments from counterparties. **Results:** By implementing the above measures and taking advantage of opportunities offered by a rise in product prices, the Corporation was able to mitigate the risk. The risk level remains unchanged, as quotations for natural uranium and the separative work unit are currently low, which limits their downside, while creating an upside if the market environment improves.	1 2 4
6. Electricity and capacity market risk ↑ (Director General of JSC Rosenergoatom)	Adverse changes in electricity and capacity prices	**Management approaches:** – Participating in the working group on forecasting hosted by the Association NP Market Council; – Monitoring price drivers; – Updating price forecasts on a monthly basis.	1

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
–·–		Results: Agreement was reached with the Association NP Market Council to submit an additional forecast taking into account the predominance of nuclear power sales in the region, which makes it possible to provide the most accurate forecast for electricity prices on the day-ahead market (DAM) for NPPs. Given the challenging economic situation, the risk of a decline in consumption, which is one of the DAM price drivers, is increasing. The impact of wind and solar power generation capacities commissioned as part of the Integrated Power Systems of the North-West and the South cannot be fully reflected in the forecast due to limited statistics on electricity output, but in certain periods of 2022 they made a significant contribution to a decrease in electricity prices. The likelihood of materialisation of the above risks will increase in 2023.	
Operational risks			
7. Risk of a decrease in power generation (Director General of JSC Rosenergoatom)	Decrease in power generation due to equipment shutdowns and unavailability	**Management approaches:** – In order to improve NPP safety, reliability and resilience, prevent equipment failures, meet the load schedule and achieve the target for power and heat supply while meeting the established schedule of repairs at NPP power units, to accelerate efforts to achieve key targets for power generation, and in order to systematise efforts aimed at ensuring that NPP managers assume a greater personal responsibility, the relevant orders were issued in 2022. – Scheduled repairs of NPP power units are carried out annually in accordance with the approved schedule; NPP life extension and equipment upgrade programmes are implemented to increase installed capacity and power generation at operating power units (including the possibility of power units operating at above nameplate capacity). **Results:** In 2022, nuclear power generation reached a record high of 223.4 billion kWh, totalling 102.5% of the balance target set by the Federal Antimonopoly Service (FAS) of Russia and 100.4% of electricity output in 2021. The capacity factor stood at 86.21% in 2022. Russian NPPs forming part of the Unified Power System of Russia accounted for 19.9% of the total electricity output within the Unified Power System of Russia. All incidents and equipment failures have been properly investigated. Corrective and preventive measures have been developed in order to address the root causes of the incidents and prevent their recurrence. The implementation of risk management measures and the use of tools of the ROSATOM Production System make it possible to offset the impact of negative factors. *For details, see 'Performance of the Power Engineering Division in 2022'.*	1

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
8. Health, safety and environmental (HSE) risks –·– (Executives of ROSATOM's Divisions)	Major accidents/ incidents in nuclear enterprises	**Management approaches:** – Occupational safety and health monitoring in nuclear organisations, including inspections and preventive visits, development of action plans and implementation of risk mitigation measures; – Implementation of measures to improve HSE performance in the enterprises, including measures to enhance occupational safety, reduce the impact of ROSATOM's operations on the health of the local population and prevent irreversible changes in the natural environment in the towns and cities where nuclear facilities are located; – Measures to upgrade process equipment and improve production processes in the enterprises; – Monitoring of individual radiation risk exposure of employees and measures to reduce it; – Monitoring of the radiation level and the environmental situation in ROSATOM's regions of operation; – Constant readiness of emergency and incident response teams and equipment; – Special reserve funds formed by ROSATOM to ensure safety at all stages of the life cycle of its production facilities; – Arranging civil liability insurance against damage resulting from accidents for enterprises that own hazardous industrial facilities; – Calculation and monitoring of indicators used for assessing the probability of potential negative impacts of industrial safety violations at hazard class 1 and 2 industrial facilities; – Timely updates to internal regulations of the organisations, as required by legislation and federal rules and standards; – Technical inspection of equipment used at hazardous industrial facilities; – Maintaining a high level of professionalism, accountability and safety culture among employees, including certification of operating personnel at hazardous industrial facilities; – Continuous monitoring of the use of personal protective equipment by employees in the workplace; – Improvement of project management practices in the sphere of occupational safety and health. **Results:** Safe operation of ROSATOM's organisations, including hazardous industrial facilities. *For details, see the chapters 'Safety Report' and 'Social Report'.*	4

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
9. Political risk ↑ (ROSATOM's International Relations Unit and International Business Development Unit)	Changes in the regulatory and political climate in foreign countries imposing restrictions on the operations of ROSATOM and its organisations	**Management approaches:** – Coordination with the Russian Ministry of Foreign Affairs and other authorities, including through ROSATOM's representatives in Russian embassies and trade missions abroad; – Updating and implementing the relevant action plan on a quarterly basis amid sanctions pressure on the Russian Federation; – Providing political support for global operations of nuclear organisations; – Using the platform of specialised international organisations for communication and awareness campaigns; – Establishing partnerships with local and foreign regional companies and searching for alternative partners; – Examining alternative options for the supply of equipment that has been produced by the Corporation or is in production; – Taking into account political interests of governments in the Corporation's end markets; – Strict compliance with international requirements governing relations in the sphere of peaceful use of nuclear energy: nuclear non-proliferation, export control, security and physical protection; – Further product diversification (wind power, nuclear medicine); – Systematic engagement with the IAEA and partner countries with a focus on nuclear infrastructure; – Using national currencies for settlements; – Active media outreach; supporting the operation of information centres; ensuring openness and transparency during the construction of nuclear facilities abroad, including through active community engagement. **Results:** Despite a challenging global political situation, ROSATOM fulfils all its international commitments to build Russian-design nuclear facilities abroad. The conclusion of 17 intergovernmental and interdepartmental agreements on the peaceful use of nuclear energy is a positive sign. At year-end 2022, ROSATOM's portfolio of overseas projects comprised 34 nuclear power units in 11 countries worldwide. Overseas projects involving the construction of 23 power units in eight countries are in the active stage of implementation. **Explanation of the increase:** – Growing sanctions pressure on the Russian Federation; – Political and economic pressure on the Corporation's foreign partners in order to force them to suspend or terminate cooperation with ROSATOM; – Political and economic instability on target markets and politicised decisions on the selection of nuclear technology suppliers;	1 3 4

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		– The anti-nuclear movement in a number of countries; persisting negative public perception of nuclear power in some countries; – Negative coverage by foreign media outlets in order to discredit Russian technology. ROSATOM plans to mitigate the negative impact of this risk by implementing the relevant action plan in response to sanctions pressure on the Russian Federation, expanding its footprint on those target markets where there are no restrictions, implementing the import substitution programme, holding consultations and negotiations under intergovernmental agreements and securing the required diplomatic support. *For details, see the section 'International Cooperation' and the chapter 'Business Development Report'.*	
10. Risk of loss of and damage to assets –·– (Asset Protection Department of ROSATOM)	Corruption and other offences leading to a damage to/ loss of assets	**Management approaches:** ROSATOM and its organisations have adopted an industry-wide system for the prevention of corruption and other offences. **Results:** Pursuant to the National Anti-Corruption Plan for the period from 2021 through 2024, the Anti-Corruption Plan of ROSATOM and Its Organisations was approved for the relevant period; it supports corruption risk management, including the following focus areas: – Continuous assessment of corruption risks across all business processes implemented in the Corporation and all accounting events; – Professional development of employees focused on combating corruption, with priority given to the following employee categories: • Employees newly hired by the Corporation and its organisations and appointed to positions involving responsibility for compliance with anti-corruption standards; • Executives that have been assigned responsibility for preventing corruption in the organisations; • Employees involved in the procurement of goods, work and services; – Introduction of online anti-corruption training based on mobile platforms accessible to every employee in the industry; – Reporting evidence of corruption and other offences, including through feedback mechanisms (the hotline); – Reviewing and updating industry-wide regulations on asset protection and combating corruption in line with updates to anti-corruption legislation; – Detection, timely prevention and settlement of conflicts of interest; – Prioritised implementation of industry-wide anti-corruption regulations in new businesses.	1 2

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
11. Reputational risk –·– (Communications Department of ROSATOM and Heads of Divisions)	Changes in stakeholder perception of the trustworthiness and appeal of ROSATOM and its organisations	**Management approaches:** – Measures to shape a positive public opinion on the development of the Corporation's technologies and projects (both nuclear and non-nuclear) through improved information transparency and open stakeholder engagement (including the functioning of an industry-wide public reporting system); – Continuous efforts to improve the recognition and appeal of ROSATOM's HR brand (both in the industry and among prospective employees and within the expert community); – ROSATOM continuously monitors and analyses news reports in the national and international media and information obtained during business meetings, industry conferences and workshops. Industry executives are promptly informed about key developments in the media space in Russia and abroad; – ROSATOM implements projects in the sphere of communication and the humanities in cooperation with foreign partners. It has successfully introduced the practice of holding online events in overseas organisations and virtual tours. ROSATOM continuously monitors public opinion on NPP construction and information on the decisions of government and regulatory bodies on curtailment of nuclear power generation in the countries where the Corporation is implementing projects; – Technical tours and media tours of Russian nuclear facilities for foreign media representatives; – Maintaining a presence on social media: the number of followers of the Corporation's official community pages on social media is growing steadily, with the largest increase in the number of followers recorded for social media platforms focused on visual content; – Participation of ROSATOM's representatives in international trade fairs as speakers/delegates; – Production of printed materials to raise public awareness about the nuclear power industry. **Results:** Projects implemented in Russia and abroad are supported by governments. In 2022, the reputation score of companies in the nuclear industry (an indicator whose calculation takes into account the results of opinion polls) stood at 3.7 (2021: 3.5). There was no significant increase in the level of reputational risk in 2022. *For details, see the section 'Strategic Communications' and the chapter 'Social Report'.*	1 3

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
12. Project risk ↑ (Executives of ROSATOM's Divisions)	Changes in the macroeconomic indicators of the countries participating in the projects; contractors' failure to fulfil their commitments with regard to the schedule and quality of work to be performed	**Management approaches:** – Full-cycle risk management applied in NPP construction projects, including risk identification and assessment, development and implementation of risk management measures, risk monitoring, updates to the risk register, and reporting; – Improving project management and risk management systems; – Negotiating the main terms and conditions of contracts with customers in advance; – Developing risk maps for new business areas; – Regular monitoring and control of achievement of key milestones, financial and physical targets for overseas projects; – Regular monitoring and communication with customers concerning the schedule for NPP maintenance and training of foreign NPP personnel abroad, as well as other matters related to the implementation of overseas projects; – Implementing best project management practices (including ROSATOM's industry-wide risk management system and the TCM NC cost and schedule management methodology) and industry-wide guidelines for projects and investment activities in project companies; – Steps taken both by shareholders and at the operational level to enhance risk-based project management; – Improving project management practices; – Developing action plans for engagement with foreign customers; – Concluding long-term contracts and locking in electricity prices; – Developing standardised design solutions; – Implementing a programme to reduce the cost and duration of NPP construction; – Implementing procedures forming part of an industry-wide approach to managing risks associated with NPP construction projects; – Using opportunities for the redistribution of available credit resources between projects; – Concluding agreements that impose penalties for the full or partial repudiation of commitments; – Developing alternative projects meeting the established criteria; – Concluding long-term offtake contracts.	1 3 4

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		Results: Risk management measures implemented by the Corporation have enabled it to avoid a negative impact on key performance indicators. For key components that are no longer unavailable, alternative suppliers have been found, and further steps are being taken to replace imports. Project implementation stages are monitored in real time; RPS methodologies are being implemented. The Corporation is expanding its product portfolio (offers) and entering new end markets, including by establishing JVs and acquiring the relevant assets. Procurement of imported equipment is brought forward, with prices locked in and the warranty period extended. The risk is expected to rise due to the lengthening of supply chains and the fact that major suppliers of IT equipment have left the Russian market because of sanctions pressure.	
13. Climate and environmental risk –·– (Executives of ROSATOM's Divisions)	Adverse climate change/ impacts of natural disasters on the operations of ROSATOM and its organisations; risk of environmental damage from the operation of nuclear facilities and other facilities in the industry	**Management approaches:** – At the stage of NPP design, ROSATOM carries out a comprehensive assessment of risks associated with the climatic characteristics of the region where the proposed NPP construction site is situated; – Implementation of industry-wide policies on sustainable development and environmental protection. Taking into account adverse natural phenomena (including earthquake tendencies) and climatic factors at the design stage. Industrial environmental control and monitoring; – Parameters of the NPP construction site are continuously monitored; – Environmental monitoring is performed, including radiation monitoring at the NPP construction site and in the radiation control area using mobile radiation monitoring equipment at ARMS stations in accordance with the Environmental Radiation Monitoring Programme; – Annual reports presenting the findings of site monitoring, environmental and radiation monitoring are published on an annual basis. Annual reports are submitted to the Nuclear Regulatory Authority of Turkey (NDK), the general design contractor (JSC Atomenergoproekt) and the holding company (JSC REIN); – Steps are being taken to determine the zero background radiation level at the NPP construction site; – To maintain the balance of local ecosystems, all enterprises involved in various stages of the production process strictly comply with technological standards for natural uranium mining and processing. Active steps are being taken to reduce the relevant impacts and improve the environmental safety of the production cycle.	1 4

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		Results: Pollutant emissions into the atmosphere from NPPs do not exceed permitted limits and are significantly below the limits set by environmental regulators. The majority of pollutant emissions from NPPs are generated by start-up and backup boiler houses, boiler houses of healthcare centres and backup diesel generators, which are regularly started up for routine testing. For many years, NPPs account for less than 0.01% of the total volume of pollutant emissions into the atmosphere from Russian enterprises. Despite the progress that has been made, NPPs continue to systematically implement measures to reduce the man-made impact on the atmosphere: ROSATOM is improving technological solutions used to enhance the fuel efficiency of its facilities; the Corporation has switched to higher-grade fuel oil (with lower sulphur content); painting techniques are being improved; efficient gas scrubbers and dust collectors are put into operation.	
14. Social and political risks in the regions of operation ↓ (ROSATOM and executives of the Corporation's Divisions)	Loss of public approval for the location of infrastructure facilities	**Management approaches:** – ROSATOM operates in a socially important sector of the economy. The Government of the Russian Federation makes a direct impact on ROSATOM's operations by financing individual federal projects and federal target programmes. As a result, the Corporation and its organisations are characterised by a high level of financial resilience sufficient to withstand the negative economic consequences of social and regional risks; – ROSATOM engages with regional and municipal governments on matters related to promoting regional development, increasing regional tax revenue and maintaining social and economic stability in the regions; – In order to reduce social risks in its regions of operation, the Corporation implements a set of measures (public consultations, engagement with non-governmental organisations and the media) to inform the general public about the operations of its regional manufacturing enterprises, plans for their future development and their stability, and the fact that its operations do not pose any environmental risks; – Simultaneously, the Corporation conducts environmental upgrades in the back-end segment, introducing new RAW and SNF processing technologies and reducing the volume and radioactivity of waste. **Result:** the situation in the towns and cities where ROSATOM operates remains stable. Operational continuity has been ensured in the Corporation's enterprises.	

Other risks

Licensing risks. ROSATOM currently has all necessary licences. Where necessary, the Corporation can promptly obtain licences for new businesses and renew existing licences.

Logistical risks. Regions in which the core operations of ROSATOM and its organisations are situated have well-developed infrastructure and transport links. ROSATOM's organisations implement preventive measures to ensure reliable supplies: they maintain emergency stocks of materials and equipment, organise exercises for emergency response and recovery teams and implement other measures to ensure the continuity of production and logistical processes.

Risk insurance

Risk insurance is one of the main risk management approaches used by ROSATOM.

To improve the reliability of insurance coverage, in 2022, the Corporation continued to cooperate with the insurance community in order to insure Russian operators against property risks. A significant share of liability of Russian NPPs for potential nuclear damage was transferred for reinsurance to the Russian Nuclear Insurance Pool (RNIP) and the Russian National Reinsurance Company (RNRC). This proves that the insurance community acknowledges the safety and reliability of Russian NPPs to be adequate.

In 2023, the Corporation plans to continue to engage RNIP and RNRC experts to audit key enterprises in the industry for insurance purposes.

Objectives for 2023 and the medium term

Plans for 2023 include activities stipulated in the Risk Management Development Programme for the period from 2019 through 2024. The Programme takes into account both external factors related to the requirements of foreign customers (NPP construction on time and on budget) and Russian government bodies and internal factors (the need to build an efficient risk management system aligned with global best practices in ROSATOM).

The following three key objectives for the development of risk management in the Russian nuclear industry have been set for 2023:

– To develop an automated risk assessment and management system, which will, among other things, enable ROSATOM to maintain and update a knowledge base of typical risks and risk management measures;

– To develop the risk management expert community in the industry;

– To adopt procedures (including initial assessment) for managing risks associated with projects and programmes in the sphere of new business development.

In 2023, the Corporation plans to perform activities in the URAN IRMS and activities forming part of the second stage of the URAN IRMS project (under the resolution of the Steering Board of ROSATOM's URAN IRMS project). Key activities forming part of the second stage will include the following:

– Integration with the system supporting investment activities (the Sirius information system), the Digital Science system of digital services and TCM NC;

– Implementation of modelling and quantitative risk assessment tools.

1.12.3. Internal control system

Key results in 2022

- Inspections conducted in ROSATOM and its organisations by Russian regulatory agencies did not reveal any major violations.
- Based on the findings of monitoring, internal control performance was highly rated by internal customers (with a score of 6.4 out of 7 against a target of 5.7).

The internal control system in ROSATOM and its organisations is based on:

- Russian laws and regulations;
- The IAEA requirements;
- The COSO model (The Committee of Sponsoring Organisations of the Treadway Commission);
- Guidelines for Internal Control Standards for the Public Sector by the Internal Control Standards Committee of the International Organisation of Supreme Audit Institutions (INTOSAI).

Key characteristics of the internal control system include the following:

- Preventive control and development of timely, comprehensive and practicable corrective measures;
- Efficient communication and cooperation with operating divisions at all stages of operations;
- Proactive change management;
- Growing demand from executives in ROSATOM's organisations for advisory services provided by the Internal Control and Audit Function (ICAF).

Results in 2022

The following measures were implemented in order to improve the internal control system:

- Methodological Approaches to the Internal Audit of Performance of the System of Internal Controls in Business Processes were developed;
- The application of incentives for employees of specialised internal control bodies (SICBs) who have special knowledge (expertise and practical experience) and act as competence centres in the Divisions was examined taking into account performance in 2021;
- The SICBs of ROSATOM's organisations assumed greater responsibility through an updated leadership model;
- Progress was made in the development of control activities in terms of supporting the implementation of sustainable development principles.

For the SICBs to provide reasonable assurance regarding the achievement of ROSATOM's strategic goals, the following steps were taken in 2022:

- Financial and business audits were focused on monitoring the implementation of projects and strategic programmes and minimising material risks;
- Following an audit of projects focused on the rehabilitation of disturbed land (Usolyekhimprom, the Baykalsk Pulp and Paper Mill, the Krasny Bor landfill), ROSATOM prepared a comprehensive development plan focused on repairing historical environmental damage;

- Following an audit of development of port infrastructure along the Northern Sea Route, measures were developed to enhance the efficiency of the internal control system with a focus on the use of subsidies, as well as timely and complete reporting;
- Following an audit of industrial dismantling of nuclear submarines, control over the performance of government contracts aimed at fulfilling the state defence order was enhanced;
- Following an audit of implementation of ROSATOM's digital strategies, a set of measures was implemented to optimise digital operations and speed up decision-making;
- The percentage of significant instances of non-compliance with sustainability guidelines adopted in the industry in audited organisations decreased by 64% compared to 2021;
- Measures were implemented to minimise operational risks related to sanctions.

The ICAF takes steps to create and maintain an internal professional community of auditors in the nuclear industry:

- Steps are taken to improve the intranet portal and the forum for the sharing of experience;
- Online meetings of internal auditors and controllers in the nuclear industry are held on a monthly basis in order to share best practices and practical experience in the sphere of internal audit, risk management and internal control (every event is attended by more than 180 people; 13 events were held in 2022);
- A centralised independent assessment of compliance with the professional standard for internal control officers (internal controllers) was carried out successfully for 150 employees of the SICBs of ROSATOM and nuclear organisations.

Outcomes of control activities in 2022

In the reporting year, ROSATOM's SICBs conducted 728 inspections in Russian nuclear organisations. External supervisory bodies conducted 13 inspections, including nine inspections by the Accounts Chamber of the Russian Federation. No instances of misuse or illegal use of budget funds or assets were detected.

Following the inspections, the ICAF developed 692 corrective measures and approved them for implementation.

Based on the findings of inspections conducted in the reporting year, disciplinary sanctions were imposed on 293 employees of nuclear organisations, including seven senior managers.

Stakeholder control

The Corporation continues to operate the Partner Special Monitoring and Analytics Unit designed for integrating ROSATOM's information systems in real time; it contains full information on complaints regarding procurement processes in the nuclear industry, as well as indicators for online monitoring of procurement procedures.

The Corporation continues to maintain a public information system for calculating the business reputation score of suppliers, which is one of the key risk assessment tools used in the course of procurement in the nuclear industry. The Uniform Industry-Wide Guidelines for Assessing the Business Reputation of Suppliers were updated. The information system for calculating the business reputation score of suppliers was migrated to modern software that does not rely on imported solutions; the recording of negative information on certain grounds was automated through integration with information systems applied in the industry. ROSATOM and JSC Russian Post signed a memorandum on the joint use and development of the information system for calculating the business reputation score of suppliers.

The Corporation carries out methodological work to produce recommendations and proposals for improving procurement processes in the nuclear industry based on the findings of investigation of complaints. A methodology has been developed for monitoring current procurement procedures.

Webinars are held for employees of the procurement function and controllers; they are focused on the most frequent issues and irregularities in the sphere of procurement.

As part of advisory activities, explanatory letters on individual issues are sent to customers to prevent similar violations. Advisory support is provided to employees of the procurement function regarding the application of provisions of the UIPS. A Q&A forum for employees in the industry has been put into operation as part of the Partner Special Monitoring and Analytics Unit to address questions related to the application of the business reputation score of suppliers.

The Central Arbitration Committee and the arbitration committees of the Power Engineering, Fuel and Engineering Divisions received 636 reports (complaints) from stakeholders regarding violations of procurement rules established by Russian legislation, the UIPS and other regulations of ROSATOM and its organisations supporting the UIPS. 365 complaints were investigated; 81 complaints (22.2% of the total number of investigated complaints) were deemed to be valid. Other complaints were withdrawn by complainants or were dismissed on the following grounds:

- Because the deadline for filing the complaint had expired;
- Because a similar complaint had been accepted for investigation or investigated by the Federal Antimonopoly Service;
- Because the complainant was not entitled to file a complaint (after the deadline for submitting bids has expired, complaints may only be filed by bidders that have submitted a bid);
- Because the defendant had taken corrective measures to address the violation before the complaint was investigated by an arbitration committee.

Systematic efforts of arbitration committees (including detailed explanations provided to customers/procurement authorities during the investigation of complaints concerning the nature of detected violations), the publication of biannual practice reviews and a library of arbitration practices maintained on the official procurement website of the nuclear industry helped to minimise the number of violations in the procurement process, which was reflected in a 25% decrease in the number of valid complaints as a percentage of the total number of purchases (from 0.14% in 2021 to 0.11% in 2022). The reversal of decisions on the recommendation of the Central Arbitration Committee following the investigation of just four complaints concerning the customer's failure to rebid enabled organisations in the industry to save about RUB 200 million. Following the investigation of complaints, a proposal was submitted to the Central Arbitration Committee, and steps were taken to enable foreign bidders to participate in the procurement process.

In addition, the Central Arbitration Committee reviewed 14 complaints related to the calculation of the business reputation score of suppliers, which is 55% less than in 2021 (all complaints were found to be invalid).

Indicator	2020	2022	2022
Third-party inspections			
Number of inspections by external supervisory bodies	18	17	13
including the number of inspections by the Accounts Chamber of the Russian Federation	12	11	9
Outcomes of inspections			
Number of actual incidents or significant shortcomings detected by government agencies as a result of inspection of processes in ROSATOM and its organisations that had not been detected by the ICAF	0	0	0
Quality of organisation and performance of internal financial control and internal financial audit as assessed by the Russian Ministry of Finance, %	96.8	100	*
Internal inspections			
Number of inspections by specialised internal control bodies (SICBs)	646	722	728
Outcomes of inspections			
Number of corrective measures implemented following the inspections	667	575	692
Number of employees on whom disciplinary sanctions were imposed	369	358	293
including the number of senior managers	12	22	7
Stakeholder control			
Number of complaints filed with the arbitration committees of ROSATOM and its Divisions regarding violations of procurement rules	899	869	636
Number of reports (complaints) accepted for investigation	596	496	365
Outcomes of investigation of complaints in the sphere of procurement			
Number of valid complaints	140	113	81
Valid complaints as a percentage of the total number of investigated complaints	23.5	22.8	22.2
Valid complaints as a percentage of the total number of purchases	0.19	0.14	0.11

** Annual monitoring for the reporting fiscal year is conducted based on sources of information until 1 June of the year following the reporting year.*

Plans for 2023

In 2023, efforts aimed at improving the performance of governance and internal control systems in ROSATOM and its organisations and further enhancing control activities will involve implementing a set of measures, including the following:

- Mastering project audit and strategic audit practices;
- Practising continuous auditing techniques;
- Developing control activities with a focus on improving sustainability maturity in the industry;
- Digitisation of control activities;
- Automation of the information system for calculating the business reputation score;
- Establishing an integrated nationwide system for assessing business reputation, with a single methodology centre at the Competition Policy Monitoring Office;
- Investigating complaints concerning procurement transactions made using the BRIEF solution and supplier verification.

1.12.4. Prevention of corruption and other offences

1.12.4.1. Prevention of corruption

ROSATOM's anti-corruption efforts are governed by the Anti-Corruption Plan of State Atomic Energy Corporation Rosatom and Its Organisations for the period from 2021 through 2024 developed pursuant to the Decree of the President of the Russian Federation on the National Anti-Corruption Plan for the Period from 2021 through 2024. Key focus areas include the following.

1. Ensuring that ROSATOM's employees fulfil their responsibilities and comply with prohibitions, restrictions and requirements for preventing or resolving conflicts of interest:

- Informing ROSATOM's employees, including those newly hired, about anti-corruption responsibilities, prohibitions, restrictions and requirements;
- Analysing information on the income of candidates for positions in ROSATOM (34 candidates and 55 of their close relatives in 2022); submitting declarations of income, expenses, property and liabilities (in 2022, the relevant information was provided with regard to 287 employees of ROSATOM and 415 members of their families); annual performance reviews at operational meetings chaired by ROSATOM's Director General; posting information on ROSATOM's official website under the established procedure (in 2022, the relevant information for 2021 was posted with regard to 131 employees);
- Ensuring that ROSATOM's employees report gifts received in connection with their position or the performance of their official duties under the established procedures and hand over the gifts for valuation, sale (buyback) and the remittance of proceeds from their sale.

2. Consistently applying Russian anti-corruption laws in order to enhance the efficiency of mechanisms for preventing and resolving conflicts of interest:

- Assigning responsibility to every executive for ensuring compliance of their subordinates with the provisions of anti-corruption standards and timely implementation of effective measures aimed at preventing and resolving conflicts of interest;
- Appointing an official responsible for making entries in the register of persons dismissed due to a loss of trust and confidence and removing information from the register by sending information to the competent department of the Office of the Government of the Russian Federation;
- Incorporating provisions stipulating that the organisation and its sole executive body are responsible for compliance with Russian or foreign anti-corruption laws in its region of operation, arranging and supporting the development and implementation of anti-corruption measures into the charters of nuclear organisations of any legal form (businesses, enterprises and institutions) as part of corporate actions involving their establishment, reorganisation and (or) acquisition;
- Incorporating provisions into the templates of employment contracts with ROSATOM's employees requiring them to inform the employer about personal interest that may create a conflict of interest and to take measures to prevent it;
- Posting methodological guidelines explaining the requirements of Russian legislation for preventing and resolving conflicts of interest on ROSATOM's official website at www.rosatom.ru;
- Informing persons appointed to positions involving anti-corruption responsibilities, restrictions and prohibitions in writing about matters related to preventing and resolving conflicts of interest and about anti-corruption laws and regulations.

3. Enhancing anti-corruption initiatives in the sphere of procurement of goods, work and services for government or municipal needs and in the sphere of procurement of goods, work and services by certain types of legal entities:

- Updating (as required) the Uniform Industrial Procurement Standard (the Regulations on Procurement) approved by ROSATOM's Supervisory Board (the UIPS);
- Posting the annual procurement programme, the procurement plan and the procurement schedule, as well as amendments thereto, in the integrated procurement information system and making them publicly available; conducting procurement through online trading platforms; maintaining electronic registers of contracts;
- Obtaining approval for all procurement procedures from anti-corruption departments, with the largest and most important procurement transactions to be approved by the authorised bodies of qualified buyers in order to prevent the risk of corruption in relations between customers and suppliers;
- Annual submission of information on income by employees of the authorised bodies;
- Ensuring that internal control and audit functions and (or) anti-corruption departments of ROSATOM and its organisations investigate reports of evidence of non-compliance detected in the procurement process; providing all stakeholders in the procurement process with an opportunity to contact the hotline by email or by phone or visit the procurement page on the official procurement website of the nuclear industry or on an online trading platform;
- Making the procurement of simple standardised goods by ROSATOM more transparent, which involves introducing fully automated electronic procurement conducted through the UIS Procurement System and electronic trading platforms; taking steps to make non-competitive procurement methods more transparent;
- Developing face-to-face and online anti-corruption training courses for employees of ROSATOM and nuclear organisations involved in the procurement process and rolling them out in cooperation with the Procurement, Logistics and Quality School of the Rosatom Corporate Academy.

4. Professional development activities focused on combating corruption:

- Using the set of training programmes and training courses developed by ROSATOM's educational institutions with assistance from experts from the Russian Presidential Academy of National Economy and Public Administration, the Institute of Legislation and Comparative Law under the Government of the Russian Federation and the Academy of the Prosecutor General's Office;
- Holding a wide range of training and awareness events that are accessible to virtually all employees of ROSATOM and its organisations under the established procedure.

Face-to-face training was provided for the following categories of employees stipulated in the National Anti-Corruption Plan:

- Persons newly hired by the Corporation and its organisations and appointed to positions involving responsibility for compliance with anti-corruption standards (more than 880 people);
- Employees in charge of procurement (more than 2,900 people);
- Employees responsible for preventing corruption and other offences (more than 5,900 people).

7,252 employees of ROSATOM and its organisations completed remote training courses.

1.12.5. Financial management

Key results in 2022

- The Company placed a second issue of 'green' exchange-traded bonds worth RUB 9 billion.
- A total of RUB 46.64 billion has been saved in the industry through intra-group financing since 2010.
- The credit ratings of ROSATOM and JSC Atomenergoprom were confirmed by rating agencies at the highest possible level: ruAAA with a stable outlook by Expert RA; AAA(RU) with a stable outlook by ACRA.

Implementation of ROSATOM's financial strategy in 2022

Given the scale of ROSATOM's business in Russia and abroad, the Corporation's management attaches special importance to the financial resilience of nuclear organisations in a changing environment. The financial strategy is an integral part of ROSATOM's overall business strategy. Its main aim is to ensure the financial resilience of the Corporation and its organisations in a changing external environment and to maximise the efficiency of financing and financial risk management.

ROSATOM's key financial transactions have been centralised. Cash flow management is centralised through:

- A single industry-wide regulatory framework governing financial management (including the Uniform Industry-Wide Financial Policy);
- Vertical integration of treasury departments in ROSATOM's companies, which are functionally accountable to ROSATOM's Treasury Department. The established treasury structure enables 100% control of funds in the industry;
- Concentration of principal treasury functions of nuclear organisations in ROSATOM's Treasury Department, which communicates with nuclear organisations in a shared information space and is essentially a liquidity management centre;
- An industry-wide automated system for recording treasury transactions (the Corporate Settlement Centre Information System), which enables the recording of all treasury transactions in all of ROSATOM's organisations on a daily basis.

Targets set for 2022 in the financial strategy in terms of engagement with banks, debt portfolio management as part of the day-to-day operations and projects of ROSATOM and its organisations, and further centralisation of financial transactions were met. In order to improve the performance of the treasury functions, in 2022, the Corporation continued to work towards:

- Accumulating spare cash in the accounts of pool leaders[1];
- Improving the accuracy of payment scheduling (a rolling liquidity forecast);
- Maintaining a competitive cost of servicing of the consolidated debt portfolio;
- Centralising treasury transactions (complying with the financial policy);
- Introducing project financing instruments as part of project implementation by the Corporation and its organisations.

1. A pool leader is an organisation of the Corporation on whose accounts spare cash is accumulated and subsequently redistributed between ROSATOM's organisations through loan agreements. The organisation performing the functions of a pool leader is appointed under the resolution of ROSATOM's executive bodies.

In 2022, ROSATOM continued to implement and expand the scope of the project focused on further centralisation of the treasury function, including the rollout of the Payment Factory at JSC Atomenergoprom (hereinafter referred to as the Payment Factory). This project is aimed at further improving the performance of the treasury function in the industry.

A total of about RUB 46.64 billion was saved in the industry through intra-group financing between 2010 and 2022.

Green bonds

In 2022, JSC Atomenergoprom placed the second issue of 'green' exchange-traded bonds (series 001R-02) with a par value of RUB 9 billion. The issue was placed as part of the series 001R exchange-traded bond programme worth up to RUB 100 billion inclusive. The bonds have a maturity of three years.

Proceeds from the bond placement have been used to refinance expenditure on the implementation of the Wind Power programme.

The securities were more than eight times oversubscribed. As the bond issue was oversubscribed, the Company was able to lower the coupon rate to 8.95% per annum, which corresponds to an effective yield of 9.15%.

The Expert RA rating agency acting as an independent verifier confirmed that the bond issue complied with the Green Bond Principles (GBP) of the International Capital Market Association (ICMA) and with the provisions of the Russian Green Finance Guidelines developed by VEB.RF.

Parties to the transaction included all categories of investors, such as banks, managers, investment firms and insurance companies; it also generated demand from individuals.

Earlier, in 2021, JSC Atomenergoprom placed the first issue of 'green' exchange-traded bonds (series 001R-01) with a par value of RUB 10 billion. The issue was placed as part of the series 001R exchange-traded bond programme worth up to RUB 100 billion inclusive. The bonds have a maturity of five years. This was the first placement of exchange-traded bonds by a Russian issuer to finance renewable energy sources.

Receiving and maintaining credit ratings

In the reporting year, JSC Atomenergoprom continued to take steps to the maintainthe credit rating assigned by the national rating agency, JSC Expert RA.

As at 31 December 2022, the national rating agency JSC Expert RA confirmed the credit rating assigned to JSC Atomenergoprom at ruAAA with a stable outlook.

In addition, in 2022, the Analytical Credit Rating Agency (ACRA) confirmed the credit rating assigned to the Corporation at the highest possible level, AAA(RU), with a stable outlook.

Raising financing for day-to-day operations and for projects

As part of its day-to-day operations and project activities, the Corporation successfully maintained the average interest rate on its total debt portfolio denominated in Russian roubles at 8.9% as at 31 December 2022. Despite turbulence on the Russian financial market amid unprecedented sanctions pressure on financial and industrial sectors of the Russian economy, throughout 2022, ROSATOM maintained sufficient liquidity to ensure that it and its organisations operate normally and fulfil their contractual obligations on time.

Both JSC Atomenergoprom and other organisations of ROSATOM continued to obtain funding on preferential terms, including for the implementation of digital transformation projects aimed at improving management efficiency in the nuclear industry and implementing domestically produced IT solutions that do not rely on imported technology as part of a subsidy programme run by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation pursuant to Decree No. 1598 of the Government of the Russian Federation dated 5 December 2019.

ROSATOM continued to use suretyship to secure obligations of organisations in the industry to their counterparties. This measure helps to reduce both the cost of bank guarantees and the cost of financing raised by the Corporation (including interest expenses).

JSC AtomCapital (a wholly owned subsidiary of the Corporation acting as a pool leader in intra-group financing of FSUEs) enabled an optimal debt burden distribution between JSC Atomenergoprom and organisations and enterprises outside its scope.

ROSATOM continued to search for sources of financing for projects in traditional and new business areas:

- As part of the development of a concession model for the financing of construction of a pilot small nuclear power plant in the Sakha Republic (Yakutia), an agreement on the implementation of a zero-carbon nuclear power generation project in the Arctic zone of the Sakha Republic (Yakutia) in the form of a public-private partnership was signed with the Ministry for the Development of the Russian Far East and Arctic at the 2022 St. Petersburg International Economic Forum, and an agreement on cooperation in the development of a mineral resource centre in the Arctic zone of the Sakha Republic (Yakutia) was signed with the Ministry for the Development of the Russian Far East and Arctic, the Ministry of Natural Resources and Environment and the Head of the Sakha Republic (Yakutia) at the 2022 Eastern Economic Forum;
- Financial documents were signed to finance the construction of three industrial facilities as part of the implementation of the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project. Loans to be provided by the financial partner will total RUB 22.1 billion. The project involves setting sustainable development targets, the achievement of which will result in a decrease in the cost of financing;
- As part of the project to build the multipurpose fast neutron research reactor (MBIR), conditions precedent were met for obtaining project financing, and the first drawdown was made under the syndicated loan agreement based on the principles of the Project Finance Factory (pursuant to Decree No. 158 of the Government of the Russian Federation dated 15 February 2018), with the target amount of funding to be raised from the banks totalling RUB 23.3 billion;
- A dedicated consortium of banks was formed to finance a project to build a plant that will produce lithium-ion batteries and energy storage systems in Russia (under a syndicated loan agreement based on the principles of the Project Finance Factory).

Approaches to taxation

ROSATOM is a major taxpayer in Russia. Its organisations make significant contributions to budget revenue in their regions of operation. Information on taxes paid is regularly provided to regional administrations, the Government and the President of the Russian Federation. The Corporation views strict compliance with laws as a necessary prerequisite for the implementation of its strategy.

In order to develop a single approach and minimise tax risks, ROSATOM develops and regularly updates the following uniform industry-wide documents regulating tax matters: the Uniform Accounting Policy for Taxation; the Methodological Guidelines on Tax Due Diligence of Transactions; the Methodological Guidelines and Procedure for Communication on Transfer Pricing Matters; the Procedure for Calculating Income Tax for Controlled Foreign Companies and the Methodological Guidelines on Inspecting and Classifying Foreign Entities for the Purpose of Income Tax Calculation in the Russian Federation; the Procedure for Compiling Country-by-Country Data; the Methodological Guidelines on Identifying and Assessing Risks to Be Identified for the Purpose of Tax Monitoring; the Methodological Guidelines on Assessing the Applicability of Benefits under Tax Treaties (MLI).

ROSATOM has developed and operates a corporate risk management system on an ongoing basis. The tax risk management process involves risk identification and assessment, as well as the development and implementation of controls aimed at preventing or minimising risks, analysing the outcomes of the relevant measures and disclosing information on risks. Tax risk management approaches are regulated by uniform industry-wide guidelines and recommendations. In addition, those organisations that have joined the tax monitoring programme prepare quarterly tax risk reports to be submitted to tax authorities, as required by the Federal Tax Service of Russia (the risk register is compiled and updated based on the Industry-Wide Risk Library). ROSATOM monitors the performance of the tax function of its subsidiaries; this involves setting the relevant key performance targets (for the materiality of errors and for the share of non-deductible expenses).

Stakeholder engagement and management of tax issues

Between 2013 and 2022, major organisations in the industry formed part of the consolidated taxpayer group, with JSC Atomenergoprom as a responsible member of the consolidated taxpayer group that collects data and files income tax returns. ROSATOM actively cooperates with the Federal Tax Service in developing the tax monitoring system in the Russian Federation. Starting from 2020, 24 organisations in the industry, including ROSATOM, JSC Rosenergoatom, JSC TENEX, and enterprises in the Fuel and Engineering Divisions joined the tax monitoring programme. Another nine organisations are to join the programme as from 2024.

In the course of tax monitoring, the organisations use the Tax Monitoring Data Mart information system. This is a centralised industry-wide IT solution for information exchange with the Federal Tax Service. This system provides tax officials with real-time access to detailed data underlying the tax reports of the enterprises, including scanned contracts and primary accounting records.

ORGANISATIONS HAVE JOINED THE TAX MONITORING PROGRAMME SINCE 2020

Reporting by budget level in the Russian Federation

Tax payments by ROSATOM to budgets of different levels in the Russian Federation, RUB billion

Level of the budget system	For 2020	For 2021	For 2022	2021/2022, %
Federal	150.5	170.5	213.0	24.9%
Regional	99.0	78.2	77.8	-0.5%
Local	0.4	0.5	0.6	20%
TOTAL:	**249.9**	**249.3**	**291.4**	**16.9%**

Plans for 2023 and for the medium term:

- To roll out the Payment Factory project;
- To ensure a consistent payment discipline for intra-group financing;
- To improve the accuracy of medium-term cash flow planning;
- To prevent internal competition for credit resources between organisations;
- To continue to centralise cash management;
- To focus on maintaining relations with supporting banks as the most reliable partners providing accessible funds in terms of both volumes and cost;
- To fulfil all obligations (including covenants) to existing lenders and rating agencies;
- To discuss ROSATOM's project financing arrangements in order to reduce recourse on the group and minimise the use of the Corporation's consolidated investment resources (including through the use of project financing instruments);
- To expand the range of financing instruments used by the Corporation (where it is economically feasible to do so) in order to reduce the cost of debt service and ensure timely and full financing of the investment programme of organisations in the industry on acceptable terms and conditions;
- To continue to discuss potential areas of cooperation in the sphere of digitisation with credit institutions.

1.12.6. Investment management

Key results in 2022

- The investment programme was 83% completed (+7 p.p. compared to 2021).
- Return on the investment portfolio stood at 16.7% (+0.1 p.p. compared to 2021).

ROSATOM's approaches to investment management

- A distributed system has been built for investment decision-making by the governing bodies of ROSATOM and its organisations; it is aligned with the distribution of competence centres in the industry;
- A phase-gate approach is applied to project implementation, with decisions on key milestones made in a staged process;
- Key projects are monitored at the level of the Corporation;
- Investment decisions related to day-to-day operations of assets are delegated to ROSATOM's organisations in order to speed up the decision-making process;
- To improve the quality of investment decision-making, opinions of experts independent from the project initiator are taken into account;
- ROSATOM's project portfolio is built as a set of projects of organisations in the industry for a year and for the medium term based on available investment resources and the required rate of return;
- Experts are engaged to perform an in-depth probabilistic risk analysis for significant projects; the findings of analysis are incorporated in the decision-making system;
- A comprehensive audit is conducted, which helps to formulate recommendations on how to improve project planning and implementation;
- Measures to raise external financing for projects are being developed.

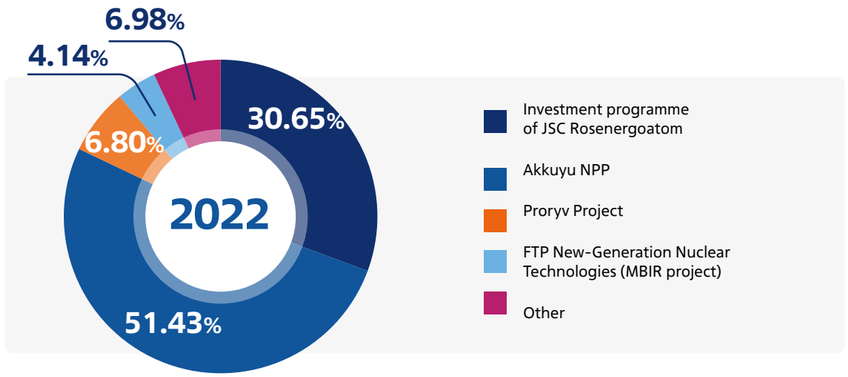
Results in 2022

In 2022, ROSATOM's investment programme was 83% completed[1]. Performance against the targets of the investment programme (including in the Divisions) increased by 7 percentage points compared to 2022 due to the gradual lifting of COVID-related restrictions.

At the same time, return on ROSATOM's investment portfolio stood at 16.7%[2].

1. Including the investment programme of JSC Rosenergoatom.
2. Calculated for the period from 2022 through 2099.

Breakdown of investments in significant projects[1]



Performance of the Digital Evolution Ventures Fund

In 2018, a venture capital fund, Digital Evolution Ventures, was founded in ROSATOM by JSC Atomenergoprom and LLC Orbita Capital Partners. Its key task is to create a diversified portfolio of promising projects in various development stages. As part of its investment activities, the Fund has prioritised and continues to focus on innovative projects in the sphere of digitisation, automation, energy storage systems, the development of artificial intelligence (AI), medical technologies and the development of user-friendly online services, which have a high potential for return on investment in the medium term and support long-term global competitiveness of various sectors of the Russian economy.

Although the Fund has been operating in a challenging economic environment in the country and amid challenges posed by the imposition of international sanctions, which have seriously affected the venture capital market, the Fund continued to search for and select promising companies that are able to make an important contribution not only to ROSATOM's business but also to the Russian economy throughout 2022. As a result, the project pipeline includes more than 500 companies across various sectors of the economy: AI and MedTech (each accounting for 19% of the total number of projects in the pipeline), the Smart City (17%), Digital Solutions (13%), etc. The investment portfolio comprises 12 promising projects focused on various technologies, with investment totalling about RUB 1.2 billion; more than 15 companies across various business areas (artificial intelligence, a logistics platform, development of solutions for business process optimisation, medical technologies, metalworking equipment, digital twins, microelectronics, neurorehabilitation, image recognition, etc.) are being actively reviewed, with potential investments totalling about RUB 2.5 billion.

Given that 2023 will be the final year when the Fund invests in new projects, in the coming period, the Fund will focus on closing deals on projects that it was actively reviewing in 2022, improving the performance of portfolio companies to enable them to move to the scale-up stage, and exploring opportunities for extending the Fund's investment period and expanding its size.

1. Apart from NPP construction in Russia.

Measures to improve investment efficiency

In the reporting year, further steps were taken to fine-tune the project management model for the implementation of federal projects by ROSATOM and its organisations taking into account the updated requirements of the Department of Project Activities of the Government of the Russian Federation.

Employees in the industry continued to develop their competences at the Project Management School. 306 people underwent assessment, subsequent training and certification in 2022.

Investment processes were adapted, given the need for prompt response amid the deteriorating international situation: project ranking criteria for building the project portfolio were revised; review and approval processes for import substitution projects were simplified.

Given external restrictions imposed on the Russian Federation in 2022, the Corporation restructured its project portfolio in order to minimise risks. Projects exposed to risks related to the actions of unfriendly countries were refocused on the Russian Federation and/or friendly countries in terms of both supplies of resources (equipment and components required for implementation) and revenue generation.

The Corporation adopted an approach to the financial autonomy of its Divisions depending on the level of risk involved in investment projects. It enables ROSATOM to monitor projects that are the most significant in terms of risks and at the same time to speed up investment decision-making by delegating projects not involving risks to which ROSATOM is exposed to the level of Financial Responsibility Centre 2.

The project to reduce red tape in the investment process produced the first results: the project review process was streamlined; a new project manager tool for verifying the completeness and content of project data sheets was introduced; a network scheduling tool based on standard office software was developed to replace specialised IT systems.

The Investment Strategy tool was operationalised in Financial Responsibility Centre 2; this is an additional medium-term investment and project planning tool that forms part of the overall industry-wide investment strategy and contains information on focus areas of investment activities and organisations in the industry that are participating in them.

A project to migrate the Sirius information system (project portfolio management) to a new software platform that does not rely on imported technology was approved and is being implemented in accordance with ROSATOM's plans.

Plans for 2023 and for the medium term:

- To continue to reduce red tape in investment and project processes and to develop project methodology on a systematic basis;
- To align the medium-term investment planning mechanism (investment strategy) with strategic and budget planning tools and schedules;
- To expand the practical application of road maps in portfolio investment management;
- To adjust project execution plans in order to minimise the lag caused by COVID-19 pandemic restrictions imposed in 2021 and the deterioration of the international situation in 2022;
- To increase the level of digitisation of projects and investment activities.

1.12.7.Procurement management

Key results in 2022

- Savings from competitive tendering procedures (using ROSATOM's own funds and federal budget funds) totalled RUB 28.16 billion.
- The share of electronic procurement (excluding procurement for foreign projects) totalled 99%.
- Pursuant to the order of the Prime Minister of Russia to disclose information on counterparties, ROSATOM disclosed information on 19,406 counterparties (100%).

The Uniform Industrial Procurement Standard (UIPS) (the Regulations on Procurement) of ROSATOM is the main document that regulates the procurement activities of ROSATOM and organisations in the industry.

Governing and supervisory bodies in the sphere of procurement include:

- The Central Procurement Commission;
- Permanent procurement commissions of the Divisions;
- The contract management function (for procurement using federal budget funds in accordance with the Federal Law on the Contract System of the Federal and Municipal Procurement of Goods, Work and Services (Federal Law No. 44-FZ));
- The Central Arbitration Committee of ROSATOM and arbitration committees of the Divisions;
- The Chief Controller.

Official procurement website: www.zakupki.rosatom.ru.

ROSATOM ranks high in professional procurement rankings every year

In 2022, the Corporation was included in major procurement rankings and received the following awards:

- The Corporation topped the National Transparency Ranking in the Guaranteed Transparency category;
- ROSATOM received a commendation from JSC Russian Small and Medium Business Corporation for expanding access to procurement procedures for small and medium-sized businesses;
- ROSATOM topped the ranking of customer loyalty to small and medium-sized businesses and received an award from JSC Russian Small and Medium Business Corporation for expanding reliable end markets and developing partnerships with small and medium-sized businesses;
- ROSATOM's Director for Procurement, Logistics and Quality Management was included in the top 5 in the Ranking of the Best Chief Procurement Officers by the RAEX rating agency (RAEX Analytics) and Expert RA;
- ROSATOM's Head of Quality Management received an award from the Russian Organisation for Quality for outstanding practical achievements in the sphere of quality.

Implementation of the annual procurement programme[1]

In 2022, the demand of nuclear organisations for products with the required price and quality was met in full.

Orders placed under a competitive tendering procedure in 2022

Type of procurement	Number of procurement transactions	Total value, RUB billion	Savings achieved, RUB billion	% of the value of completed procurement transactions
Using own funds of ROSATOM and its organisations	33,520	1,443.9	26.4	5.1%
Using federal budget funds[2]	340	96.3	1.76	2.0%

As part of the annual procurement programme, contracts were concluded with 24,354 counterparties. The share of electronic procurement (excluding procurement for foreign projects) totalled 99%.

Volume of procurement through competitive tendering and achieved savings[3], RUB billion

Indicator	2020	2021	2022
Total value of orders placed under an open competitive tendering procedure	951.05	1,087.3	1,540.2
Using ROSATOM's own funds	903.3	1,003.3	1,443.9
Using federal budget funds	47.75	84.00	96.3
Total savings, including:	30.87 (6.2%)	29.25 (4.28%)	28.16 (4.7%)
Savings from competitive tendering procedures using ROSATOM's own funds	29.7 (6.6%)	28.0 (5.2%)	26.4 (5.1%)
Savings from competitive tendering procedures using federal budget funds	1.17 (2.5%)	1.25 (1.7%)	1.76 (2.0%)

Expanding access to procurement procedures for SMEs

In 2022, nuclear enterprises concluded 40,707 contracts with small and medium-sized enterprises (SMEs) worth a total of RUB 312.9 billion; this included 51,745 contracts worth a total of RUB 191.8 billion concluded with SMEs by enterprises subject to Decree No. 1352 of the Government of the Russian Federation. The value of contracts concluded following tendering exclusively among SMEs totalled RUB 65.1 billion. The target share of procurement from SMEs was achieved.

In 2022, representatives of ROSATOM and its organisations took part in 10 workshops held jointly with JSC Russian Small and Medium Business Corporation, which were attended by representatives of 895 SMEs. Overall, between 2016 and 2022, a total of 96 workshops were held, which were attended by 10,262 representatives of SMEs.

1. The annual procurement programme is publicly available at: http://zakupki.rosatom.ru/Web.aspx?node=gpzz.
2. Taking into account orders placed under an open competitive tendering procedure using the funds allocated through the Russian Ministry of Industry and Trade under Federal Law No. 44-FZ.
3. Savings from competitive tendering are the difference between the set initial maximum purchase price and the purchase price obtained as a result of competitive tendering. Only completed procurement procedures are taken into account.

CONTRACTS CONCLUDED WITH SMALL AND MEDIUM-SIZED ENTERPRISES (SMEs)

To apply new procedures for procurement from SMEs and new document forms, ROSATOM made adjustments to the UIS Procurement System. This included its integration with the integrated information system and selected electronic trading platforms, which made it possible to halve the workload of users in the industry and implement additional controls in order to minimise the number of errors in the course of procurement from SMEs.

In 2022, ROSATOM and JSC SME Bank concluded a cooperation agreement aimed at providing support to SMEs in ROSATOM's host towns and cities.

Data reliability audits, including supplier assessment

In 2022, ROSATOM continued to improve the procedure for conducting data reliability audits, which is a tool for confirming that a supplier is able to carry out a contract in good faith. To do so, manufacturers are audited by a commission set up by the customer and having the required competences and expertise regarding the contract being tendered.

In 2022, 204 audits were conducted among manufacturers, contractors and service companies participating in procurement procedures: 161 audits were successfully passed by manufacturers/suppliers; 15 potential suppliers of products failed the audit; another 28 enterprises refused to undergo an audit. 35 audits were conducted remotely using state-of-the-art information and communications technologies. Analytics on contract performance show that the audit procedure helps to increase the share of contracts performed on schedule.

In 2022, pursuant to the Order of ROSATOM on Amending Uniform Industry-Wide Methodological Guidelines on Data Reliability Audit, the threshold level for successfully passing an audit was raised to 80 points for manufacturers that have no experience in the manufacture of types of equipment classified as safety class 3 or higher in the course of procurement of similar products. The audit included an assessment of sustainability maturity of 29 suppliers/contractors.

In the context of supplier assessment, it is also important to improve the industry-wide procurement and logistics system and develop relations with suppliers and the relevant mechanisms for communication and cooperation. In 2022, ROSATOM continued to develop the logistics process by improving the relevant methodology.

To improve the quality of products supplied to ROSATOM, as from 15 January 2022, the selection criterion stipulating that all measures to address the root causes of nonconformities detected during the performance of contracts concluded earlier must be implemented before the deadline for submitting tender bids is applied not only to suppliers under the contract but also to joint contractors that they engage (manufacturers and subcontractors). This selection criterion is currently applied by more than 200 nuclear organisations in the course of procurement of critical products, large-scale procurement (with a value totalling RUB 100 million or more), the procurement of equipment forming part of those components of nuclear facilities that are critical for their safety and security, and goods that have an impact on the safety and security of nuclear facilities (worth RUB 500,000 or more).

In 2022, ROSATOM successfully completed the project to develop its Unified Industry-Wide Quality Management System, UIS Quality. The System is designed for automating a number of processes, such as nonconformity management, inspection management, data reliability audit, recording non-conformance costs, preparing documents for claims management, and quality reporting. The use of the System has made it possible to reduce the lead time, improve product and process quality, and transition from hard copy documents to electronic document management involving the use of electronic signatures. In 2022, ROSATOM continued to take steps to integrate the UIS Quality System with related industry-wide and divisional information systems. To date, the System has been integrated with more than 20 information systems used in the industry, such as a trusted service platform enabling the use of enhanced unqualified electronic signatures, divisional accounting systems, a system for recording events at nuclear power plants (NPP Experience), the procurement management system (UIS Procurement), etc.

To date, more than 18,000 users from 250 organisations in the industry and 1,300 external counterparties have been connected to the system, and more than 90,000 documents have been registered. For all nonconformities recorded in the UIS Quality System, measures are developed and implemented to address the nonconformities and their root causes in accordance with the Uniform Industry-Wide Nonconformity Management Procedure. According to a survey, the level of user satisfaction with the functionality of the UIS Quality System was assessed at 94%.

Under the resolutions of ROSATOM's Supervisory Board, the Uniform Industrial Procurement Standard (the Regulations on Procurement) of ROSATOM (hereinafter referred to as the UIPS) was updated twice under the procedure approved by the Corporation. One of these updates was necessitated by amendments to Federal Law No. 223-FZ of 18 July 2011 on the Procurement of Goods, Work and Services by Certain Types of Legal Entities (hereinafter referred to as Law No. 223-FZ). Key changes included the following:

- In accordance with part 5.4 of Article 3 of Law No. 223-FZ, for customers subject to Law No. 223-FZ, a list of goods, work and services was approved with payment deadlines different from those set in part 5.3 of Article 3 of Law No. 223-FZ;
- In accordance with parts 15 and 16 of Article 4 of Law No. 223-FZ, amendments were made to the list of conditions prohibiting the customer from posting procurement information and conditions for selecting the form of procurement;
- An additional rationale was provided for direct procurement from the sole supplier of goods, work or services required for fulfilling the state defence order and for stockpiling products, feedstock, materials, semi-finished products or components, as stipulated in paragraphs 3–3.2 of Article 7.1 of Federal Law No. 275-FZ of 29 December 2012 on the State Defence Order (if the Government of the Russian Federation has adopted the relevant resolution on the implementation of special economic measures, as stipulated in Federal Law No. 61-FZ of 31 May 1996 on Defence, and if competitive tendering is impossible, including due to a lack of time for competitive tendering, provided that it is economically feasible for the customer or required for maintaining the production process);

– In accordance with part 7 of Article 3 of Law No. 223-FZ, amendments were made to the Regulations on the Procurement Commission concerning the procurement of goods, work and services using ROSATOM's own funds;

– In accordance with paragraph 13 of part 4 of Article 1 of Law No. 223-FZ, the procedure for maintaining and applying the List of Related Parties was revised;

– In accordance with parts 12, 14, 17, 31 and 32 of Article 3.4 of Law No. 223-FZ, amendments were made with regard to independent guarantees to be provided as tender security or contract performance security in the course of procurement when only SMEs are eligible for tendering. Such independent guarantees are subject to the provisions and requirements established by Law No. 223-FZ;

– The procedure for remote data reliability audit was formalised (engagement with teams using video conferencing and information and communications technologies; the testing of ICT solutions; the submission of a filled-in questionnaire for desk audit);

AUDITS CONDUCTED AMONG MANUFACTURERS AND CONTRACTORS

– The following changes were made to the Methodology for Calculating the Initial Maximum Price:
  - Adjustments for the exchange rate index are now applied not only to the procurement of long-lead equipment, but generally for imported goods when payments are made in roubles;
  - The adjustment procedure for aligning pricing sources with the terms of procurement was revised. It was stipulated that the price set in a technical and commercial proposal may be adjusted within a 20% range taking into account volumes after the technical and commercial proposal has been received;
– Amendments were made to the Methodology for Establishing Requirements and Tender Evaluation Criteria in Procurement Documentation and Bid Processing (the Selection and Evaluation Stages) concerning the following:
  - The use of information on the revocation of approval of the manufacturer quality assurance programme as a selection criterion in the tendering process;
  - Setting additional requirements for bidders and manufacturers in the course of procurement of equipment classified as safety class 3 according to federal rules and standards;
  - Amendments to requirements for documents confirming that machinery and equipment are in good order (information from the maintenance and repairs log), if the equipment is not second-hand.

To make non-competitive procurement procedures more transparent, optimise and speed up logistics processes, in 2022, ROSATOM continued to develop the online store used in the nuclear industry. As part of this approach, procurement has been fully automated and is conducted electronically on four online platforms. All actions

(calculation of the initial maximum price, requests for price reduction, selection of the winner, generation of records and conclusion of the contract) are performed via an electronic trading platform, which is an efficient measure for preventing corruption and other wrongdoings.

Amid restrictions related to the spread of the new coronavirus disease (COVID-19) and the imposition of sanctions, in 2022, further steps were taken in the industry to reduce procurement lead time. Pursuant to ROSATOM's orders, a number of simplifications were developed and introduced, including the following:

– To determine the fair price of products to be purchased, ensure pricing transparency and enable reasonable and efficient spending, provisional methodological guidelines on price audit were issued;

– To minimise errors on the part of bidding SMEs, uniform procedures for tendering exclusively among SMEs were updated; more specifically, documents such as the summary of costs, the schedule for the supply of goods (performance of work/provision of services), background information on experience and personnel are to be filled in on an electronic trading platform, with the bid and the technical proposal to be attached by the bidder;

– In order to establish price adjustment rules for contracts for the construction, renovation, major repairs or demolition of capital facilities due to a significant rise in prices for construction resources[1], pursuant to ROSATOM's order dated 17 March 2022, the Uniform Industry-Wide Methodological Guidelines on Price Adjustment under Contracts for the Construction, Renovation, Major Repairs or Demolition of Capital Facilities due to a Significant Rise in Prices for Construction Resources were approved;

– In order to establish an integrated schedule and cost control chain covering the entire life cycle of a facility through uniform coding of work and costs, WBS and CBS codes were incorporated into procurement regulations;

– The requirement stipulating that a bidder must have completed a plan of corrective measures to address delays in achieving key milestones during the fulfilment of orders from the Corporation and nuclear organisations for a similar procurement item started to be applied;

– In the course of procurement of critical equipment or equipment forming part of safety-relevant systems and components (including the procurement of products, components and semi-finished products for such equipment), the customer is required to review nonconformities detected earlier for similar equipment. If a critical nonconformity is discovered, requirements may be set stipulating that machinery and mechanisms, special devices and human resources must be in place to prevent similar nonconformities in the future;

– Further steps were taken to support the fullest possible transition to electronic document management (documents drafted while preparing for and conducting procurement procedures are approved and signed in the integrated industry-wide electronic document management system (IIEDMS) and are considered to be equivalent to documents signed in hard copy), with the requirement remaining in force that persons signing documents in the course of procurement activities must obtain an enhanced qualified electronic signature;

– A remote meeting format remained a preferred option: the Procurement Commission held its meetings using audio/video conferencing. Requirements for holding online meetings were incorporated in the technical specifications for UIS Procurement 2.0; permitting bodies (the Central Procurement Commission, the Committee on Cost, the Committee on Procurement Strategies) held meetings by correspondence or using audio/video conferencing;

– The handling of complaints related to procurement was also switched to a remote format.

To advance the automation of logistics and procurement processes, a shared information space has been created; it comprises the following industry-wide subsystems:

1. Taking into account the provisions of Decree No. 1315 of the Government of the Russian Federation dated 9 August 2021.

- Procurement 2.0, a subsystem developed as part of the import substitution programme and designed to automate procurement management business processes related to procurement planning and preparation, tendering and initiating the conclusion of a contract/supplementary agreement following the tendering;
- In 2021 and 2022, the first and second releases of UIS Procurement 2.0 (procurement planning and preparation for the publication of procurement notices) and an updated procurement website of the nuclear industry were piloted. Work is currently underway on the third release, which includes tendering functionality and is integrated with external resources, including integrated information systems and electronic trading platforms;
- The subsystem for communication with suppliers (UIS Contract) has been piloted. It is a platform containing information on contractual obligations and enabling the supplier and the customer to exchange information in a shared information space and to sign documents (using EQES and EUES[1]). Suppliers can view all their contracts, the status, risks, fulfilled and outstanding obligations. The customer can generate 'chains' of contracts; the system provides information on how a breach of one contract may affect other contracts, which enables the customer to develop measures to minimise the risk of breach of contract in a timely manner and to create escalation chains required for decision-making. In 2022, the pilot operation of the first ('Customer Portal') and second ('Supplier Portal') releases was completed; the first group of reports was prepared; migration to a more efficient platform ('Form Designer') was completed;
- The Brief Digital Solution: this is a subsystem supporting the new approach to procurement automation. As part of the project, a prototype of the subsystem has been developed, and pilot procurement transactions have been made between related parties in the nuclear industry. This solution is designed to improve operational efficiency of the organisation of procurement and minimise the risk that products supplied to ROSATOM may be of poor quality; it will also help to enhance digital culture. As part of the project, the first and second releases of the subsystem have been piloted, and procurement transactions have been made between nuclear organisations; catalogues of products of nuclear organisations that supply or manufacture products have been populated in order to compile a general product catalogue. Preparations are underway for the piloting of the Brief functionality; this will involve encouraging third-party suppliers (not controlled by the Corporation) to use the solution;
- A project has been initiated to migrate the UIS Quality functionality to the shared information space.

To improve the overall efficiency and quality of procurement and contracting, in 2022, ROSATOM continued to develop the Qualified Buyer Service (QBS). The QBS performs the full range of competitive and non-competitive procurement activities and the relevant preparations. In 2022, services provided by the QBS to ROSATOM and JSC Atomenergoprom with regard to procurement under Law No. 223-FZ covered 88 out of 100 divisions, while services related to procurement under Law No. 44-FZ covered 100% of divisions of the internal customer.

Performance of the Qualified Buyer Service

Law	Number of completed procurement procedures	Value, RUB billion	Change, 2022/2021	Average lead time in 2022, days[2] (2022/2021)
223-FZ	683	45.7	+150%	46 (-3)
44-FZ	328	96.3	+15%	36 (-2)

1. EQES (EUES) stands for an enhanced qualified (unqualified) electronic signature.
2. The time from the identification of needs to the contract award as part of the procurement process under Law No. 223-FZ and the time from the identification of needs to the tender award as part of the procurement process under Law No. 44-FZ.

In 2022, satisfaction with the quality of service was assessed at 98.8% out of 100% (the highest possible score on the rating scale established by the methodology).

Following the investigation of complaints by the Federal Antimonopoly Service of Russia, there were no complaints deemed to be valid. Following inspections conducted in 2022 by the Accounts Chamber, the Prosecutor General's Office, the Auditing Commission and the internal financial audit function, no irregularities were detected in procurement activities.

A tailored professional approach has made it possible to optimise the procurement of certain products: translation services, asset and real estate valuation services, insurance services, due diligence services, market valuation services and legal support of transactions, the production and supply of trophies, etc. Other enterprises in the industry now also draw on this experience.

To support new businesses, the QBS actively participates in projects run by the Digitisation Unit, including the Navigator Digital Management System; projects of Private Institution Cifrum, the Business Intelligence Department, the Office of Support for New Businesses and the Northern Sea Route Directorate; an inter-divisional RPS project to streamline end-to-end processes over the APCS life cycle and an RPS project to improve the Current Payments subprocess. Furthermore, the contribution of the QBS to the implementation of these projects is highly appreciated by functional executives (with seven letters of appreciation received in 2022).

In order to ensure supply chain resilience and reliability, a 10-year demand plan (code-named 'Atomplan') has been developed in the industry. This enables ROSATOM to place long-term orders with suppliers both in and outside the industry, making it possible to develop products tailored to ROSATOM's needs, launch batch production, cooperate on product quality and process flow optimisation, use flexible pricing, etc.

In 2022, ROSATOM developed and started to implement the first strategies for critical categories. In the coming years, ROSATOM plans to expand the scope of long-term orders to include other categories that are less important.

Training and development in the sphere of procurement

In order to develop employees' competences to enable more effective use of procurement, logistics and quality management mechanisms, in 2022, the Procurement, Logistics and Quality School conducted a wide range of activities.

In 2022, 1,492 people participated in face-to-face training courses and webinars conducted by the Procurement School. Due to the easing of COVID-related restrictions, face-to-face training was resumed. A well-balanced combination of face-to-face and online training has proved to be efficient and convenient for the industry. During the year, free online courses on procurement, logistics and quality management available on industry platforms garnered more than 15,000 views. The Corporate Academy jointly with experts from ROSATOM and other organisations in the industry produced video and audio content focused on topics related to procurement and designed to provide training in the use of new tools and approaches and promote them.

In order to develop employees' competences in the sphere of nonconformity management, in 2022, ROSATOM's Technical Academy provided specialists with training in nonconformity management techniques and the use of modules of the UIS Quality System. A total of 1,166 specialists completed continuing professional education courses on these topics and received the relevant certificates.

PEOPLE

PARTICIPATED IN TRAINING EVENTS HOSTED BY THE PROCUREMENT SCHOOL

In addition, specialists in the industry were provided with online training using the RECORD Mobile system (10,023 people underwent training between 2017 and 2022). In 2022, 324 employees completed the Data Reliability Audit training programme at the Rosatom Corporate Academy in order to undergo certification qualifying them to audit manufacturers and contractors.

The Procurement Assistance Portal information system has been created; it enables employees of nuclear organisations to continuously gather information on existing and emerging issues without sending official letters to ROSATOM. In addition, all organisations in the industry are now able to search across all questions and answers and sort information by topic on the Procurement Assistance Portal. A topic directory has been developed for the Assistance Portal; all enquiries on the portal are sorted based on the topic directory and can be filtered. Keyword search across processed enquiries has been introduced, and a mechanism has been provided for the submission of notifications to the Department for Methodology and Procurement Organisation/to the initiator and the responsible person in the event of delays.

A framework for developing the Qualified Buyer function in nuclear organisations has been established in order to free procurement initiators from functions that are not relevant to their role; as a result, 19 qualified buyer functions have been established in the industry.

An integrated industry-wide support system has been created to handle complaints filed with antitrust authorities or courts with regard to requirements set out in procurement documents in accordance with the UIPS. This included creating a section titled ‘Legal Precedents in Procurement’, which contains answers to frequently asked questions concerning complaints with regard to procurement by enterprises in the industry, as well as industry practice of filing complaints related to procurement with the Federal Antimonopoly Service and courts.

The development of industry-wide remote communication channels continued in the industry. In 2022, a dedicated group, ‘Procurement, Logistics, Quality’, was launched on the ROSATOM. Life social media platform. Its participants can receive regular updates on key developments in the sphere of procurement and discuss specialised topics. At year-end 2022, the group comprised more than 300 specialists in procurement, logistics and quality management.

In 2022, the ‘Procurement for Everyone’ additional development track of the Procurement Officers’ Club focused on information support (launched in 2021) was transformed into a series of webinars titled ‘Procurement Environment’. In 2022, meetings started to be held regularly, twice a month. Topics to be covered were formulated primarily by industry specialists. More than 20 webinars were held in the reporting year; they were attended by more than 3,500 industry specialists.

In order to enable prompt communication with ROSATOM’s specialists in procurement, logistics and quality management, a dedicated email box of the Procurement Officers’ Club (zakupki-club@rosatom.ru) has been set up as part of the Procurement Officers’ Club project. Industry specialists can use it to promptly get a reply and obtain advice on a wide range of matters related to their job.

In 2022, representatives of the Corporation and nuclear organisations regularly participated in conferences and other external events focused on the development of the procurement system.

At the GOSZAKAZ Annual National Forum and Exhibition (6–8 April 2022), ROSATOM’s exhibition stand showcased its achievements in the sphere of procurement; the Corporation also provided visitors with information on new and promising innovations in the sphere of procurement being adopted by ROSATOM and its organisations. On 15–21 August 2022, ROSATOM’s representatives participated in the ARMY 2022 Forum.

As part of procurement, logistics and quality management activities, ROSATOM continued to implement the programme adopted following the industry-wide session on procurement in the nuclear industry held on 17 November 2020. In the reporting year, ROSATOM’s Council for Improving Transparency continued its work. In 2022, the Council held two meetings where the Council members representing the government, non-governmental organisations and the media discussed topical matters in the sphere of procurement, including the new digital space (the BRIEF project), proposals for the design of the ATOM-Plan planning and import substitution process, as well as other legislative initiatives.

An industry-wide workshop titled ‘Improving the Procurement Management System in ROSATOM’ was held on 31 March and 1 April 2022. The event was held in a hybrid format, with about 100 people attending the meeting in person and 300 employees participating online.

On 13 October 2022, the Corporation’s representatives took part in the Russian Standardisation Week International Technology Forum, where they gave a presentation titled ‘QMS Certification from the Perspective of the Customer’. Following the presentation, an extended meeting of the Committee of the Russian Chamber of Commerce and Industry on Technical Regulation, Standardisation and Product Quality titled ‘Management System Certification Issues’ was initiated and held in November 2022.

Plans for 2023 and for the medium term:

- To develop the Price Audit project, including conducting price audits under contracts concluded on the relevant terms and conditions (developing a price audit plan and programme, forming a team of price auditors for a specific contract, monitoring and supporting the work of auditors as part of pilot projects);
- To draft functional specifications for price audit automation and launch an IT project focused on price audit; to amend the pilot methodology for actual price audits and form a working group on the price audit methodology; to develop a training programme and provide training for price auditors; to develop a procedure for the conversion of an approximate contract price to a fixed contract price based on the findings of a price audit;
- To continue work focused on long-term planning and the conclusion of long-term contracts, including using partnership arrangements, developing production and joint projects;
- To develop a sustainability methodology for the supply chain in the industry;

- To update uniform procedures for tendering exclusively among SMEs and the relevant document forms, including continued automation (a formalised approach) using electronic bid forms for tendering among SMEs;
- To implement the framework for developing the Qualified Buyer function in nuclear organisations in order to free procurement initiators from functions that are not relevant to their role. To roll out the QBS across the industry;
- To continue to develop contract strategies for ROSATOM's overseas nuclear construction projects based on the methodology developed in 2019;
- To create a shared information space for customers and suppliers covering the entire procurement cycle, from the identification of needs to the performance of contracts; to integrate local modules, industry-wide and national systems; to globalise data; to expand the application of electronic document management in procurement; to use robots in order to reduce the amount of time and effort spent on routine transactions;
- To provide extensive training for customers and suppliers in the use of the UIS Contract System using online courses and a training system (a simulator), which will significantly reduce the amount of time needed to master the required operations;
- To continue the modernisation of the UIS Procurement System (including methodological support for the project) and its migration to domestically developed software;
- To continue to implement the Brief digital solution, including expanding its functionality and encouraging third-party suppliers to use the Brief digital solution;
- To support the development of procurement legislation;
- To enable efficient work of ROSATOM's Council for Improving Transparency;
- To implement the 'Procurement for Everyone' framework for the Procurement Officers' Club;
- To create an industry-wide interactive procurement portal (a shared information space);
- To update training courses on quality management developed earlier jointly with ROSATOM's Technical Academy and develop new courses on analytical reporting in the UIS Quality System and quality cost accounting.

1.12.8. Strategic communications

1.12.8.1. Stakeholder engagement

Key results in 2022:

- 77% of the population in Russia support the use of nuclear energy.
- Viewership of channels broadcasting the *Strana ROSATOM* TV programme in various regions of Russia totals 3.1 million people.
- 1.1 million people visited ROSATOM's website during the reporting year.
- ROSATOM's audience on social media increased by a total of 41,000 people.
- The Corporation's representatives took part in more than 12 Russian exhibitions and 59 overseas exhibitions and conferences.

Approaches to stakeholder engagement

GRI 2-29

Due to its scale and special characteristics of its business (simultaneous performance of state and business tasks, operation across a large number of markets), ROSATOM has a wide range of stakeholders both in Russia and worldwide.

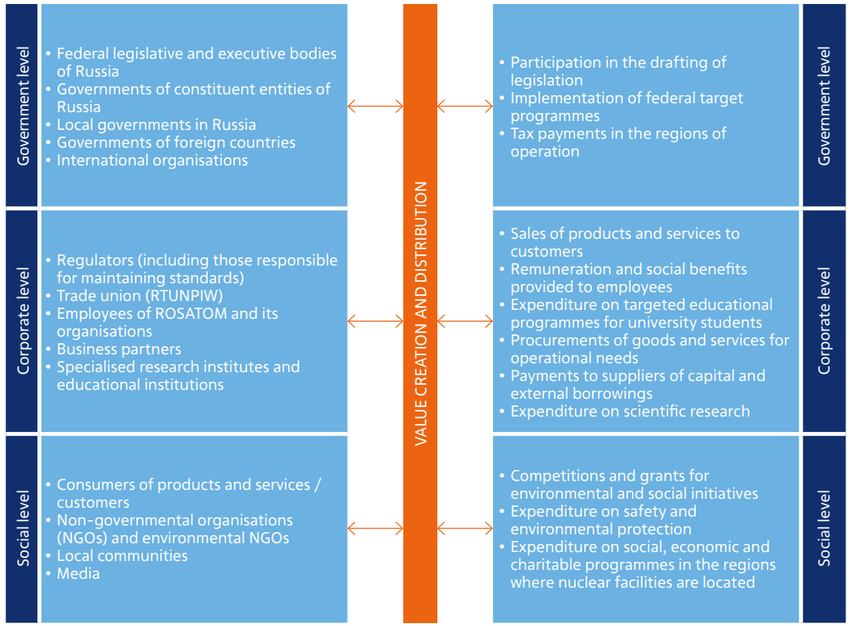
Targeted stakeholder engagement is aimed at achieving strategic goals and gaining public acceptance for nuclear power development.

The Corporation promotes systematic and constructive stakeholder engagement across all areas of its business and conducts communication and information campaigns for the general public.

Fundamental principles underlying stakeholder engagement are as follows:

- Respect for and accommodation of the interests of all participants;
- Open and productive cooperation;
- Timely provision of complete information on ROSATOM's activities;
- Striving to provide specific benefits to all participants;
- Fulfilment of obligations.

Stakeholder map[1]



Stakeholder interests

1. Ensuring non-proliferation of nuclear materials and technologies
2. Nuclear and environmental safety
3. Technological modernisation in the nuclear industry
4. Efficient use of budget funds
5. Economic performance of ROSATOM's organisations
6. Compliance with international and Russian legislation
7. Responsible business conduct and competitiveness in global markets
8. Improvement of product and service quality
9. Transparency of ROSATOM's operations, including transparency of procurement activities
10. Addressing the legacy of past business operations and defence efforts in the industry
11. Reliable electricity supply
12. Adequate remuneration to employees; promoting the professional development of employees; safe working conditions
13. Improvement of the standard of living in the regions of operation
14. Talent development in ROSATOM and its organisations

1. The stakeholder map is based on an assessment of ROSATOM's impact on stakeholders and/or their interests.

Types of stakeholder engagement

A. Cooperation with specialised international organisations, participation in international programmes and projects
B. Participation in law-drafting activities
C. Public consultations and public environmental impact assessments of NPP power unit construction projects
D. Employee training and development programmes
E. Social programmes, and projects
F. Contribution to the development of the regions of operation
G. Opinion polls, customer satisfaction surveys
H. Philanthropy
I. Hotlines
J. Programmes of cooperation with specialised universities
K. Dialogues, presentations, forums, conferences
L. Open and competitive procurement procedures
M. Programmes of cooperation with other companies
N. Programmes of cooperation with government regulators (supervisory bodies) and law enforcement agencies
O. Public governing and supervisory bodies
P. Information and communications
Q. Public reporting

Interests and types of engagement with stakeholders, experts and users of information

Federal legislative and executive bodies of Russia	1, 2, 4, 5, 6, 9, 11, 12, A, B, C, L, N, Q
Governments of constituent entities of Russia	2, 5, 10, 11, 13, C, F, J, K, O, Q
Local governments in Russia	2, 3, 5, 10, 11, 13, C, D, F, H, K, O, P
Governments of foreign countries	1, 2, 6, 7, 9, 10, A, D, J, K, P, Q
International organisations	1, 2, 3, 7, 8, A, K, P, Q
Regulators (including those responsible for maintaining standards)	2, 6, 7, 8, 9, 10, 11, A, C, L, N, Q
Trade union (RTUNPIW)	2, 3, 5, 6, 12, 11,13, 14, D, E, F, I, K, O
Employees of ROSATOM and its organisations	2, 3, 5, 6, 8, 10, 11, 12, 13, 14, D, E, F, H, I, J, O, Q
Business partners	2, 3, 5, 6, 7, 11, K, L, M, P, Q
Specialised research institutes and educational institutions	2, 5, 8, 11, 12, 14, D, G, J, K, P, Q
Consumers of products and services/customers	2, 3, 7, 8, 11, I, G, L, M, P
Non-governmental organisations (NGOs) and environmental NGOs	1, 2, 3, 5, 12, 13, A, C, H, I, N, P, Q
Local communities	2, 3, 8, 10, 11, 13, D, E, F, H, O, P
Media	2, 4, 5, 6, 9, 10, C, G, K, P, Q

Industry media

Nuclear Kids

Nuclear Kids (NucKids) (http://www.nuckids.ru/) is an annual international charitable art project for children from nuclear towns and cities across Russia, as well as children of employees of overseas enterprises partnered with ROSATOM. Since its launch, the project has covered 24 countries. Many NucKids alumni study and work at famous universities (such as the Russian Institute of Theatre Arts (GITIS), the Moscow Art Theatre School, the Russian State University of Cinematography (VGIK), the Oleg Tabakov Studio, etc.), perform in films and work in show business and in ROSATOM's Divisions. In 2022, 68 participants from 32 Russian towns and cities, as well as from Hungary and Belarus took part in the summer session of the project. A theatrical production titled 'Best Life. A Game' was performed 11 times in Moscow, Saint Petersburg, Desnogorsk and Nizhny Novgorod; the total audience exceeded 3,000 people. The production titled 'Winter Fairy Tale 2022' staged as part of the project ended its run in January 2023. In 2022, 32 participants from 20 Russian towns and cities took part in the winter session. Rehearsals and the first performances of the production took place at the Presidential Lyceum in the Sirius Federal Territory, with 14 performances attended by a total of 5,500 people. In January 2023, 11 theatrical performances were given for children of employees of nuclear enterprises in Moscow and the Moscow Region, with the total audience exceeding 3,500 people.

To inform employees and other stakeholders about news and key events in the Russian nuclear industry, a range of corporate media outlets operates under the common brand name *Strana ROSATOM* ('The Country of ROSATOM'):

- A newspaper (published weekly in all organisations in the Russian nuclear industry, with a circulation of 55,000 copies and a readership (including the online version) exceeding 300,000 people);
- A TV news programme (aired weekly in 24 nuclear towns and cities; the viewership of the channels broadcasting the programme totals 3.1 million people).

Online communications

In 2022, ROSATOM continued to actively communicate with its stakeholders on the Internet. Information is disclosed both on ROSATOM's official website (www.rosatom.ru) and on official community pages on social media.

In 2022, the number of visitors of ROSATOM's official website remained at the level of 2021 and totalled about 1.1 million people, or an average of 4,000 to 7,000 visits every weekday. ROSATOM published press releases informing the general public about the activities of the Corporation and its organisations almost every day. Key events involving ROSATOM received extensive coverage.

In 2022, the Corporation launched new community pages on Telegram and Yandex.Zen. The audience of ROSATOM's community pages increased by a total of more than 41,000 people, with the largest increase recorded for the group on VKontakte: +24,000 people (+22% compared to 2021).

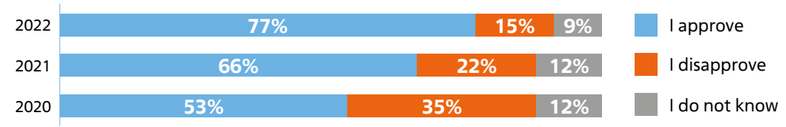
Opinion polls

ROSATOM analyses the public perception of the development of nuclear power in Russia on an annual basis and adjusts its communication with stakeholders accordingly.

In 2022, ROSATOM's reputation score (an indicator whose calculation takes into account the results of opinion polls) stood at 3.7 (2021: 3.5).

According to an independent opinion poll carried out by ZIRCON Research Group in December 2022, 77% of the Russian population supported the use of nuclear power (66% in 2021, 53% in 2020). Over the past few years, the figure has remained consistently high.

On the whole, do you approve or disapprove of the use of nuclear (atomic) energy as a way to provide power supply for the country? (% of the total sample)



Nuclear Energy Information Centres. Educational projects

The objective of Nuclear Energy Information Centres (NEICs) is to raise awareness among local communities about the operation of the nuclear industry and prospects for the development of nuclear power and radiation technologies, make professions in the industry more prestigious, promote science, innovative technologies and technical education, and cooperate with the professional scientific community in promoting science. The NEIC network comprises 20 centres in Russia, including the Atomarium in Sochi, as well as centres in Belarus (Minsk). In February 2023, a Nuclear Technology Information Centre was opened in Myanmar; this is a joint project of ROSATOM and the Ministry of Science and Technology of Myanmar.

In 2022, almost 300,000 people participated in NEIC OPEN programmes and the Atomic Workshop series of activities, attended lectures, workshops, intellectual games and science festivals. 480 teams competed in the BrainShaker intellectual tournament launched in 2022: more than 2,000 people gathered at NEIC venues every month in order to answer quiz questions and questions from experts. More than 37,000 spectators took part in 670 NEIC OPEN programmes run in 18 regions of Russia. The Energy of Science Federal Project enabled local residents in the regions hosting the NEIC network to engage with federal-level researchers and science communicators.

In 2022, the KSTATI ('By the Way') Science Festival was held in Vladimir, Voronezh, Novosibirsk and Chelyabinsk. The festival in Ekaterinburg became the largest event (5,600 participants). In December 2022, the Atom+ festival of teaching practices was held for the first time in five regions.

The Icebreaker of Discovery is an educational expedition to the North Pole organised by ROSATOM and the Autonomous Non-Profit Organisation Bolshaya Peremena. In 2022, 70 high school students who had won the Big Break Competition took part in the voyage to the Arctic on the *50 Let Pobedy* nuclear icebreaker. The participants of the expedition were accompanied by ROSATOM's leading experts in the field of nuclear physics, new technologies, entrepreneurship, design and construction. The project supervisor, ROSATOM's Corporate Academy, prepared an educational programme for the participants of the expedition; the programme consisted of three tracks: Discovering Technology, Discovering the Arctic, and Discovering Oneself. The experts helped the young travellers to master useful skills, held workshops and training sessions.

Highlights of the year included the IN.Borg Engineering Festival of Cultural Design held by the NEIC network jointly with ROSATOM's Engineering Division (JSC ASE) in Vyborg. Several thousand spectators immersed themselves in the art of engineering in a gamified format.

Online shows and video lectures on the YouTube channel of the NEIC network garnered more than 1.5 million views, while broadcasts and recordings of regional events posted on social media pages of the centres had more than 420,000 views. Overall, throughout 2022, projects and events run by the NEIC network received coverage in the regional media and new media more than 8,000 times.

Exhibitions in the Russian Federation

In 2022, ROSATOM participated in 13 Russian exhibitions, including the 17th GOSZAKAZ Annual National Forum and Exhibition, the St. Petersburg International Economic Forum, the 'Arctic: Territory of Dialogue' International Arctic Forum, the INNOPROM 2022 International Industrial Trade Fair, the ARMY International Military and Technical Forum, the Congress 'Diversification of the Russian Defence Industry. Transformation of Production Capabilities', the Eastern Economic Forum, the Moscow Financial Forum, the Russian Energy Week, the Russian Occupational Safety Week, etc.

A major international forum, ATOMEXPO 2022, was held in Sochi on 21 and 22 November 2022. This event has clearly demonstrated that nuclear technology unites participants from around the world, regardless of the geopolitical context. The main topic of the forum was 'Nuclear Spring: Creating a Sustainable Future'. The plenary session was focused on the development prospects of the global nuclear power industry. The Forum was attended by about 3,000 people from 65 countries worldwide. It confirmed ROSATOM's leading role in shaping the development agenda of the global nuclear industry and enabled the Corporation to demonstrate to the international community that it is committed to open cooperation with international partners in expanding the application of nuclear technology for the benefit of humanity. During the Forum, ROSATOM signed 41 documents with partners in order to expand the scope of its operations on the Russian and foreign markets.

In December 2022, the Mayak Academy (Nizhny Novgorod) hosted the third Global Impact Conference. Live broadcasts of the conference were viewed by more than 1 million people in 15 countries; more than 30 experts from 20 countries participated as speakers. The event featured representatives of academia from India, China, Russia, Turkey, the UAE, Oman, Armenia, Kazakhstan, South Africa, Brazil, Vietnam, Egypt, Latin America and Africa. The experts discussed challenges, trends and new opportunities in the sphere of education in the coming years.

Communication activities abroad

In 2022, ROSATOM participated in 59 overseas exhibitions, conferences and workshops.

As part of the EXPO 2020 International Exhibition held between 1 October 2021 and 31 March 2022 in Dubai (UAE), the Corporation held the ROSATOM Week showcasing state-of-the-art Russian technologies.

The Corporation participated in the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27; Sharm El Sheikh, Egypt, 6–18 November 2022), the 'INNOPROM. Big Industrial Week in Uzbekistan' International Industrial Trade Fair (Uzbekistan, 25–27 April), the 66th IAEA General Conference (Austria, 26–30 September), the 26th Belarusian Energy and Industrial Forum (Belarus, 11–14 October) and other overseas events.

On World Science Day on 10 November, an international educational initiative titled 'Global Atomic Quiz' was launched in order to raise public awareness of nuclear technology. The event was held in 11 languages (Russian, English, Turkish, Vietnamese, Hungarian, Spanish, Portuguese, Bengali, Uzbek, Armenian and Kazakh) on the website at quiz.atomforyou.com. The online initiative attracted over 7,000 people from more than 35 countries worldwide, including Bangladesh, Belarus, Vietnam, India, Turkey and Uzbekistan.

In order to demonstrate Russian nuclear technologies to the international community, in 2022, the Corporation organised 15 media tours for foreign media representatives across a number of focus areas:

Topics of press tours	Description
Power generation	Media tours of ROSATOM's facilities in Russia (Leningrad NPP) and the construction site of a Russian-design NPP in Turkey (Akkuyu NPP), as well as the world's first NPP connected to the power grid (Obninsk NPP)
Nuclear medicine	A visit to the Nuclear Research and Technology Centre (NRTC) in Bolivia by representatives of Latin American media outlets and a visit to JSC NIITFA by representatives of Belarusian media outlets
Front end of the nuclear fuel cycle (NFC)	A media tour of a factory of JSC TVEL Fuel Company in Elektrostal for representatives of Hungarian media outlets
Irradiation centres	A visit to the Axenter multipurpose radiation processing centre by media representatives from Ghana, Kenia, Nigeria, Tanzania and Zambia
Uranium mining	A visit by Namibian media representatives to uranium mining enterprises of JSC Dalur specialising in in-situ leaching
Education	A visit to NRNU MEPhI and Tomsk Polytechnic University by representatives of Latin American media outlets

In addition, as part of major conferences and exhibitions, ROSATOM organised virtual technical tours of its key facilities.

Coverage of the 15th anniversary of the establishment of ROSATOM

On 1 December 2007, the President of the Russian Federation signed an order to establish ROSATOM. As part of celebrations to mark the 15th anniversary of its establishment, the Corporation launched a large-scale communications campaign, which included publications in print and online media, TV and radio coverage, videos, publications and interviews on social media. The total reach of media coverage and events exceeded 700 million people.

1.12.9. Public reporting system

Dialogues with stakeholders

In order to improve transparency and accountability in the Corporation, representatives of key stakeholders are engaged in the preparation of ROSATOM's public report (hereinafter referred to as the Report) through participation in the discussion of socially important aspects of the Corporation's business and their reflection in the upcoming Report. In addition, stakeholder representatives participate in public consultations on the draft Report and public assurance of the Report.

Stakeholder engagement is one of the key requirements of international standards, such as the AA1000 Stakeholder Engagement Standard (2015), the Global Reporting Initiative Sustainability Reporting Standards (GRI 2021) and the International Integrated Reporting Framework (International <IR> Framework). When preparing the previous Report, ROSATOM took on a number of commitments that were later fulfilled in the 2022 Report (see the subsection 'Incorporation of Stakeholders' Proposals').

In 2022, the Corporation and its Divisions held dialogues with stakeholders (by correspondence and directly) in order to discuss the public report for 2021. During these events, stakeholder representatives voiced their requests, provided recommendations as to what information should be disclosed in the Report, and put forward proposals for developing the public reporting system.

In 2023, the Corporation held a foresight dialogue to prioritise its material impacts to be disclosed in the 2022 Report, as well as public consultations on the draft public annual report for 2022, where ROSATOM's representatives presented the concept and the draft Report, while stakeholders, experts and users of information voiced their recommendations and comments on ways to improve the Report (see the subsection 'Incorporation of Stakeholders' Proposals').

Public reports of ROSATOM and its Divisions are available on the public reporting portal (https://report.rosatom.ru).

For details on our materiality process, see Appendix 1 'Report Profile'.

Outcomes of the 2022 reporting campaign

ROSATOM's Report won in the Best Annual Report category in the federal competition of annual reports held by the RAEX rating agency (RAEX-Analytics) for the third year in a row. The results of the competition can be viewed on the RAEX website (https://raex-a.ru). ROSATOM's Report was also awarded 5 stars (the highest score) for quality in the 2021 ranking of reports compiled by RAEX[1].

ROSATOM's Report for 2021 was rated A in the ESG Ranking of Sustainable Corporate Governance compiled jointly by the University of Perugia (Italy) and the Da-Strategiya Agency for Corporate Development. The ranking included reports of 230 Russian companies. In the ranking, ROSATOM is described as a company that has adopted a strategic approach to ESG management, fully manages ESG risks and has a governing body with a wide range of competences. In addition, according to the compilers of the ranking, a company rated A actively engages stakeholders in governance, has a high level of transparency and a well-developed corporate culture.

Incorporation of stakeholders' proposals

Proposals and comments concerning ROSATOM's Public Report for 2022[2]

Commitments taken on during the discussion of the 2021 public report (in 2022)

No.	Stakeholders' proposals/recommendations	Incorporation of proposals
1	To make descriptions of cases in the Report on the Development of Nuclear Towns and Cities less formal, to enliven dry figures.	The proposal has been incorporated in the 2022 Report (see chapter 4). The proposal has been partially incorporated in the 2021 Report.
2	To use some of the phrases from public speeches by ROSATOM's Director General Alexey Likhachev ('quantum leap') in the Report in order to make it more readable.	The proposal has been taken into account.
3	To focus more on disclosing information for the reporting year and not only plans for the next year.	The proper balance has been achieved in the 2021 and 2022 reports.
4	To revise the list of risks for 2022 in the next report.	The proposal has been taken into account (see section 1.12.2).
5	To disclose information on the development of host towns and cities more comprehensively, to shift the focus from the performance of government functions by ROSATOM to the management of development of these towns and cities.	The proposal has been taken into account (see chapter 4 of the 2022 report).
6	To clarify the difference between civil society and environmental organisations in the stakeholder map.	The proposal has been taken into account. In accordance with the GRI 2021 Standard, stakeholders have been divided into groups, including experts (professional ecologists) and affected stakeholders (grassroots environmentalists).
7	To raise the status of the regional dialogue forum on the environmental agenda of development of nuclear towns and cities to the level of a federal forum.	The request has been forwarded to the responsible department. The advisability of the proposal will be assessed in the medium term.
8	To reflect the conclusion of an agreement with local stakeholders in Novouralsk on the implementation of an educational platform for personnel training and technological leadership in the Report.	The proposal has been taken into account. See section 4.5.
9	To highlight ROSATOM's innovative role in ensuring the country's technological sovereignty.	The proposal has been taken into account. The prioritised topic of the 2022 Report is 'ROSATOM's Contribution to the Technological Sovereignty of the Russian Federation'.
10	To place added emphasis in the Report on the fact that the Corporation efficiently fulfils its responsibilities for the safe use of ROSATOM's nuclear technologies and products not only in Russia but also worldwide.	The proposal has been taken into account. See the Safety Report.
11	To present the rich and interesting information on the development of nuclear towns and cities in a way that links it to the towns and cities themselves, which will increase the value of the reports.	The proposal has been taken into account (see section 4.3 on priority development areas).
12	To disclose information separately for each nuclear town and city.	The proposal has been considered; it has been decided to disclose information in a way that links nuclear towns and cities to specific projects and activities.
13	To provide all necessary explanations of events after the reporting period (in this case, the events of 2022) in the introductory statement of the senior executive to the Report, which should also reflect ROSATOM's commitment to the principles and objectives of sustainable development.	The proposal has been incorporated in the 2021 and 2022 reports.
14	To make sure that the Report reflects the variety of ROSATOM's nuclear towns and cities, which necessitates different approaches to their development and regional priorities.	The proposal has been incorporated by reflecting development priorities, participation of the towns and cities in projects and their development plans (see chapter 4).
15	To consider holding round-table discussions with representatives of municipal governments and the expert community on the topic of the Smart City.	The request has been forwarded to the responsible department.
16	To add more cases and specific examples of ROSATOM's activities, including engagement with nuclear towns and cities, to the text of the Report.	The proposal has been taken into account (see chapter 4).
17	To revise the list of risks for 2022 in the next Report.	The proposal has been taken into account (see section 1.12.2).

1. Full information on the ranking is available at: https://raex-a.ru/files/diplom/KGO2022_Analytica_1.pdf
2. Based on the outcomes of public consultations on ROSATOM's draft public report for 2021 and 2022 and a foresight dialogue on the materiality of topics covered in ROSATOM's public report for 2022.

18	To revise the list of ESG risks in the next reporting cycle and specify new risks; to include risks related to digitisation (cybersecurity) and personal data security.	Cybersecurity risks are taken into account in the course of operations; however, access to the relevant information is restricted. Personal data security risks are taken into account in the course of operations, but the relevant information is not disclosed, as these are not key risks for the Corporation.
19	To provide more detailed information on the competences of ROSATOM's Supervisory Board, potentially duplicating information provided on the corporate website.	The proposal has been taken into account (see section 1.12.1).
20	To provide information on changes in the total number of instances of corruption, the number of cases handed over to the prosecutor's office and the number of administrative decisions taken over three years.	The summarisation and analysis of the required information and the decision on its publication fall within the exclusive competence of competent government authorities, including law enforcement agencies and judicial authorities, as it affects the rights and legitimate interests of those organisations with which the persons held liable are affiliated.
21	To publish separate analytical reports on ROSATOM's engagement with nuclear towns and cities in order to demonstrate ROSATOM's best practices to other regional organisations and local governments, which would facilitate the sharing of experience and knowledge.	The matter has been considered. The proposal has been forwarded to the Department for Liaison with Regions.
22	To expand the range of stakeholders participating in public consultations on ROSATOM's Public Annual Report by adding overseas representatives and to adjust the format of public consultations accordingly.	The proposal has been considered. At present, it is inadvisable to expand the list of stakeholders by including overseas representatives.
23	To add more cases and specific examples of ROSATOM's activities, including engagement with nuclear towns and cities, to the text of the Report.	The proposal has been taken into account.

Statement of Public Assurance of ROSATOM's Public Report for 2022

Background

State Atomic Energy Corporation Rosatom has suggested that we assess its Public Report for 2022, which comprises five reporting modules (the Strategic Report, the Business Development Report, the Social Report, the Report on the Development of Nuclear Towns and Cities and the Safety Report) as well as the Sustainability Report and reports on the performance of the Mining, Engineering, Mechanical Engineering, Fuel, Power Engineering, and Sales and Trading Divisions of ROSATOM, which are included as appendices hereto (hereinafter referred to as the Report).

Our analysis and evaluation during the public assurance process focused on the materiality of information disclosed in the Report, completeness of disclosures on the Corporation's impacts, involvement of the Corporation's stakeholders in the reporting and assurance process, and the Corporation's responsiveness to stakeholders' requests and proposals. Our opinion is based on an analysis of the Report, additional materials provided to us (minutes of stakeholder engagement events and tables reflecting the incorporation of stakeholders' proposals) and the feedback provided by ROSATOM's employees.

We received no remuneration from ROSATOM for our participation in the public assurance procedure.

Assessments, comments and recommendations

We are unanimous in the opinion that the 2022 Report is of high quality in terms of both its format and the scope of information that it provides. In our opinion, ROSATOM adheres to a consistent approach to ensuring the transparency and accountability of its business and involves a wide range of stakeholders in this process. During the preparation of the Report, the Corporation demonstrated strong commitment to ensuring that the development of nuclear technology is publicly acceptable and willingness to hold an open dialogue with stakeholders on various aspects of its operations.

In our view, the modular approach to public reporting used by the Corporation during the preparation of the 2022 Report has enabled it to provide information to stakeholders in a more targeted way while continuing to offer a deep and comprehensive insight into the operation of the nuclear industry. Through a detailed examination of the Corporation's business model, the Report clearly presents the comprehensive nature of its value chain. The Report provides information on ROSATOM's governance system, strategic goals and management approaches, social, environmental and economic impacts, challenges and plans for the medium and long term. We also support the selection of 'Contribution to the Technological Sovereignty of the Russian Federation', which is a highly relevant topic, as the prioritised topic of the Report. Information on the topic provided in the Report is well structured and representative.

We would like to highlight and express our full support for the Corporation's decision to reflect its progress in the implementation of the UN Global Contact Principles in the Report in the form of a standalone appendix, namely the Sustainability Report. This enables the readers of the Report to obtain a comprehensive picture of ROSATOM's activities, including socially significant aspects of its business that concern human rights.

An indisputable advantage of the Report is the use of Russian and international corporate reporting standards during its preparation. These are, first and foremost, the updated Global Reporting Initiative Sustainability Reporting Standards (GRI 2021). In addition, during the preparation of the Report, the Corporation traditionally used the International Integrated Reporting Framework (International <IR> Framework), the AccountAbility Principles as set out in the AA1000SES Standard, the Basic Performance Indicators of the Russian Union of Industrialists and Entrepreneurs (RSPP), as well as the Uniform Industry-Wide Public Reporting Policy and the Public Reporting Standard of ROSATOM. It is also important to highlight the Corporation's initiative to include the climate agenda and climate risk management issues (with a forward-looking focus on adopting the TCFD Recommendations) in the scope of topics to be covered in public reports.

Materiality of information

To incorporate stakeholders' requests as fully as possible, ROSATOM and its Divisions held dialogues with stakeholders, experts and users of information, both directly (online) and/or by correspondence (in the form of questionnaire surveys), in order to identify material topics for disclosure in the Report in accordance with the updated GRI Standards (2021). We highly appreciate this initiative and recommend that in the future ROSATOM should continue its cooperation on the matter with reference representatives of the target audiences for the Corporation's public reports.

Completeness of information

We believe that the reporting information adequately covers all material aspects and enables readers to draw conclusions on the Corporation's performance in the reporting year.

Stakeholder involvement

We believe that in the course of stakeholder engagement events as part of the Report preparation process, the Corporation involved a wide range of stakeholders, with every participant offered an opportunity to freely make comments on the Report, suggest improvements and to put forward recommendations concerning the Corporation's sustainability initiatives.

Response to stakeholders' requests and proposals

At the request of stakeholder representatives, corrections were made and additional information was included in the final version of the Report (or substantiated explanations were provided as to why the requested information could not be disclosed or will be disclosed in future reporting cycles).

The Corporation took into account key proposals put forward by stakeholders during the preparation of ROSATOM's previous Report in the form of recommendations on the draft Report for 2022, during the foresight dialogue aimed at identifying material topics to be disclosed in the 2022 Report and during the collection of written comments and recommendations on the draft Report for 2022. For details on events held by ROSATOM, see the Appendix 'Report Profile' and the section 'Strategic Communications' of Chapter 1 'Strategic Report'.

We took part in determining material topics to be disclosed in the 2022 Report and in the reports of ROSATOM's Divisions (which are included as appendices to the Report).

We are willing to take part in future activities focused on public reporting and the development of ROSATOM's public reporting system.

To summarise, we would like to point out that in recent years ROSATOM has made significant progress in public reporting, representing the best transparency and accountability practices among Russian companies, which enables it to continuously improve confidence in its business. In turn, the high level of maturity of public reporting is reflected by the fact that ROSATOM won the federal competition of annual reports held by the RAEX-Analytics agency for the last three years (2020-2022) and has won the Russian Business Leaders: Dynamics, Responsibility and Sustainability – 2022 National Competition held by the Russian Union of Industrialists and Entrepreneurs (RSPP) in the High Quality of Sustainability/ESG Reporting category.

The modular approach to public reporting used by ROSATOM in 2022 has enabled it to make information disclosure more specific and target it at the relevant stakeholders. We consider it advisable to continue to use this approach to public reporting at ROSATOM in the future.

We hope that ROSATOM will continue to consistently implement the principles of responsible business conduct in the future, work systematically on the sustainable development agenda and disclose information on its performance in this context in its public reports.

Persons who took part in the public assurance of ROSATOM's public annual report for 2022

Alexander Ageev
Director General of the Institute for Economic Strategies of the Social Sciences Division of the Russian Academy of Sciences

Sergey Baranovsky
President of the Inter-Regional Environmental Non-Governmental Organisation Green Cross

Pavel Belousov
Head of the Innovation and Technology Centre of Obninsk Institute for Nuclear Power Engineering of NRNU MEPhI, Associate Professor

Vladimir Gorchakov
Head of the Sustainability Risk Group of the ACRA Rating Agency

Natalia Davydova
Director of the Environmental Projects Consulting Institute (Autonomous Non-Profit Organisation), member of ROSATOM's Public Council

Konstantin Dolgov
Deputy Chairman of the Committee on Economic Policy of the Federation Council of the Federal Assembly of Russia

Elena Dubovitskaya
Director of the Centre for Sustainable Development of SKOLKOVO Moscow School of Management

Natalia Nazarova
Deputy Chair of the State Duma Committee on Energy

Vladimir Ognev,
Chairman of the Interregional Public Movement of Nuclear Industry and Power Veterans

Gennady Sklyar
Deputy Chairman of the State Duma Committee on Industry and Trade

Elena Feoktistova
Managing Director for Corporate Responsibility, Sustainable Development and Social Entrepreneurship of the Russian Union of Industrialists and Entrepreneurs (RSPP)

Vladimir Kuznetsov
Chairman of the Russian Trade Union of Nuclear Power and Industry Workers

Andrey Khitrov
Director General of the Russian Union of Employers in the Nuclear Industry, Power and Science

Elena Sharoikina
Member of ROSATOM's Public Council, Chairwoman of the Commission for Ecology and Nature Protection of the Public Chamber of the Russian Federation, Director of ANO Association of Genetic Security Analysts (ANO AGSA)

2

BUSINESS DEVELOPMENT REPORT

RUB 697.5 BILLION

REVENUE FROM NEW PRODUCTS

STATEMENT BY THE FIRST DEPUTY DIRECTOR GENERAL FOR DEVELOPMENT AND INTERNATIONAL BUSINESS

Dear colleagues and partners,

You are reading the business development report of State Atomic Energy Corporation Rosatom for 2022. We remain committed to the principle of openness and continue to operate on a global scale and comply with international quality and transparency standards.

During the past year, we had to adapt quickly to a new environment. Despite external pressure, we continue to fulfil all our contractual commitments. We are convinced that nuclear power should not be politicised; accordingly, we adhere to a business-focused approach in order to maintain our foothold on the international market.

In the context of our business, the reporting year can be described as successful: we achieved a significant increase in foreign revenue compared to 2021, which exceeded the target and totalled more than USD 11 billion.

The Corporation is actively developing its traditional business and continues to implement overseas nuclear power projects, with 23 power units currently under construction. In 2022, ROSATOM started the construction of eight NPP power units worldwide, including five Russian-design power units.

Speaking of overseas projects, I would like to highlight the Akkuyu NPP site in Turkey: this is currently the largest nuclear construction project in the world, with four power units simultaneously under construction. In 2022, two official ceremonies were held to mark the start of concreting at the El Dabaa NPP site in Egypt with an interval of four months, which is a record for the global nuclear industry. In addition, the Corporation has obtained licences for the construction of the fifth and sixth power units equipped with VVER-1200 reactors at Paks NPP in Hungary; this is the first licence for the construction of reactors of this type in the European Union.

We see growing global demand for small NPPs. The Corporation has extensive expertise and capabilities in this area supported by a long track record of successfully operating the nuclear-powered icebreaker fleet and the first floating NPP, *Akademik Lomonosov*, which has been supplying electricity and heat to Chukotka for almost three years. In addition, we are currently implementing a large-scale project to provide power supply for the Baimskoye gold and copper deposit in Chukotka, which involves building four floating power units. We are also implementing the first onshore small NPP project in Russia, which will be situated in Yakutia. Reference projects implemented domestically enable us to maintain an active dialogue with our foreign customers. During the past year, we signed bilateral agreements and documented intentions with partners from the Kyrgyz Republic, the Republic of the Union of Myanmar, etc.

We also see the potential in other countries. Foreign partners are considering cooperation with ROSATOM, as we not only offer the best technologies but also support the overall development of individual sectors, including science, the development of the relevant legal framework, local content and personnel training. This comprehensive approach contributes to energy self-sufficiency and technological sovereignty of our partners, which is probably the key task for every country in the current environment.

In the sphere of the NFC, despite external factors, ROSATOM has fulfilled all its contractual obligations related to the export of uranium products and nuclear fuel, including supplies to customers in the US and Europe. JSC TENEX has entered a new market in Brazil with a long-term arrangement for the provision of uranium enrichment services. In 2022, ROSATOM's share on the global markets for natural uranium mining, uranium enrichment services and nuclear fuel fabrication stood at 14%, 35% and 17% respectively.

I would like to point out that technological solutions offered by ROSATOM in the sphere of environmental protection are also in demand. For instance, a contract has been signed for the rehabilitation of the Taboshar industrial site in Tajikistan, including uranium dumps and tailings storage facilities.

ROSATOM continues to develop high-technology solutions for non-energy applications. Nuclear medicine is an important focus area. The Corporation already offers integrated solutions covering various aspects, from medical isotopes to own healthcare centres. In 2022, ROSATOM started to supply Brachium gamma radiation therapy facilities designed for comprehensive cancer treatment using the brachytherapy method. The procedures have demonstrated that this equipment enables highly effective treatment, which has attracted the interest of foreign customers. Simultaneously, we are expanding the sales geography of Tianox devices for inhaled nitric oxide therapy, which have also proved to be efficient.

In addition, in 2022, stage 1 and 2 facilities of the world's highest-altitude Nuclear Research and Technology Centre in Bolivia, namely the Cyclotron Radiopharmacy Preclinical Complex (CRPC) and the Multipurpose Irradiation Centre (MIC), started pilot operation. Radiopharmaceuticals produced by the CRPC will make it possible to carry out clinical examinations for more than 5,000 patients per year, while the MIC will process agricultural produce and food products to ensure their safety and extend their shelf life; it will also use irradiation technology for the sterilisation of medical products

In 2022, ROSATOM also achieved record results in terms of new business development. Revenue from new products reached a record high of RUB 697.5 billion, which is twice as high as the target.

ROSATOM is making steady progress in developing international partnerships in the sphere of electric transport: in 2022, the Corporation start-

ROSATOM'S SHARE ON THE GLOBAL MARKETS FOR NATURAL URANIUM MINING

ed to supply lithium-ion batteries to a leading Belarusian producer of electric vehicles for urban transport. Lithium-ion batteries have a high energy density and capacity; they are sustainable and make urban life more comfortable.

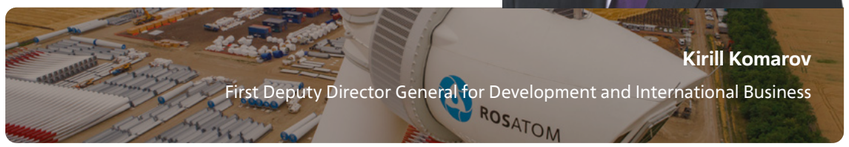
In the motor transport segment, we are building up our capabilities related to the manufacture of high-pressure cylinders of various classes. Cylinders supplied by ROSATOM are used on public transport and trucks, enabling a significant reduction in vehicle weight and size.

We have already acquired local expertise in the sphere of wind power generation. Seven wind power plants are in operation, and another two are under construction. In the future, we plan to launch our product on the global wind turbine market. In 2022, JSC NovaWind and representatives of a Vietnamese company An Xuan Energy JSC signed a cooperation agreement on a project to build a wind farm.

In addition, hydropower projects are underway; these are focused primarily on small hydropower plants. ROSATOM has adopted a holistic approach to this area: the project implementation process starts with a pre-feasibility study and involves performing the full range of work, up to and including the commissioning of the facility in question.

Special mention should be made of the development of the Northern Sea Route (NSR). The Corporation has set itself an ambitious task of enabling year-round navigation by 2030 in order to provide flexible logistics arrangements for its partners. We see that the transit capabilities of the NSR have attracted the interest of international businesses, primarily Asian and Middle Eastern companies, for which it will serve as an additional environmentally sustainable and stable route.

Looking back on 2022, I would like to emphasise that the year was full of business activity, and we intend to keep up the pace in the future and offer our partners high-technology solutions that help to improve people's lives.



Kirill Komarov

First Deputy Director General for Development and International Business

GRI 2-6
GRI 3-3

2.1. BUSINESS DIVERSIFICATION

One of ROSATOM's strategic goals is to develop new products. The relevant operations provide new opportunities for developing healthcare and municipal infrastructure, improving environmental safety and making progress in other key areas relevant to sustainable development.

Key results in 2022:

- Revenue from the sales of new products outside the scope of the nuclear industry totalled RUB 697.5 billion, up by 111.9% compared to 2021.
- The 10-year portfolio of orders for new products outside the scope of the nuclear industry reached RUB 2,250 billion, up by 13.9% compared to 2021.

New business areas have been formed taking into account the maximum number of overlaps with existing technical, technological and research competences, including the research and production capabilities of ROSATOM's organisations. Responsibility for new business development has been assigned to the Development and International Business Unit of ROSATOM.

2.1.1. Management system

The system for managing new businesses at the level of the Corporation is focused on the development of strategic programmes (Wind Power, Products and Services for the Oil and Gas Industry, Industrial and Consumer Waste Management, Development of the Nuclear Medicine and Technology Product Line, Energy Storage Systems Based on Electrochemical Cells, Additive Manufacturing, Digital Products, the Smart City, an International Logistics Operator, APCS and Electrical Engineering, Development of the Lithium Business, Renewable Energy (Foreign Markets), Hydrogen Energy, Gold Mining, etc.).

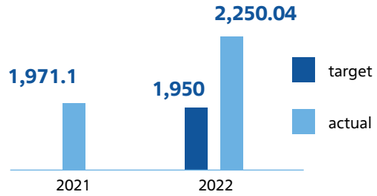
At the same time, the Corporation is actively searching for areas that may become strategically important in the near future.

2.1.2. Results in 2022

Last year, revenue from the sales of new products of ROSATOM's organisations to counterparties outside the industry totalled RUB 697.5 billion, which is 108.2% higher than the target set for 2022 (RUB 335 billion) and 111.9% higher than the figure for 2021 (RUB 329.1 billion).

The target and historical figures were exceeded in 2022 mainly due to an increase in volume in the following business areas: transportation and logistics services, electricity sales, special steel, digital products, reprocessed products, solutions for the urban environment, shipbuilding, and SNF management.

ROSATOM's 10-year portfolio of orders for new products (outside the scope of the Corporation), RUB billion



Process control systems and electrical engineering

In order to replace imported radio and electronic equipment used in automated process control systems and manufacturing execution systems (APCS and MES), as part of R&D activities conducted in 2022, the Corporation developed engineering designs and produced mock-ups of industrial network switches using domestically produced basic electronic components.

To meet the needs of the nuclear industry, prototypes of 6 (10) kV cubicle switchgear were produced based on components supplied by Russian manufacturers, and research focused on generator switches and on the search for technical solutions for sealed cable penetrations was completed. As part of efforts to improve information security and cybersecurity at nuclear facilities, a software and hardware system was developed to ensure information security of APCSs at NPPs; a pilot APCS test site was established to test software and hardware and software systems.

For non-nuclear markets, a SCADA system was developed in-house, and mock-ups of switches for industrial data networks were developed and produced.

Plans for 2023 include the following:

- Expanding the footprint on external automation markets; to do so, the Corporation will obtain licences for a new controller and an engineering centre;
- Completing the development of a number of digital products and solutions in the sphere of information security in order to expand the range of trusted digital platforms offered by the Corporation;
- Starting the commercialisation of the SCADA system developed by the Corporation, including certification by the FSTEC of Russia and validation by key customers, as well as developing software for a digital industrial platform and testing it to assess its compliance with information security requirements.

Wind power

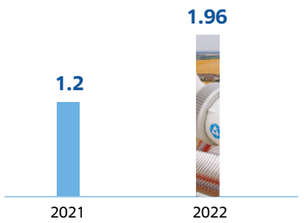
Following competitive selection as part of the DPM RES and DPM RES 2 government programmes aimed at promoting the development of renewable energy generation in the Unified Power System of Russia, ROSATOM has formed a portfolio of projects with a total capacity of 1.7 GW.

On 19 December 2022, ROSATOM's seventh wind farm, the 60 MW Berestovskaya WPP, was put into operation. Thus, by year-end 2022, seven wind farms with a total capacity of 780 MW were in operation.

The WPPs generated 1.96 billion kWh of electricity in 2022.

In 2022, investments exceeded RUB 27 billion (including VAT).

Electricity output from WPPs in 2021 and 2022, billion kWh



ROSATOM produces 2.5 MW wind turbines in-house. At year-end 2022, local content in equipment produced by the Corporation stood at 68%.

In 2023, ROSATOM plans to commission the 160 MW Kuzminskaya WPP and the 95 MW Trunovskaya WPP. As a result, the number of wind farms managed by JSC NovaWind will reach nine wind power plants, while their total installed capacity will exceed 1 GW.

Plans for 2023 also include the first project acquisitions outside Russia. In accordance with ROSATOM's international business strategy, the target for the total installed capacity of overseas wind farms to be owned by the Corporation by 2030 has been set at 5 GW.

Hydrogen energy

An integrated road map for the development of the Hydrogen Energy high-technology area until 2030 has been approved. On 16 January 2023, the Government of the Russian Federation and ROSATOM signed an Agreement on Cooperation in the Development of Hydrogen Energy drafted in 2022.

Under the agreement, by 2030, ROSATOM will implement a programme focused on domestically developed technologies for the production and handling of hydrogen and will start mass production of Russian electrolysis units of various capacity. The Corporation will also work on a project to build a nuclear power plant for hydrogen production comprising high-temperature gas-cooled reactors and chemical processing facilities.

On 16 February 2022, the Corporation participated in the establishment of the National Hydrogen Energy Development Union (the National Hydrogen Union). The Union aims to promote cooperation between businesses and research institutes in order to develop hydrogen energy in Russia, coordinate the efforts of market players, support the implementation of the National Hydrogen Programme, and formulate proposals for regulations on support to be provided to the sector jointly with government agencies. It is expected that the Union's members will include companies, consumers, financial institutions and research organisations.

A number of agreements have been signed with Russian and foreign partners in order to develop cooperation and unlock opportunities for joint implementation of pilot hydrogen projects. As a follow-up to an R&D cooperation agreement with Moscow Institute of Physics and Technology (MIPT), a contract has been signed for the delivery of a pilot hydrogen production module.

TARGET FOR THE TOTAL INSTALLED CAPACITY OF OVERSEAS WIND FARMS TO BE OWNED BY THE CORPORATION BY 2030

Logistics services

The number of shiploads transported in 2022 increased by 10 compared to 2021 and totalled 19; 75,000 freight tonnes of cargo were transported (up by 50,000 freight tonnes compared to 2021).

The order portfolio totalled RUB 3.5 billion, up by RUB 1.7 billion compared to 2021. Cargo deliveries were made for Rooppur NPP (Bangladesh), Akkuyu NPP (Turkey) and Kudankulam NPP (India). In addition, cargo deliveries from Russia, India, China and other countries were arranged. Customs clearance of 20 million tonnes of coal to be transported to China was arranged.

In 2022, test cargoes were transported along the North – South and Silk Road International Transport Corridors.

Amid restrictions imposed by the EU on Russia and Russian hauliers, cargoes critical for NPP equipment manufacture were delivered to Russia. Oversized cargo with a volume of about 1,500 m^3 was shipped to Rooppur NPP, setting a record in the history of LLC Rusatom Cargo.

To support the implementation of the Eurasian Container Transit project, in 2022, contracts were signed for the design of Arctic container ships and the Western Transport and Logistics Hub (WTLH); a conceptual design of the container ship was developed, and the relevant tests were conducted. As part of the development of the WTLH, a lease agreement was concluded for a land plot in the Murmansk Region in order to carry out surveys. Engineering surveys were mostly completed in the reporting year. In 2022, a concept for the digitisation of the Eurasian Container Transit project was developed and approved; these developments underpin the design of the WTLH and the commercial fleet.

In 2023, the Corporation plans to take steps to improve the efficiency of logistics arrangements in the industry and to develop commercial logistics.

Gas and petrochemical industry

In March 2022, the first tests were completed on a new test bench for medium- and large-capacity equipment for LNG projects built by JSC Atomenergomash at the site of JSC Efremov Institute of Electrophysical Apparatus (NIIEFA) in Saint Petersburg; the test bench is unique in Europe. The first item of equipment to be tested on the test bench was the ENK 2000/241 large-capacity cryogenic LNG pump designed to load liquefied gas from storage tanks into the tanks of an LNG carrier. It currently has the highest performance among LNG pumps manufactured in Russia. The successful tests confirmed the reliability and operability of equipment made in Russia and validated the capabilities of ROSATOM's Mechanical Engineering Division in the sphere of development of new high-technology products for the gas industry.

The development of a fundamentally new LNG storage and transportation technology involving the use of independent tanks made of carbon-fibre-reinforced plastic has been initiated. Research focused on the development of a cargo containment system, including the design of a Project 10070 gas tanker, has been completed, and positive feedback has been obtained both from the Maritime Register and from Russian shipowners that are potential customers for this product. The project has been included in the Northern Sea Route development plan until 2035 and supported by the interdepartmental Commission on Promoting National Interests in the Arctic under the Security Council.

ROSATOM has initiated the production of a pilot prototype of the first Russian working fluid turboexpander with the fullest possible use of domestically produced components and the first Russian LNG loading arm, with tests scheduled for 2023.

Shipbuilding

Enterprises in the Mechanical Engineering Division have shipped a total of eight RITM-200 reactors for four icebreakers.

Power ships based on MFPUs

As part of the development of new nuclear power technologies, the Mechanical Engineering Division is building follow-on floating power units (FPUs), the Corporation's new promising product designed to provide power supply to remote areas and new industrial clusters and production facilities.

In 2022, the Division started to manufacture RITM-200S reactor units for the FPUs that will provide power supply for the Baimskaya Ore Zone, and the hulls of the first two FPUs were laid down.

A total of four FPUs with installed power generation capacity of up to 110 MW each (three main FPUs and one standby FPU) will be produced. The project to provide power supply for the Baimskaya Ore Zone has given impetus for the development of an entire family of FPUs differing in terms of their capacity and applications (designed for use in the Arctic and in tropical regions), providing ample opportunities for the implementation of large-scale industrial projects and exports from the Russian Federation.

Environmental protection

As part of the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project, in 2022:

- Preparatory, construction and installation work was carried out in the Saratov and Kurgan Regions (the Gorny and Schuchye facilities); main steel structures were assembled; the construction of new buildings and deliveries of process equipment were initiated. In addition, construction was started in the Kirov Region and the Udmurt Republic (the Maradykovsky and Kambarka facilities); preparatory work was carried out;
- Positive opinions following state expert reviews and construction permits were obtained for greenfield industrial facilities to be built in the Irkutsk and Tomsk Regions (the Vostok and Western Siberia facilities); construction contracts were concluded, and preparatory work was started. A contract was concluded for the development of design documentation and the construction of the RG Centre industrial facility in the Nizhny Novgorod Region;
- In the sphere of hazard class 1 and 2 waste management, FSUE FEO (an organisation within ROSATOM's scope of consolidation), which is the federal operator responsible for hazard class 1 and 2 waste management, started to operate on 1 March 2022. A digital platform, FGIS OPVK, has been introduced; it is designed for waste tracking and the monitoring of its management, and for managing the operations of market players. At year-end 2022, 34,400 waste-generating organisations, as well as operators providing hazardous waste transportation and processing services were operating in the digital environment.

As part of the Clean Country and Preservation of Lake Baikal Federal Projects, the Corporation continued the remediation of particularly challenging legacy sites causing environmental damage.

Work was started as part of the project to repair historical environmental damage at the Krasny Bor toxic industrial waste landfill. Construction of a multilayer cut-off wall surrounding the landfill site was underway; it is designed for groundwater diversion and prevents the seepage of contaminants to adjacent areas. The structure will be equipped with an automated control system. In addition, the construction of infrastructure for wastewater treatment and for the processing of liquid and paste-like waste stored in open landfill cells was started.

Government contracts were concluded as part of the project to repair historical environmental damage in the Usolye-Sibirskoye municipality (Irkutsk Region). The dismantling of superstructures of 204 buildings and structures was completed ahead of schedule.

As part of the project to repair historical environmental damage from the operations of OJSC Baykalsk Pulp and Paper Mill (BPPM), measures were implemented to lower the water level above the sludge layer in landfill cells at the Babkhinsky and Solzansky landfills. This helped to prevent the contamination of Lake Baikal with waste generated by the enterprise. About 70,000 m^3 of sludge water was treated and transferred to municipal sewage treatment facilities in Baykalsk.

Design work was completed as part of measures to repair historical environmental damage at the site of sewage treatment facilities, including industrial spaces where black liquor is stored (the central wastewater treatment facilities), and at the Babkhinsky landfill site; positive opinions were obtained following state expert reviews.

In 2023, the Corporation will continue to build infrastructure to enable the safe management of hazard class 1 and 2 waste, with the Gorny and Schuchye sites to be commissioned in December 2023.

In 2023, the Corporation will continue to take steps to repair environmental damage caused by legacy sites. Measures to repair historical environmental damage at the Krasny Bor landfill site are scheduled to be completed in 2025, while work in the Usolye-Sibirskoye municipality and at the site of OJSC BPPM (the Babkhinsky landfill and the site of the central wastewater treatment facilities) is scheduled for completion in 2026.

Energy storage systems

In October 2022, the construction of Russia's first 'gigafactory' started in the Kaliningrad Region; the factory will produce lithium-ion batteries (cells) and assemble battery modules. The factory will meet the demand of Russian electric vehicle producers for lithium-ion traction batteries; it will also produce stationary energy storage systems for the power grid and for industrial enterprises.

The factory will become a fully integrated lithium-ion battery production facility, with its operations covering all stages from the mixing of cathode and anode mass components to the outgoing inspection of finished products.

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. If demand for the products is confirmed, the second and third stages of the factory may be commissioned.

Battery assembly capacity in Russia has been increased from 15 MWh per year to 150 MWh per year; a universal battery module based on a new type of lithium-ion cells has been developed.

Nuclear medicine

Despite restrictions, in 2022, ROSATOM managed to increase its overseas revenue from isotope products.

Imports of life-saving drugs were replaced. More specifically, deliveries of radioimmunoassay (RIA) kits produced in Belarus were started in order to replace brands that had left Russia, and the supply of samarium-153 oxabifor for the treatment of bone metastases was increased by 53%.

As part of the promotion of BRACHIUM gamma radiation therapy facilities, the Tula Regional Cancer Centre was the first in Russia to receive a BRACHIUM machine and carried out the first radiation therapy procedures.

A registration certificate was obtained from the Federal Service for Surveillance in Healthcare (Roszdravnadzor) for the ONYX radiation therapy facility.

The pilot operation of a manufacturing site was started as part of the project to localise the manufacture of diagnostic equipment.

The project to develop a competitive domestically produced 1.5 T MRI scanner received government support from the Ministry of Industry and Trade. On 15 December 2022, an agreement was signed on the provision of subsidies from the state budget. JSC Rusatom Healthcare and JSC NIITFA concluded a contract for the development of the MRI scanner.

As part of the initiative to establish a multipurpose irradiation centre in the Republic of Tatarstan, the production of main process equipment and the construction of a shielding room for an accelerator were started.

The development of a pilot ONYX remote radiation therapy facility (KLT-6) by JSC NIITFA is nearing completion. The project will help to promote the widespread use of new medical techniques and domestically produced equipment in clinical practice, guarantee a higher quality of treatment for cancer patients and reduce dependence on expensive imported equipment.

Additive manufacturing

In the reporting year, the first commercial delivery of an industrial 3D printer using the selective laser melting technology developed in-house was made.

A pilot sample of a DMD printer based on two industrial robots and a positioner was put into operation; the relevant technology was developed, and a fragment of a partition for an in-vessel device of a VVER-TOI reactor with an optimised design was produced from 08H18N10T stainless steel.

Batch production of stainless steel powders was launched, and an additive manufacturing centre was opened in Novouralsk (Sverdlovsk Region).

Two 3D printers using the selective laser sintering and direct laser growth techniques were put into operation at the site in Nizhny Novgorod in order to introduce additive manufacturing technologies into the production cycle of the enterprise and print parts for the nuclear industry.

The pre-commissioning of a pilot sample of 3D equipment for wire-based electron-beam additive manufacturing (EBAM) was completed; a technology was developed for the manufacture of a blank for the outlet of a magnetohydrodynamic pump for an analogue of the BREST-OD-300 reactor.

TOTAL INSTALLED POWER GENERATION CAPACITY OF ROSATOM'S THERMAL POWER PLANTS

An integrated process chain for the printing of parts involving heat treatment in the commissioned vacuum kiln, post-processing and 3D scanning was set up at the additive manufacturing centre in Moscow; parts for the aircraft industry were printed from superalloys.

A new product was developed, namely the MARPAK mobile automated additive manufacturing facility for repairs and production; field tests of the first pilot sample are underway.

The development strategy for this business area involves launching mass-produced 3D printers using metal powder compositions and wire materials on the market, launching batch production of stainless steel powders, superalloys and titanium alloys, and further expanding the network of additive manufacturing centres.

Small nuclear power plants

An agreement has been signed to supply power from a small nuclear power plant for the development of the Kyuchus deposit in the Ust-Yansky and Verkhoyansky Districts in the Sakha Republic (Yakutia).

Under the agreement, an onshore small NPP with a RITM-200N reactor unit will supply electricity for 40 years starting from 2028. A positive opinion has been obtained from the State Environmental Expert Review Board for supporting materials for the licence for the placement of the NPP.

ROSATOM has signed a Cooperation Agreement with the Ministry for the Development of the Russian Far East and Arctic to build a small NPP with a RITM-200N reactor in the Sakha Republic (Yakutia) as part of the Far Eastern Concession Programme.

The engineering design has been developed for the RITM-200N reactor unit; it has enhanced characteristics compared to the RITM-200 marine reactor unit and has been adapted for onshore use.

The Corporation has continued to cooperate with potential foreign customers for small NPPs; a number of documents have been signed as part of exploration of opportunities for cooperation in the construction of new Russian-design nuclear power units, including in Kyrgyzstan, Myanmar and other countries.

Non-energy nuclear projects (NRTCs)

In 2022, ROSATOM continued to implement one of its key major projects in Latin America, namely the construction of a Nuclear Research and Technology Centre in Bolivia. In 2022, stage 1 and 2 facilities, namely the Cyclotron Radiopharmacy Preclinical Complex (CRPC) and the Multipurpose Irradiation Centre, started pilot operation, and the necessary permits were obtained from the Bolivian healthcare regulator for the medical use of radiopharmaceuticals produced at the CRPC.

For details, see the section 'New Products for International Markets'.

Smart City

ROSATOM has completed the acquisition of PJSC Quadra – Power Generation. As a result, in 2022, installed power generation capacity of ROSATOM's thermal power plants totalled 4 GW, while their installed heat generation capacity exceeded 19,000 Gcal/h. The Corporation has also completed the acquisition of GORTEKH Group of Companies.

The development of the Digital Heat Supply and Infrastructure IoT Platform products has been completed, and they have been launched on the market.

In 2022, the Smart City solutions covered 12 regional projects, 18 nuclear towns and cities and 84 non-nuclear towns and cities.

16 towns and cities where the Smart City projects were being implemented by ROSATOM ranked high in the Urban IQ Index ranking compiled by the Russian Ministry of Construction, Housing and Utilities for 2022.

A greenhouse gas emission reporting verification and validation body has been established and accredited to operate.

Six concession agreements aimed at managing and upgrading resource supply systems in Lesnoy, Glazov, Kursk, Voronezh and Yuzhno-Sakhalinsk are being implemented.

GRI 2-6

2.2. INTERNATIONAL BUSINESS DEVELOPMENT

Key results in 2022

- The 10-year portfolio of overseas orders totalled USD 135.9 billion.
- The portfolio of overseas orders covering the entire life cycle totalled USD 200.8 billion.
- Foreign revenue reached USD 11.76 billion (USD 8.98 billion in 2021).
- The overseas NPP construction project portfolio comprised 34 power units in 11 countries around the world.
- Projects were underway in more than 50 countries worldwide.

2.2.1. Promoting ROSATOM's technologies on foreign markets

Despite the deteriorating global political environment, in 2022, ROSATOM remained a leader in key segments of the global nuclear energy market.

The main focus of ROSATOM's international business is the construction of Russian-design nuclear power plants abroad. The Corporation promotes an integrated offer covering a wide range of areas, from uranium supply and NPP construction to assistance in project financing and personnel training. This approach is unique on the global market, which enables the Corporation to remain the only player in the world capable of establishing a comprehensive technological partnership in the nuclear power industry.

ROSATOM is actively promoting Russian nuclear technologies and solutions for energy and non-energy applications both in countries that are beginning to develop nuclear power and in countries with a well-developed national nuclear power industry (including based on Russian technology).

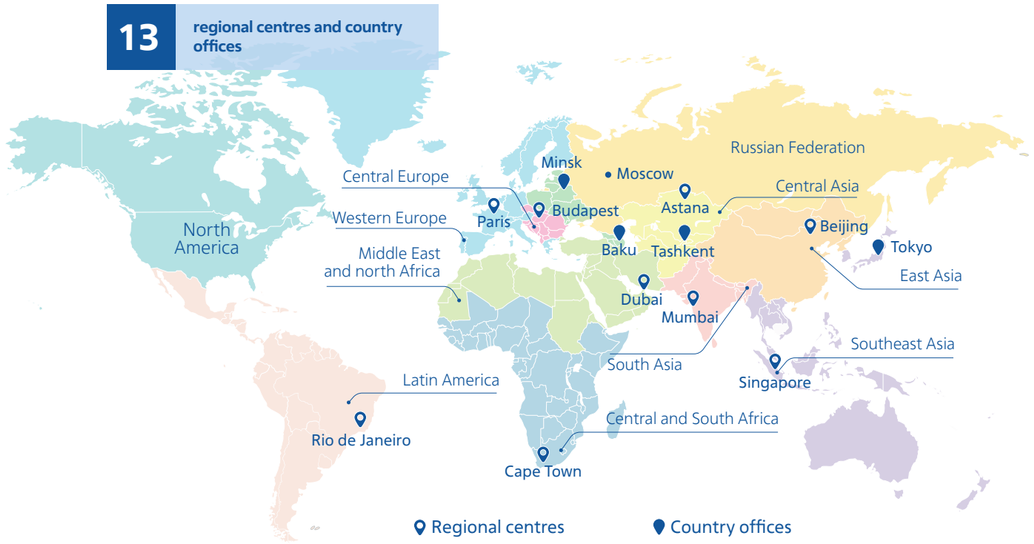
In addition, ROSATOM provides support throughout the life cycle of nuclear facilities (including both energy and non-energy facilities) by supplying the global market with the full range of products and services in the front-end and back-end stages of the nuclear fuel cycle (NFC), as well as providing services related to the maintenance and modernisation of such facilities. In 2022, ROSATOM maintained its foothold on the nuclear fuel cycle product market.

GRI 2-1 Despite all challenges that faced it in 2022, including growing sanctions pressure, ROSATOM maintained and even expanded its overseas footprint. ROSATOM implements its projects in more than 50 countries worldwide.

As at 31 December 2022, 158 overseas divisions of ROSATOM and its organisations operated in 43 foreign countries. Among them, a special role is played by 13 regional centres and country offices of ROSATOM. They are managed by Rusatom International Network, a private institution that performs international business development, marketing and PR functions in the industry.

Furthermore, ROSATOM not only builds nuclear power plants under existing contracts but also continues to make steady progress in terms of arrangements for the construction of new NPPs.

ROSATOM's country offices and regional centres



ROSATOM takes systematic steps to promote small nuclear power plants; given heightened interest from customers in the energy market, this is a crucial focus area for the Corporation. ROSATOM's capabilities and the successful implementation of the project to build the FTNPP, which simultaneously supplies both heat and power to the town of Pevek in Chukotka, enable the Corporation to engage in a meaningful dialogue with overseas partners. For instance, in November, documents were signed on a joint pre-feasibility study for small NPP construction projects in Myanmar and Kyrgyzstan.

GRI 2-28 ROSATOM attaches special importance to cooperation with foreign organisations (non-profit organisations, including associations, initiatives, councils, etc.). In 2022, ROSATOM had business relationships with more than 30 foreign organisations in 16 countries worldwide. The World Nuclear Association (WNA) remains a key partner of the Corporation. As part of the Corporation's membership in the WNA, representatives of ROSATOM and its organisations took part in the key WNA events, as well as its working groups and research initiatives.

2.2.2. Changes in foreign revenue and the portfolio of overseas orders

In the reporting year, ROSATOM's 10-year portfolio of overseas orders reached USD 135.9 billion.

Changes in the portfolio of overseas orders, USD billion

Indicator	2020	2021	2022
10-year portfolio of overseas orders, including:	138.3	139.9	135.9
– NPP construction abroad	89.1	84.1	78.0
– NFC (including the back end)	30.9	34.0	33.5
– Other activities	18.3	21.2	24.4

Changes in foreign revenue, USD million

Indicator	2020	2021	2022[1]
Foreign revenue, including:	7,475	8,979	11,764
– NPP construction abroad	4,098	4,896	5,612
– NFC (including the back end)	2,899	3,336	4,098
– Other activities	479	748	2,051

2.2.3. NPP construction abroad

At year-end 2022, ROSATOM's portfolio of overseas NPP construction projects included 34 power units in 11 countries worldwide, with 23 power units in eight countries at the construction stage. All overseas NPP construction projects are on track; the only exception is the Hanhikivi 1 NPP project in Finland, which has been unilaterally terminated by the Finnish customer for political reasons. No other overseas construction project has been suspended. Russian-design nuclear reactors that are currently under construction fully meet international safety requirements.

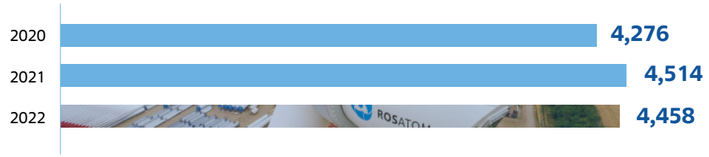
1. Foreign revenue for 2022 includes MC Delo.

NPP, country	Results
Asia	
Rooppur NPP, Bangladesh	The welding of the main coolant line has been completed at power unit No. 1 The installation of the inner containment dome has been completed at power unit No. 1 The reactor vessel has been moved into final position at power unit No. 2
Kudankulam NPP, India	The reactor vessel has been installed at power unit No. 3 The installation of reactor unit equipment has been completed at power unit No. 3 The dome of the reactor building of power unit No. 3 has been moved into final position
Tianwan NPP, China	The core catcher vessel has been installed at power unit No. 7 Concreting of the foundation slab of the reactor building has been started at power unit No. 8 The core catcher vessel for power unit No. 8 has been shipped
Xudabao NPP, China	The core catcher vessel has been installed at power unit No. 3 Concreting of the foundation slab of the reactor building has been started at power unit No. 4
Europe	
Paks II NPP, Hungary	A licence has been obtained for the implementation of the Paks II NPP project
Belarusian NPP, Belarus	Preparations for the commissioning of power unit No. 2 are underway
Middle East and North Africa	
El Dabaa NPP, Egypt	Concreting of the foundation slabs of the reactor buildings has been started at power units No. 1 and 2
Akkuyu NPP, Turkey	The production of fresh nuclear fuel for power unit No. 1 has been launched Concreting of the foundation slab of the reactor building has been started at power unit No. 4

2.2.4. NPP servicing abroad

ROSATOM provides maintenance services for 48 Russian-design power units abroad that are currently in operation or at the design/construction stage. Its product portfolio targeted at international markets includes a wide range of work and services covering the entire NPP life cycle.

Uranium mining by Uranium One enterprises, tonnes



In 2022, the Corporation provided support for scheduled preventive maintenance at Kudankulam NPP (India), Tianwan NPP (China), Kozloduy NPP (Bulgaria) and the Armenian NPP. The first scheduled repairs were successfully carried out at power unit No. 1 of the Belarusian NPP.

Over 900 members of operating and maintenance personnel at foreign NPPs underwent training as part of long-term and short-term programmes in 2022, including at Rooppur NPP (Bangladesh), Akkuyu NPP (Turkey), El Dabaa NPP (Egypt) and Paks II NPP (Hungary).

The Corporation provided assistance to foreign customers in building and improving nuclear infrastructure in Egypt, Bolivia, Bangladesh and Namibia.

Reactor control systems were upgraded at power unit No. 6 of Kozloduy NPP (Bulgaria). The relevant equipment was put into operation.

A long-term contract was signed for the supply of spare parts and equipment for the reactor coolant pump to Tianwan NPP (China).

Full-scale and analytical simulators for the training centres at Akkuyu NPP (Turkey) and Rooppur NPP (Bangladesh) were delivered and put into operation.

2.2.5. Export of uranium products and natural uranium enrichment services

In 2022, ROSATOM remained one of the world's leading suppliers of nuclear fuel cycle front-end products.

All obligations under existing contracts in the reporting year were fulfilled in full, with uranium products supplied to 43 customers in 15 countries. Feedback received as part of customer satisfaction surveys and the findings of supplier audits conducted by customers indicate that on the whole, product quality, communications and supply chain resilience meet customer expectations. The customer-centric approach adopted by the Corporation and the importance that it attaches to its partners' offers provide a foundation for constructive long-term cooperation. The 10-year portfolio of orders for uranium products remained roughly at the same level as in previous years.

In the reporting year, 15 new contracts for the supply of uranium products were concluded with 11 customers from eight countries, including addenda to existing contracts.

Uranium mining abroad

In 2022, ROSATOM's overseas uranium mining enterprises produced about 4,500 tonnes of uranium; along with the operation of its mining enterprises in Russia, this enabled ROSATOM to remain the world's second largest producer of this naturally occurring metal.

The Corporation plans to develop its mineral resource base and continuously improve the economics of its natural uranium mining projects.

2.2.6. Nuclear fuel export

In 2022, the Corporation continued to fulfil its existing contractual obligations related to nuclear fuel supply, despite the transportation and logistics challenges facing it.

In 2022, ROSATOM's share on the global nuclear fuel fabrication market totalled 17%.

In the reporting year, Russian nuclear fuel fully met the demand of Russia, as well as a number of partner countries, including Armenia and Belarus, for reactor fuel. Nuclear fuel produced by ROSATOM is also used in reactors at NPPs in India, China and a number of other countries.

Despite existing external factors, all deliveries of nuclear products were made in full and on time. In addition, contract documents were signed with the Indian party, and the first batch of a new type of fuel, TVS-2M, was supplied to power unit No. 1 of Kudankulam NPP. Fuel for start-up core loading and for the first reloading of the CFR-600 high-power fast neutron reactor, which is currently under construction in China, was manufactured and shipped to the customer.

The reactor core mock-up was delivered to Akkuyu NPP in Turkey using new document preparation and customs clearance mechanisms.

A contract was signed with the Uzbek customer for the supply of a pilot batch of advanced fuel. It will be used to conduct reactor tests in a research reactor in Uzbekistan, to be followed by the delivery of a commercial batch.

NFC products were supplied and contracts were concluded for additional volumes and an expanded product range, including uranium components, as well as aluminium alloy and aluminium powder products, as a follow-up to the long-term framework contract for the supply of nuclear fuel components for the ETRR-2 research reactor to Egypt, which was concluded in 2020 with the Egyptian Atomic Energy Authority (EAEA).

ROSATOM'S SHARE ON THE GLOBAL NUCLEAR FUEL FABRICATION MARKET

As part of the Balanced NFC product line, the Corporation developed the design of the fifth-generation fuel bundle, TVS-5, for VVER reactors, which underwent a full range of pre-irradiation tests. These confirmed the reliability of the design and the possibility of its use in VVER-1000 and VVER-1200 reactors. The special features of the TVS-5 design will help to completely eliminate manual labour in nuclear fuel production.

The programme of reactor tests for new materials for accident tolerant fuel was expanded. The technology for the production of fuel pellets from uranium disilicide was developed. Reactor tests of new VVER- and PWR-sized fuel elements with uranium silicide fuel were started in the MIR research reactor.

2.2.7. New products for international markets

Construction of Nuclear Research and Technology Centres

ROSATOM also continues active work on non-energy applications of nuclear technology.

In 2022, ROSATOM continued to implement one of its key projects focused on new products, namely the construction of the Nuclear Research and Technology Centre in Bolivia, the world's highest-altitude nuclear facility. As part of the construction of the Centre, in 2022, stage 1 and 2 facilities, namely the Cyclotron Radiopharmacy Preclinical Complex (CRPC) and the Multipurpose Irradiation Centre, started pilot operation, and the necessary permits were obtained from the Bolivian healthcare regulator for the medical use of radiopharmaceuticals produced at the CRPC. In addition, in 2022, a licence was obtained for the construction of stage 4, which includes reactor and engineering facilities, and the required degree of completion of the relevant facilities was achieved.

Jointly with foreign partners, the Corporation is examining options for the establishment of production and sales hubs for the construction and subsequent operation of radiopharmaceuticals plants and nuclear medicine centres.

In addition, in 2022, ROSATOM continued to implement the intergovernmental agreement signed earlier on cooperation in the construction of an NRTC in Vietnam, with a focus on preparing for the development of a feasibility study for this project.

Promoting life cycle back-end services

The Corporation continues to promote the Balanced NFC, a product offer for the back end of the nuclear fuel cycle (NFC), on the global market. This is a solution incorporating certain elements of a closed nuclear fuel cycle and enabling effective recycling of regenerated nuclear materials and a significant decrease in the volume and radioactivity level of radioactive waste sent for near-surface or medium-depth disposal. This is achieved through SNF processing and high-level waste fractionation.

In 2022:

- Russia and Belarus concluded an intergovernmental agreement on cooperation in SNF management, which is a necessary prerequisite for concluding a contract for the management of SNF from the Belarusian NPP;
- A contract was concluded and transportation packages were delivered for the management of SNF from Kudankulam NPP;
- The pilot TUK-137T.R transportation package was manufactured; this is new-generation packaging required for the implementation of the Balanced NFC concept.

Nuclear medicine

In 2022, ROSATOM continued to develop its capabilities in the sphere of medicine, produce and supply medical isotopes and radiopharmaceuticals, and develop medical equipment for diagnostics and therapy. For instance, following a successful tender, a contract was signed with a Bengal partner to upgrade a gamma radiation facility and supply cobalt-60. Distribution contracts were concluded for the supply of Russian medical equipment to Mexico and Belarus.

Isotope products

In 2022, ROSATOM continued to operate on the global market for isotope products. It supplied products under existing contracts and concluded new contracts with foreign customers. Considerable efforts were made to redesign logistics, supply chains and payment arrangements. Preparations continued for launching Russian radiopharmaceuticals compliant with international GMP standards on the foreign market.

2.2.8. Plans for 2023

Plans for 2023 include the start of full-scale operation of power unit No. 2 of the Belarusian NPP. As part of the Akkuyu NPP construction project in Turkey and the Rooppur NPP construction project in Bangladesh, in 2023, the Corporation plans to deliver fresh nuclear fuel to the construction sites. As part of the El Dabaa NPP construction project, the Corporation expects to obtain a licence for the construction of power unit No. 3 and subsequently start the concreting of the foundation slab of the reactor building at power unit No. 3.

As part of the NRTC construction project in Bolivia, ROSATOM plans to continue construction and installation operations at stage 4 facilities, including the installation of main process equipment for Bolivia's first nuclear research reactor.

Given that the customers' interest in the energy market is shifting towards flexible solutions (in terms of both the power generation volume and the amount of funding), the most important area of focus for ROSATOM in 2023 will be the promotion of small nuclear power plants. More specifically, the Corporation plans to complete pre-feasibility studies in Myanmar and Kyrgyzstan.

ROSATOM plans to consistently diversify its product offer and launch new products on new markets. In 2023, the Corporation intends to continue to expand the footprint of its isotope business abroad. It also plans to be more active on foreign markets in the wind power segment and to leverage existing capabilities in the Russian Federation. Special emphasis will be placed on the development of projects in the field of nuclear medicine and energy storage systems, given the considerable potential of these market segments.

2.3. ENERGY EFFICIENCY

2.3.1. Energy efficiency management system. Implementation of energy efficiency management and energy management systems

Energy conservation is an important prerequisite for the efficient use of ROSATOM's energy resources, making it more competitive and reducing the negative impact on the environment. An energy conservation and energy efficiency improvement programme for the period from 2018 to 2022 is being implemented in the Russian nuclear industry.

In accordance with the government programme of the Russian Federation titled 'Development of the Nuclear Power and Industry Complex' (hereinafter referred to as the 'DNPIC programme'), between 2015 and 2022, the Corporation set and achieved the following targets for the reduction in energy consumption as a percentage of the actual consumption volume in 2015 and 2020 respectively:

Indicator	2018		2019		2020		2021		2022	
	target	actual	target	actual	target	actual	target	actual	target	actual
Savings compared to 2015, %	5	8.9	6	9.7	7	9.84	–	–	–	–
Savings compared to 2020, %	–	–	–	–	–	–	0.5	0.99	1.0	1.50
Cumulative total savings between 2015 and 2020, RUB billion (excluding VAT)	–	2.6	–	2.9	–	2.95	–	–	–	–
Cumulative total savings in 2021 and 2022, RUB billion (excluding VAT)	–	–	–	–	–	–	–	0.35	–	0.56

2.3.2. Results in 2022[1]

Energy consumption and energy cost allocation with a breakdown by Division and complex

In 2022, energy costs of ROSATOM's organisations (under comparable conditions, in 2020 prices) totalled RUB 36.85 billion (JSC Rosenergoatom: RUB 2.30 billion; JSC Atomerdmetzoloto: RUB 1.87 billion; JSC Atomenergomash: RUB 1.05 billion; the NWD: RUB 7.56 billion; other: RUB 24.07 billion), with energy costs of JSC Atomenergoprom totalling RUB 26.56 billion.

Energy consumption in the nuclear industry in physical terms (reduction against 2020 as the base year)

Division/ complex	Heat		Water		Electricity		Other (gas, fuel oil)	
	Actual consumption during the period under comparable conditions, '000 Gcal	%	Actual consumption during the period under comparable conditions, '000 m³	%	Actual consumption during the period under comparable conditions, '000 kWh	%	Actual consumption during the period under comparable conditions, tonnes of fuel equivalent	%
JSC Atomredmetzoloto	591.33	1.23	3,668.32	2.89	468,635.49	3.02	–	–
JSC Atomenergomash	48.23	4.52	1,385.59	37.77	159,506.79	2.16	65,510.83	3.57
JSC Rosenergoatom	410.02	2.32	1,185,983.41	0.44	984,804.95	0.97	–	–
JSC Science and Innovations	228.12	0.29	5,528.21	0.70	165,778.62	0.53	1,023.48	1.71
Environmental Solutions	488.65	8.48	21,232.58	17.71	328,448.50	2.75	23,240.90	0.00
NWD	2,101.24	0.72	25,731.78	2.33	866,939.75	1.56	158,408.88	1.43
Other	2,065.44	3.53	597,081.78	-4.48	3,133,882.26	0.54	2,569,886.53	1.91
Total across ROSATOM	**5,933.03**	**2.56**	**1,840,611.67**	**-0.78**	**6,107,996.36**	**1.11**	**2,818,070.62**	**1.91**

1. According to the reports of nuclear organisations in the Corporation's information system (the Automated Energy Efficiency Management System, hereinafter referred to as the AEEMS).

Energy savings as a result of energy efficiency measures and energy cost savings achieved by ROSATOM, with a breakdown by Division and complex

In accordance with the DNPIC programme, the energy conservation target for ROSATOM for 2022 has been set at 1.0% of the actual consumption volume in 2020.

According to reports by nuclear organisations, in 2022, actual energy savings against 2020 as the base year totalled 1.50%, or RUB 0.56 billion (excluding VAT) in monetary terms and 2,508,652.09 GJ in physical terms, with the following breakdown by Division/complex:

Energy cost savings in 2020 (against 2015 as the base year, excluding VAT) and in 2021 and 2022 (against 2020 as the base year, excluding VAT)

Division/complex	2020		2021[1]		2022	
	RUB million	%	RUB million	%	RUB million	%
JSC Atomredmetzoloto	227.60	12.64	23.24	1.22	33.66	1.77
JSC Atomenergomash	187.35	19.65	31.11	2.86	35.28	3.25
JSC Rosenergoatom	90.40	4.86	12.74	0.55	11.06	0.48
JSC Science and Innovations	82.92	9.01	8.56	0.67	3.87	0.30
Environmental Solutions	570.99	23.97	26.24	-1.24	118.64	5.23
NWD	645.03	10.57	86.68	-1.13	107.16	1.40
Other	1,141.68	7.17	164.83	0.86	251.01	1.20
Total across ROSATOM	**2,945.97**	**9.84**	**353.40**	**0.99**	**560.68**	**1.50**

2.3.3. Implementation of new import substitution technologies that contribute to the technological sovereignty of the Russian Federation

ROSATOM's organisations work continuously to achieve the strategic goal of developing new products for the Russian and international markets, which involves increasing the share of import substitution products relevant to energy conservation.

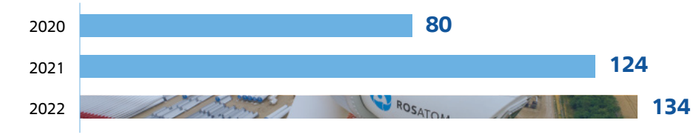
In order to replace imports and meet the demand for lighting fittings, JSC Khiagda continued to produce high-performance lighting products (LED lamps) used in industry enterprises. More than 3,000 lamps have been sold since 2021.

ROSATOM's organisations have implemented most elements of an energy management system compliant with the ISO 50001 international standard (the organisations of JSC Rosenergoatom and JSC TVEL have obtained international certificates; organisations in other Divisions have implemented individual elements of the system).

Organisations in the industry also use the AEEMS information system (the Automated Energy Efficiency Management System of ROSATOM) for reporting on energy conservation and improvement of energy efficiency. In addition, in order to comply with the requirements of Federal Law No. 261-FZ of 23 November 2009 on Energy Conservation and on Increasing Energy Efficiency and on Amending Certain Laws of the Russian Federation, in 2022, energy conservation and energy efficiency improvement programmes for the period from 2023 through 2027 were approved in ROSATOM and its organisations, and a similar programme was approved in JSC Atomenergoprom; among other things, they involve migrating the AEEMS to software that does not rely on imported solutions.

1. The decrease was due to the transition to a new base year (2020).

Number of ROSATOM's organisations covered by the AEEMS



2.3.4. Plans for 2023 and for the medium term

In 2022, the energy conservation target was 0.5% higher that the target set as part of the DNPIC programme; accordingly, the following differentiated energy conservation targets were set for 2023 and included in the KPI maps of executives of ROSATOM's Divisions/complexes (against 2020 as the baseline), providing for outperformance against the targets set in the DNPIC programme for the current year:

Division/complex	Energy conservation targets for 2023 (%)
JSC Atomredmetzoloto	1.70
JSC Atomenergomash	2.10
JSC Rosenergoatom	0.40
JSC Science and Innovations	0.60
JSC Rusatom Infrastructure Solutions	1.50
Environmental Solutions	1.20
NWD	2.20
Other	from 0.80 to 5.60

In the medium term, ROSATOM will also continue to take steps to meet the requirements of the DNPIC programme until 2027:

Reduction in energy consumption (under comparable conditions)	Target (%)				
	2023	2024	2025	2026	2027
against 2020	1.5	2	2.5	–	–
against 2025	–	–	–	0.5	1

In addition, between 2022 and 2027, ROSATOM plans to:

- Monitor progress on scheduled energy audits in organisations in the industry;
- Monitor updates to energy conservation programmes approved by organisations with energy costs exceeding RUB 50 million per year for the next five years following the completion of the current programmes;
- Assess the outcomes of energy conservation measures implemented by the organisations (assign industry ratings) on an annual basis;
- Maintain the energy efficiency management and energy management systems implemented in the industry and continuously improve their performance;
- Achieve additional synergy between energy conservation initiatives and the Corporation's efforts to improve sustainability maturity in the industry;
- Migrate the AEEMS to software that does not rely on imported solutions;
- Update the Corporation's scope of reporting;
- Continuously improve the functionality of the AEEMS.

2.4. BUSINESS EFFICIENCY

2.4.1. ROSATOM Production System

Key results in 2022

- The scope of systematic RPS development included 41 nuclear enterprises.
- Digital benchmarks were created in 14 nuclear enterprises.
- The Shop Floor Club of Construction Project Owners was established.
- More than 3,000 RPS projects with a social and economic focus were implemented in the regions.

The ROSATOM Production System (RPS) is a lean manufacturing culture and a system for continuous process improvement to provide ROSATOM with competitive advantages globally.

The RPS principles enable the Corporation to achieve one of its strategic goals: to reduce the production cost and the lead time by identifying and eliminating all types of losses in manufacturing and office processes and by improving the performance of each employee.

2.4.2. Results in 2022

Digital RPS Enterprise as a new RPS priority

Since 2015, a systematic RPS development programme is implemented in nuclear enterprises: business goals are decomposed to the level of production sites; the manufacture of an enterprise's core products (production flows) is optimised; training in RPS techniques is provided for employees, and incentive systems are introduced to encourage continuous improvement.

Nuclear enterprises supporting the comprehensive development of the ROSATOM Production System are eligible for one of the following statuses: the RPS Reserve, an RPS Candidate, an RPS Leader or a Digital RPS Enterprise (a Lean Smart Plant). In 2022, the scope of systematic RPS development included 41 enterprises.

The Digital RPS Enterprise is a new RPS priority. This approach is focused on improving the management of manufacturing operations through the application of RPS tools, digital solutions and information technologies.

The Digital RPS Enterprise initiative involves comprehensive production development in accordance with the RPS methodology and the achievement of targets for the following indicators:

1. Digital RPS benchmarks incorporated into product flows;
2. The use of end-to-end digital technologies;
3. The use of digital twins of production facilities;
4. Digital RPS benchmarks incorporated into production support processes;
5. The use of digital modelling techniques;
6. The use of electronic information centres.

Based on development progress measured by the relevant indicators, enterprises are successively awarded the Bronze, Silver and Gold levels.

In 2022, digital benchmarks were created in 14 enterprises: JSC Afrikantov OKBM, JSC CDBMB, JSC Chepetsk Mechanical Plant, the Petrozavodskmash branch of JSC AEM-Technology, JSC Khiagda, branches of JSC Rosenergoatom (Kalinin, Kola and Balakovo NPPs), JSC MSZ Machinery Manufacturing Plant, PJSC NCCP, JSC Angarsk Electrolysis Chemical Plant, JSC PA ECP, JSC Dalur and FSUE Mining and Chemical Plant. Following a peer review of progress in RPS development carried out in early 2023 to promote RPS development, some of these enterprises became eligible for the Bronze level of the Digital RPS Enterprise status.

An RPS benchmark is a processing stage or a process in the process flow for a key product of ROSATOM's organisation matching global best practices in production engineering.

These enterprises were developing more than 40 digital RPS benchmarks. They are currently using a variety of digital solutions based on state-of-the-art technology, such as artificial intelligence and machine vision, digital twins and digital 3D modelling, robotics and additive manufacturing, the Industrial Internet of Things (IIoT) and predictive analytics, as well as MES, ERP, PLM, CAE, CAD, PDM and other information systems.

The development and roll-out of RPS benchmarks continued in shop floor clubs established in the previous years: Mechanical Assembly Operations, Multi-Product Machining and Design Organisations.

The participants of the RPS Leaders forum held in December 2022 reviewed the best practices in the implementation of the Lean Smart Plant approach introduced in 2022 (the use of electronic checklists, bar coding capabilities, 3D modelling techniques for assemblability evaluation, a prototype digital twin of a product flow, additive manufacturing technologies) and discussed matters related to the development of a digital RPS enterprise.

RPS engineering

In 2022, ROSATOM continued to implement RPS engineering standards at construction sites of RPS enterprises in the nuclear industry.

Kursk NPP-2 has met all the necessary criteria for assigning the highest (third) level of an RPS construction benchmark. More specifically, effective cooperation between the project owner and the general contractor on the construction site has been demonstrated; joint process optimisation initiatives are being implemented at all stages of construction.

RPS construction projects have been successfully implemented at major construction sites:

- Reduction of the lead time for the decommissioning of an industrial site of the Moscow branch of FSUE Radon;
- Timely completion of key 2022 milestones in the construction of the BREST-300 reactor unit (JSC SCP);
- Reduction of the lead time for the construction of process units 4-1, 4-2, 4-3, 3-3, 3-2 targeting the Eastern ore body of the Khokhlovskoye deposit (JSC Dalur);
- Optimisation of the process for ensuring preparedness for the assembly of the 10UJA reactor vessel at power unit No. 1 of Kursk NPP-2 (JSC ASE).

In order to mobilise reserves and promote horizontal cooperation in the sphere of construction, the Shop Floor Club of Construction Project Owners was established in 2022.

Supplier development

According to the Uniform Industry-Wide Guidelines on the Development of the Production System of ROSATOM's Suppliers, suppliers' production systems are developed in three stages:

The first stage of development includes efforts aimed at starting the transformation and creating a pilot production site using lean manufacturing techniques and tools.

The second stage is aimed at laying the foundation for a production system underpinned by the lean manufacturing principles, further improving process flows selected earlier for optimisation, ensuring that the pilot production site reaches a benchmark level, starting to roll out best practices, planning and launching systematic initiatives across focus areas (Decomposition, Process Flows, Project Implementation, Training, Motivation).

The third (highest) stage of development (Efficiency) includes efforts aimed at creating an operational system of continuous improvement and a strategy for the development of key product flows. After reaching the third stage of development and meeting the necessary criteria, an enterprise is able to develop its own production system without regular involvement of the Customer's RPS experts.

In 2022, industry RPS experts contributed to the systematic development of over 30 suppliers from other industries using lean manufacturing approaches and tools. The development is based on the Uniform Industry-Wide Guidelines on the Development of the Production System of Suppliers of ROSATOM and Its Organisations Using the Techniques and Tools of the ROSATOM Production System. In 2022, 14 enterprises participating in systematic development efforts demonstrated a high level of efficiency.

The Corporation constantly searches for new tools and reserves in the sphere of supplier development. For instance, in 2022, the Supplier Data Reliability Audit with a Production System Assessment Unit tool was used for the first time at the stage of announcing the outcomes of tendering. The audits were commissioned by a division of JSC ASE, for which three pilot procedures were conducted in the following enterprises: JSC Uralmashplant (Ekaterinburg); JSC Enmash (Rybinsk); LLC Smart Pipeline Systems (Nizhny Novgorod).

Introduction of lean techniques in Russia's social sector and industry

ROSATOM voluntarily shares its best management techniques and workflow organisation methods nationwide as part of the Efficient Region project and the Labour Productivity and Employment Support National Project. Introduction of the principles and tools of the ROSATOM Production System enables a significant improvement in the efficiency of healthcare, education and utility systems and other sectors of the Russian economy.

In 2022, the Efficient Region project was underway in 35 regions, with the Republic of Tatarstan, the Kaliningrad, Vladimir, Novgorod and Omsk Regions joining the project during the year. Over 3,000 social and economic projects were implemented in the regions.

In 2022, 162 benchmark best practices in the application of lean techniques were validated in the following areas of social and economic activity in the regions: public and municipal administration, education, healthcare, housing and utilities, employment centres, multi-service centres, social security, sports and industry.

It should be noted that in 2022, all four prizes in the Lean Management Projects category of the Project Olympus competition in the sphere of professional project management in the public sector were awarded to projects implemented in the regions involved in the Efficient Region project.

2022 saw rapid development of lean communities in the form of clubs as part of the Efficient Region project; these include the Club of Directors of Lean Schools and Kindergartens, the League of Lean Colleges and the Association of Lean Universities, a community of lean local governments, as well as regional associations, which currently comprise more than 750 educational institutions in 10 regions.

In 2022, ROSATOM participated in the National Social Initiative in cooperation with the Agency for Strategic Initiatives; as a result, more than 100 interorganisational lean projects were implemented in 127 organisations to address 12 real-life situations in 10 Russian regions.

The project of the Ministry of Health of the Russian Federation titled 'Development of Primary Care Models Underpinned by the Principles of Value-Based Healthcare' has been implemented in seven pilot regions jointly with the Federal Research Institute for Health Organisation and Informatics of the Ministry of Health of the Russian Federation. The results of this project will be replicated in all Russian regions.

In 2022, ROSATOM, along with the Ministry of Economic Development of the Russian Federation, the Agency for Strategic Initiatives and major business associations, joined the End-to-End Investment Flow project. The project is aimed at reducing paperwork and speeding up the launch of investment projects. The optimisation of the end-to-end investment flow, or the investor journey, is supported by the tools and approaches of the ROSATOM Production System.

The project covers seven pilot regions that previously participated in the Efficient Region project run by ROSATOM (the Krasnodar Territory, the Rostov, Nizhny Novgorod, Lipetsk, Oryol and Sakhalin Regions and Kuzbass), as well as 12 observer regions. Work on the identified issues has resulted in the drafting of more than 160 proposals for amendments to federal laws and about 140 proposals for amendments to regional and municipal laws and regulations, as well as the development of about 500 measures to address organisational and technological issues. The key project parameter is the lead time. It has been used as a basis for the

calculation of the relevant targets for all algorithms. As they reach the target state, regions will be able to reduce the lead time for the end-to-end flow by a factor of 1.5–2 (by 120 to 800 days, depending on the region); furthermore, if they use the best results of the pilot regions as a benchmark, it will be possible to reduce the lead time for the end-to-end flow more than three-fold.

2.4.3. Plans for 2023

ROSATOM has prioritised the following areas for 2023:

- The Digital RPS Enterprise (Lean Smart Plant);
- RPS engineering;
- Supplier development;
- Introduction of lean techniques in Russia's social sector and industry.

Digital RPS Enterprise (Lean Smart Plant)

Plans for 2023 include creating at least 30 new digital RPS benchmarks for product flows and production support processes in 18 nuclear enterprises. A list of key digital RPS projects scheduled for 2023 has been compiled following a review of road maps for the development of Digital RPS Enterprises in seven Divisions.

Steps will be taken to improve the digital maturity of enterprises, and an active knowledge environment will be created (this will involve demonstrating digital solutions in process flows, holding digital literacy workshops, facilitating the sharing of experience between enterprises, including those in other industries, and formulating requirements for the establishment of laboratories focused on digitisation and robotic process automation).

The development of the Digital RPS Enterprise initiative will also involve designing the format and formulating requirements for project teams developing digital RPS benchmarks (the allocation of responsibility, functional specifications, mechanisms for cooperation and communication, etc.), and establishing operations centres focused on digital competences, which will provide advisory support.

RPS engineering

The Club of Technical Coordinators of Construction Projects will function in 2023; it will be tasked with promoting horizontal cooperation among construction project participants. The Club will review typical challenges and issues facing many construction firms. This shop floor club will enable construction companies to share their experience with other participants.

Category strategies for the supply of key products involve planning measures to ensure long-term supply of key products to the Divisions in the industry.

ROSATOM will continue to implement RPS engineering standards at construction sites of RPS enterprises in the industry and to develop RPS construction benchmarks for operational construction schedule management.

Supplier development

As part of its initiatives focused on supplier development and logistics management, ROSATOM constantly searches for new tools and reserves. In 2023, the task of the RPS is to make a significant contribution to the development of the industry-wide import substitution and de-monopolisation initiative. ROSATOM plans to actively engage RPS experts in the development of category strategies for the supply of key products to the Divisions in the industry at the stage of supplier qualification. Subsequently, during the implementation of the category strategies, RPS tools will be used for the introduction of new product lines into production.

Introduction of lean techniques in Russia's social sector and industry

As part of the Efficient Region programme, the Corporation will continue to create benchmarks in all areas of social and economic activity in the regions.

ROSATOM is developing a Regional Social Standard jointly with the Agency for Strategic Initiatives. In 2023, Standards for Friendly Social Welfare Institutions are to be piloted in the sphere of healthcare and education in five Russian regions.

The project to develop a benchmark primary care model will be implemented jointly with the Ministry of Health of the Russian Federation in pilot regions. The development of the model is scheduled to be completed by the end of 2023; it is expected to be adopted by healthcare institutions in all Russian regions by 2030.

Plans for 2023 for the End-to-End Investment Flow project include continuing the implementation of measures to address regional and local issues and a focus on operational analysis and monitoring, with the project to be supported simultaneously by investors and by regional governments and municipalities. Amendments need to be made to regional laws and regulations, and amendments to federal laws and regulations need to be discussed with industry authorities and submitted as a package. In the future, a ranking of pilot regions will be compiled based on the findings of operational analysis with assistance from the Agency for Strategic Initiatives. The second 'cohort' of regions is to participate in the optimisation of the end-to-end investment flow.

RPS PROJECTS WITH A SOCIAL AND ECONOMIC FOCUS IMPLEMENTED IN THE REGIONS

3

SOCIAL REPORT

RUB 562.37 BILLION

TOTAL PERSONNEL COSTS

STATEMENT OF THE DEPUTY DIRECTOR GENERAL FOR HR

Dear colleagues and partners,

The 2022 reporting year was marked by continued transformation both in our country and globally; it was a time of major challenges. ROSATOM always views any challenges as an opportunity to become even more robust and efficient. As we work towards our business goals, we focus on people, and the results that we have achieved show that this has been the right decision.

Last year, we continued to provide all existing benefits, as well as additional support to employees in the industry, their family members, and local residents in nuclear towns and cities. In April, by order of ROSATOM's Director General, salaries of employees in the industry were indexed, and additional assistance was introduced for certain employee categories: young specialists, researchers and highly skilled specialists, blue-collar workers and retirees.

During the year, we not only supported our people, but also maintained an open and sincere dialogue with them. We answered questions as part of Communication Days and Director's Days, engaged young people and managers in discussing and cascading ROSATOM's 2030 Vision by outlining everyone's role in achieving the Corporation's strategic goals, and conducted pulse surveys and focus groups. ROSATOM's open culture has enabled it to maintain the employee engagement rate at 84% at year-end, on a par with the world's best employers.

In 2022, we placed a strong emphasis on the health and safety of our employees. Jointly with the Federal Medical and Biological Agency of Russia, the Corporation launched a project to improve the quality and accessibility of medical care in ROSATOM's host towns and cities. The share of residents satisfied with medical care increased from 36% to 61%. The duration of medical check-ups was reduced from three days to one, and the waiting time for a scheduled hospital admission was shortened from 10-14 days to 3-5 days.

During the year, employees underwent regular in-depth medical check-ups and health screening programmes. Health awareness days and health school events were organised in enterprises to inform employees about serious illnesses. A mental health support hotline, psychologists' offices and onsite stress relief rooms continued to be available; more than 50 webinars on stress management and mental health practices were held for about 9,000 employees in the industry.

In order to reduce the number of occupational injuries, work continued on the project titled 'Developing a Culture of Safe Behaviour', with 20 enterprises in the industry currently participating in the project. Employees are provided with regular training to promote a culture of safe behaviour, and various events are held to share best practices, the most important of which is ROSATOM's Industry-Wide Safety Leaders' Forum, which was attended by more than 1,000 people in 2022.

Another major priority of the Corporation's social policy is education and development of both current and future employees. We continued to work with our talent development ecosystem, which includes kindergarteners, school, college and university students, ROSATOM's employees and residents of nuclear towns and cities.

Young people today are our backbone, as they are the future leaders of the Corporation. One of the highlights of our work with schoolchildren was the Icebreaker of Discovery expedition, which involved 80 talented children from all over Russia making a voyage to the North Pole aboard the 50 Let Pobedy icebreaker. An important highlight in the sphere of engagement with students was the Corporation's partnership in the implementation of the Professionality Federal Project, which is aimed at providing industry with highly qualified employees and aligning the training of middle-level personnel with market needs in the regions. Three educational institutions, namely Ozersk

PEOPLE

TOTAL NUMBER OF BENEFICIARIES OF ROSATOM'S VOLUNTEER CAMPAIGNS

Institute of Technology, Ozersk Technical College and Kursk Assembly College, started to train future employees of nuclear enterprises. The annual AtomProfi forum for young professionals was held at the end of the year; it was attended by more than 600 schoolchildren, students and employees of the Corporation participating in youth communities. Together with leading industry experts, they reviewed their work during the year, shared their future plans and put forward ideas for promising projects.

As before, current employees in the industry, from young professionals to 'third age' employees, continue to hold a special place in our educational ecosystem. A digital learning environment plays a special role in training. About 3,500 units of educational content have been made available on the RECORD Mobile training platform, with the most popular being courses aimed at developing digital competences, personal efficiency and time management, communication and negotiation skills.

We also continue to develop other digital services. The functionality of the ROSATOM LIFE corporate social media platform has been expanded: it now enables employees to create professional communities, find experts for project teams, share their experience and conduct surveys. The Employee's Personal Account is now also available on mobile devices. The RECORD 2.0 system, which is used for performance evaluation, training and career planning, has been rolled out in all divisions in the industry. The Digital Assistant Mark chatbot has also reached a new level in terms of scale: to date, it has already been used by 37,000 employees in 85 enterprises. The digital assistant enables employees to file a business trip request or an application for annual leave from any location that is convenient for them using their mobile phones or get replies to their queries.

Last year, ROSATOM's people not only gained knowledge, but also actively used it in practice, including in industry competitions. For instance, our team once again defended its title and topped the medal table at the High-Tech International Competition of High-Technology Professions. A record number of participants from ROSATOM and other industrial companies competed in the 7th AtomSkills 2022 Industry-wide Professional Skills Competition, proving its status as the largest corporate competition. A landmark event in 2022 was the first industry-wide competition in the application of RPS techniques and tools for primary work teams. This marked the culmination of a large-scale programme designed for line managers and small group leaders on the shop floor.

We give special focus to managers in general, and frontline managers in particular. These are not only opinion leaders, but the very foundation on which all processes in ROSATOM are built. With this in mind, the First Line development programme for line managers has been launched; in 2022, it already covered more than 17,000 people. We also continued to work with managers at all levels as part of ROSATOM's executive talent pool programmes. In 2022, around 6,000 people participated in the programmes, with 92% of them appointed to new managerial positions. Our employees successfully represented ROSATOM at the Leaders of Russia National Management Competition: five of our employees won the super finals. Two of them are women, which I think very clearly demonstrates that the Corporation offers equal opportunities for growth and promotion.

People working for ROSATOM have an opportunity to unlock their potential not only in the workplace, but also in sports. In 2022, more than 32,000 employees took part in large-scale sports and wellness events in the industry. The biggest events included the Nuclear Games, the Running Race of Nuclear Towns and Cities and an online Running Race of the Divisions.

Volunteering is another aspect of the Corporation's code; it contributes to mental well-being and helps to find new friends and develop leadership skills. In 2022, the Corporation's volunteers participated in more than 400 campaigns, with the total number of beneficiaries exceeding 500,000 people. Volunteers helped residents of ROSATOM's host towns and cities, supported the elderly and veterans, participated in blood donation and environmental campaigns, addressed important social issues in the towns and cities, designed innovative solutions for infrastructure development, and hosted events to promote science, blue-collar and engineering jobs and the environmental culture. New forms of engagement with volunteers included the Corporate Social Responsibility University launched in 2022 and the CSR Accelerator project implemented by ROSATOM, which enables its participants to share best practices.

ROSATOM is actively developing programmes aimed at expanding opportunities for the professional fulfilment of female employees. In 2022, a four-month leadership development programme titled '[in]Visible Power' was launched for female executives. Its participants included 38 junior managers, with plans to scale up the programme to cover 1,500 people in 2023. Systematic work is underway to study existing obstacles and develop measures to support the professional development of women in the nuclear industry. For instance, ROSATOM has participated in the first industry-wide study on gender balance in the nuclear industry conducted by the OECD Nuclear Energy Agency in 34 countries. 2022 saw the expansion of the Women in Nuclear community, which comprises 1,500 members from 37 constituent entities of the Russian Federation, as well as from Turkey, Kazakhstan, Indonesia, India, South Africa and other countries. Members of the community have implemented over 100 social projects aimed at creating an environment for career development of female professionals in the high-technology sector.

We continued to actively develop the branch of Lomonosov Moscow State University in the town of Sarov, which is the core of the National Centre for Physics and Mathematics. There are currently 95 Master's degree students and 10 postgraduate students at the branch, who acquire knowledge in future-oriented areas of physics and mathematics, computer science and supercomputing technologies from professors and academicians of the Russian Academy of Sciences in order to join the NCPM projects in the future. MSU Sarov is much more than just a university. It offers opportunities not only for acquiring cutting-edge theoretical knowledge but also for participation in basic research at unique world-class facilities.

Noteworthy educational projects in 2022 included the opening of the Andrey Sakharov Cultural and Education Centre Mayak Academy in Nizhny Novgorod. The Mayak Academy has become a beacon of new knowledge, a place of attraction for managers and specialists, engineers, scientists, community leaders, coaches, schoolchildren and students, as well as a venue for educational and awareness-raising events organised by ROSATOM, the Russian Academy of Sciences and the government of the Nizhny Novgorod Region. In 2022, the Centre hosted 15 events in which more than 2,000 people participated in person.

In 2022, we continued to develop our international projects. The central event was the international Global Impact Conference, where experts from 20 countries discussed issues, trends, challenges and new opportunities in education for the coming years. We also held the first meeting of the Impact Team 2050, an international youth advisory body under the Corporation's Director General. At the meeting, 12 young people from 12 countries, including talented researchers, engineers, managers and international activists, expressed their opinions on topical issues of sustainable development and declared their willingness to implement projects jointly with ROSATOM. The IAEA International Task Group on Improving Gender Balance continued its work, and the 4th International Women in Nuclear Forum was held, whose participants included Russian and international experts and female tech leaders from 13 countries in Central, Southeastern and Southern Asia, Africa, Central Europe and other regions.

Members of ROSATOM's industry-wide youth community took part in the International Youth Nuclear Congress (IYNC 2022) in Japan. The delegation consisted of 23 young employees from 12 nuclear enterprises. ROSATOM's delegation was one of the biggest at the venue (with a total of over 200 people from 40 countries attending the event). As part of the business programme of the congress, the Corporation's representatives participated in two panel sessions and six technical tracks, made 18 presentations and held three workshops. Russian nuclear engineers demonstrated a high level of professional expertise and willingness to engage in international dialogue.

Importantly, our efforts to promote the development of human capital and our host regions have been acknowledged. In 2022, ROSATOM was included in the top Platinum category in the ranking of the best employers in Russia according to *Forbes*. This shows that ROSATOM is attractive to both current and potential employees in the industry.

I believe that the secret of our success is that ROSATOM has created a special environment of openness and equal opportunities, enabling everyone who joins the Corporation to feel confident about the future and contribute to addressing global issues facing both our country and the world as a whole. We work with cutting-edge technology, but it is people that are at the centre of all our processes, which I believe has invariably been the key to success.

Tatyana Terentyeva

Deputy Director General for HR

Key results in 2022

- The average monthly salary totalled RUB 107,200 (up by 11.4% compared to 2021).
- The personnel turnover rate stood at 10.6%.
- The employee engagement rate in the industry in 2022 remained at 84%, on a par with the best global employers.
- 92% of members of the executive succession pool were appointed to new managerial positions.
- Over 340 employees of ROSATOM and its organisations received government awards, certificates of appreciation and acknowledgements from the President of the Russian Federation.
- Over 11,400 employees and veterans received industry awards.

Awards

- In 2022, ROSATOM was included in the top Platinum category in the ranking of the best employers in Russia according to the *Forbes* business magazine.
- The Corporation's project titled 'People, Towns and Cities: a Programme for Shaping a Sustainable Social Environment' won the #WEARETOGETHER 2022 international award in the Large Businesses category.
- The Corporation was one of the winners of the 2022 Youth Time National Award for Youth Achievements in the Friend of the Young category.
- The New Generation of Intelligence project ranked first in the DevRel and Techno PR category in the 2022 IT HR AWARDS national competition.
- The project titled 'Ambassadors of Nuclear Science and Technology' was shortlisted for the educational award by the Russian Znanie Society in the 'For Contribution to Education in Science and Technology' category.
- ROSATOM's Corporate Academy won the Crystal Pyramid 2022 Grand Prix award in the Corporate University of the Year category.
- The project titled 'ROSATOM's Running Race of the Divisions' became a prize winner in the Fitness and Sports Projects category at the Sports and Russia Forum, and won in the Development of a Sporting Culture category at the 'Investing in the Development of a Healthy Country. Best Corporate Practices 2022' Forum and in the Best Online Project to Involve Employees in Sports and Promote a Healthy Lifestyle category of the National Corporate Sports Award.
- The Corporation's managers were included in the Top 1,000 Russian Managers annual management ranking published by the Russian Managers Association and the Kommersant Publishing House.

Key Events in 2022

- The Andrey Sakharov Cultural and Education Centre Mayak Academy was opened.
- The Sarov branch of Lomonosov Moscow State University based at the National Centre for Physics and Mathematics (NCPM) admitted 96 Master's degree students and 10 postgraduate students.
- ROSATOM became one of the key partners of a large-scale federal project titled 'Professionality' launched in 2022. The Corporation completely redesigned 15 programmes in three educational and industrial clusters.
- The Corporation took part in the 3rd Global Impact Conference (GIC) with an audience of more than 1 million people.
- The Impact Team 2050 International Youth Advisory Council under ROSATOM's Director General held its first meeting.
- 1,400 professionals competed in the 7th AtomSkills 2022 Industry-Wide Competition.
- The Corporation's team topped the medal table of the High-Tech International Competition of High-Technology Professions for the eighth time.
- The Corporation's team won the main prize in the 2nd Optimisation and Productivity Competition held as part of the Labour Productivity National Project.
- The team of ROSATOM and NRNU MEPhI competed in 11 out of 29 competences represented at the 4th Industry-Wide Professional Skills Competition in the Field of Information Technology DigitalSkills 2022 and won 10 awards.
- At the 2nd World Construction Championship, the Corporation's team won prizes in 16 out of 20 categories and collected 26 medals.
- ROSATOM held the RPS Leaders annual industry-wide forum and the First Competition in the Application of the RPS Techniques and Tools for Primary Work Teams and Small Groups, where over 680 teams from 20 RPS enterprises numbering over 2,500 people put their skills to the test.
- The Corporation held the annual AtomProfi forum for young professionals.
- Two educational expeditions to the North Pole were organised: the Icebreaker of Discovery and the Icebreaker of Knowledge.
- As part of a project to involve the residents of Usolye-Sibirskoye in the town's public life, 38 webinars on psychology, personal growth, child development and school mediation were arranged in 2022 (with a total reach of 4,395 people). A programme titled 'Regional Leaders' was implemented to train successors to be appointed to executive positions in the town's administration, with training provided for 17 employees of the administration.

EMPLOYEES OF ROSATOM AND ITS ORGANISATIONS RECEIVED GOVERNMENT AWARDS, CERTIFICATES OF APPRECIATION AND ACKNOWLEDGEMENTS FROM THE PRESIDENT OF THE RUSSIAN FEDERATION

3.1. HR POLICY

GRI 3-3 3.1.1. HR policy approaches and principles

ROSATOM implements a motivating HR policy that involves competitive salaries and an extensive benefits package (health insurance, corporate loan programmes, pension plans, health resort treatment and recreation, family programmes, etc.).

The HR policy is aimed at providing ROSATOM and its organisations with the required number of engaged employees having the required skills in a timely and cost-effective manner.

Code of Ethics

ROSATOM has adopted a Code of Ethics and Professional Conduct for Employees. The Code of Ethics communicates ROSATOM's values and defines the relevant ethical principles of employee conduct when interacting with a wide range of external and internal stakeholders. The rules of conduct set out in the Code concern combating corruption, protecting resources, property and information, occupational health and safety, industrial and environmental safety, conflict prevention and resolving conflicts of interest, as well as maintaining the corporate image.

ROSATOM's Code of Ethics:

The principles of the HR policy are as follows:

- The areas and priorities of the HR policy must support the achievement of the Corporation's strategic goals;
- Executives of the Corporation, its organisations and business units are responsible for employee performance;
- Social partnership aimed at aligning the interests of employees and employers;
- Prioritisation of a culture focused on results and continuous improvements in the Corporation and its organisations;
- Systematic training, development and promotion of employees of the Corporation and its organisations in the nuclear industry in accordance with strategic goals;
- Performance-based remuneration contributing to the achievement of strategic goals of ROSATOM and its organisations;
- All employees of the Corporation can express their opinions on the situation in the Corporation and its organisations, give and receive feedback on their performance to/from their executives, and obtain any information on the operations of ROSATOM and its enterprises, except for classified information. .

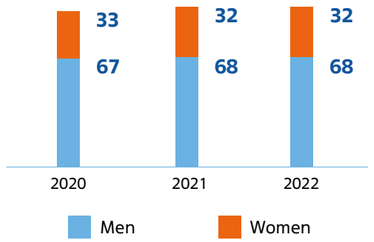
3.1.2. Key personnel characteristics

GRI 2-7 GRI 2-8 In 2022, ROSATOM and its organisations employed 329,200 people (average headcount), including 31,100 people in foreign organisations, branches and overseas representative offices:

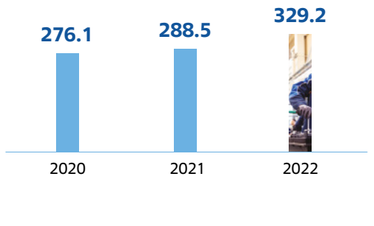
Indicator	Headcount, '000 people	% of the total headcount
Headcount by employee category		
Executives	39.7	12.1%
Specialists	132.9	40.4%
White-collar workers	10.6	3.2%
Blue-collar workers	146	44.3%
Headcount by education level		
Employees holding a university degree	184.6	56.1%
Candidates and Doctors of Sciences	3.895	1.2%

The average number of employees working under independent contractor agreements totalled 304 (0.1% of the total headcount).

Gender composition of the workforce in ROSATOM and its organisations between 2020 and 2022, %



Average headcount in ROSATOM and its organisations, '000 people[1]



The male/female ratio in the Corporation is determined by the nature of the industry.

Indicator	Men, % of the total headcount	Women, % of the total headcount
Executives	79.96	20.04
Specialists and white-collar workers	52.60	47.40
Blue-collar workers	79.50	20.50

1. A significant increase in headcount in 2022 was driven by the development of new businesses: PJSC Quadra – Power Generation (11,000 people), LLC MC Delo (8,500 people), expansion of the Digitisation Unit by 5,200 people, and other factors.

The age of employees averaged 43.2 years (46.1 years for executives).

29.3% of employees were aged under 35.

Age of employees	% of the total headcount
Under 35 years	29.3%
36 to 50 years	42.5%
50+	28.2%

GRI 401-1 During 2022, 72,171 people were hired, which totals 21.9% of the average headcount.

34,884 employees were dismissed in 2022; the personnel turnover rate stood at 10.6%.

Average headcount by business area[1], '000 people

Division/complex/organisation	2020	2021	2022
Nuclear Weapons Division	90.03	87.80	87.60
Emergency preparedness units	2.59	2.68	2.93
Northern Sea Route Directorate	2.35	2.32	2.31
Mining Division	7.25	7.33	7.69
Fuel Division	21.95 (0.11)	21.96 (0.12)	23.38 (0.12)
Sales and Trading Division	1.92 (1.26)	1.86 (1.17)	1.88 (1.21)
Power Engineering Division	56.95 (0.78)	57.28 (1.01)	63.55 (7.48)
Mechanical Engineering Division	17.75 (1.85)	18.19 (1.78)	20.37 (0.62)
Advanced Materials and Technologies	0.90	1.17	1.98
Overseas Division	2.70 (1.09)	3.46 (1.45)	4.14 (2.06)
New businesses	0.10	0.15	8.71 (0.01)
Process Control Systems and Electrical Engineering	1.35	1.53	1.67 (0.01)
Engineering Division	31.66 (11.0)	41.66 (19.18)	43.60 (19.39)
Environmental Solutions Division	7.60	8.23	8.38
Innovation Management Unit	9.10	9.16	9.33
JSC Rusatom Infrastructure Solutions	3.03	3.51	15.06
Security units	9.25	9.35	9.40
JSC Rusatom Healthcare	1.45	1.46	1.48
Wind Power	0.31	0.46	0.74
Administrative units	7.80	8.95	9.73
Non-core assets	0.02	0.01	0.00
Integrator	-	-	0.05
Digitisation	-	-	5.18 (0.10)
ROSATOM, total	**276.06 (16.09)**	**288.5 (24.73)**	**329.2 (31.08)**

1. Figures in brackets indicate the average headcount in foreign organisations, branches and overseas representative offices.

ROSATOM's organisations operate in 71 Russian regions, where they employ a total of 310,900 people[1].

ROSATOM's organisations with the highest headcount are situated in the following regions:

- Moscow and the Moscow Region: over 63,000 people;
- Nizhny Novgorod Region: over 34,000 people;
- Chelyabinsk Region: over 30,000 people;
- Saint Petersburg and the Leningrad Region: over 25,000 people;
- Kursk Region: over 23,000 people.

ROSATOM's organisations operate in 32 foreign countries, where they employ 26,500 people, with the highest headcount in the following countries:

- Bangladesh: 15,700 people;
- Turkey: 3,700 people
- Egypt: 2,900 people;
- CIS countries (Belarus, Kazakhstan, etc.): 2,600 people.

3.1.3. Personnel costs and remuneration system

In 2022, personnel costs totalled RUB 562.37 billion, up by 26.7% compared to 2021.

Costs per employee per year increased by 10.9% from RUB 1,531,810 in 2021 to RUB 1,699,150 in 2022.

Structure of personnel costs, %

Indicator	2020	2021	2022
Payroll	75.4	75.4	75.8
Insurance contributions	21.0	20.6	20.2
Social and other expenses (including training)	3.6	4.0	4.0

GRI 2-19 ### Remuneration system

ROSATOM's current remuneration system:

- Provides competitive remuneration matching the level of remuneration in the best companies in Russia;
- Is result-based: the size of an employee's salary is linked to their efficiency, professionalism and achievement of key performance indicators (KPIs).

ROSATOM has in place a flexible remuneration system which includes a variety of tools ensuring that employees achieve business targets and are closely focused on results.

1. Number of employees on the payroll of ROSATOM's branches and its organisations. For details, see Appendix 3.

ROSATOM develops KPIs in accordance with the Methodological Guidelines on KPI Development and Application[1]; the KPIs are approved by the Supervisory Board and cascaded from ROSATOM's top management down to line managers in organisations.

In accordance with the requirements of the Integrated Industry-Wide Remuneration System and the Uniform Industry-Wide Performance Management Policy, the size of the annual bonus paid to employees depends on achieving KPI targets and reflects progress in achieving the key performance targets of the Corporation and its organisations.

In 2022, the average monthly salary in ROSATOM increased by 11.4% compared to 2021 and totalled RUB 107,200 per month. This was possible largely due to the ongoing improvement of labour productivity and operational performance, and cost control.

3.1.4. Executive succession pool

In order to ensure succession and train employees to be appointed to managerial positions, an executive succession pool (ESP) is being formed and developed in ROSATOM.

In order to select development programmes that are best suited to the target positions of ESP members, the ESP is divided into four levels:

- ROSATOM's Assets and ROSATOM's Assets. Basic Level (top and senior executives);
- ROSATOM's Capital (middle-level executives);
- ROSATOM's Talents (promising specialists and junior executives).

Since the establishment of the executive succession pool, the number of its members has exceeded 5,900.

KNumber of ESP members with a breakdown by gender

Gender	2020		2021		2022	
	Number	Share	Number	Share	Number	Share
Men	3,918	78%	4,279	77%	4,614	78%
Women	1,093	22%	1,186	23%	1,306	22%

Appointments of ESP members to a new position, %[2]

	2020	2021	2022
Share of ESP members appointed to vacant top and senior executive positions (top 30 and top 1,000 executives in the industry)	68.17	70.37	70.82
Share of ESP members among senior, middle-level and junior executives appointed to a new (management) position	79.65	91.02	92

1. Approved by Order No. 3579-r of the Government of the Russian Federation dated 28 December 2020.
2. Since 2018, the calculation of the indicator has changed: the promotion of succession pool members was assessed based on the number of ESP members appointed to new positions over the last three reporting years. Between 2020 and 2022, the assessment focused on the share of promoted ESP members who had been included in the ESP in 2018 and 2020 respectively.

A special feature of succession pool development programmes is their practical focus. Executives not only complete training modules, but also work on their own projects contributing to the achievement of the Corporation's strategic goals.

GRI 404-2 **Training as part of ESP development programmes**

ESP level	Development programme	Key training topics	2020	2021	2022
Senior executives	ROSATOM's Assets	Shaping the Future, Virtuosos of Management, Communication in Times of Change, Marketing, Finance	368	391	416
	ROSATOM's Assets. Basic Level	Strategy, Leadership and People Management, Change Management and Horizontal Interaction, Marketing, Finance	368	427	491
Middle-level executives	ROSATOM's Capital	Leadership and Project Management, Advanced Leadership Skills, Data Management, Situational Leadership	2,060	2,271	2,448
Junior executives	ROSATOM's Talents		2,215	2,376	2,565
Total			**5,011**	**5,465**	**5,920**

3.1.5. Successor assessment

An innovative approach to assessing high-potential employees has been introduced in order to improve the quality of succession plans and the transparency of employee promotion processes. The methodology is based on the best practices adopted in major international companies and was piloted in 2018. Executives are involved in talent assessment and are responsible for developing succession plans. This helps to reduce the duration and cost of assessments. In order to share experience and ensure that decisions are made objectively, the assessment methodology involves the possibility of cross-functional/cross-divisional cooperation, whereby executives participate in the assessment of other executives who are candidates for managerial positions. Succession candidates are assessed in terms of their commitment to corporate values, the relevant professional and managerial experience and knowledge, motivation and potential.

In 2022, 2,857 candidates for executive positions in all of the Corporation's core Divisions (more than 80 organisations) were assessed by executives of the organisations and holding companies.

GRI 404-2

3.1.6. Career counselling

To achieve the goal of being the best in unlocking talent in accordance with ROSATOM's 2030 Vision, individual career counselling has been provided in the Corporation since 2020. This service helps employees to identify their strengths, decide on their next career move and initiate a career development discussion with their manager. There are currently 54 career counsellors working in the industry. A retraining programme for HR specialists has been developed and piloted; it offers a fast and effective way to expand the pool of career counsellors in the industry.

In 2022, 1,678 consultations were held in more than 70 organisations in the industry. In 2022, the service was highly rated by employees (84% are willing to recommend career counselling to their colleagues). Counselling is available both offline and online. In addition, the service provides support to employees going through a career crisis and helps them to shape their future career strategies.

3.1.7. Employee training

The development of employee competences is a major priority of ROSATOM's HR policy.

Training for specialists and executives in the industry is provided primarily by the Autonomous Non-Profit Organisation Corporate Academy of State Corporation Rosatom (hereinafter referred to as the Rosatom Corporate Academy), including its new venue, the Andrey Sakharov Cultural and Education Centre Mayak Academy, and the Autonomous Non-Profit Organisation Rosatom Technical Academy (hereinafter referred to as the Rosatom Technical Academy). Currently, both Academies are full partners of ROSATOM in achieving its strategic objectives; they implement projects directly relevant to prioritised areas of business development.

The Rosatom Corporate Academy, which celebrated its 10th anniversary in 2022, implements programmes aimed at developing leadership and business competences, management training, developing corporate functions, encouraging the best graduates and professionals to work in the industry, competence evaluation, career counselling, training blue-collar workers and engineers, developing the corporate culture, the youth community and the safety culture.

The Rosatom Corporate Academy plays a leading role in ROSATOM's key projects: People, Towns and Cities, which is focused on building a sustainable social environment in the towns and cities where ROSATOM operates; Acceleration, which is aimed at reducing red tape; Blue-Collar Workers and Engineers for Production Growth and Technological Development; Safety Culture Development in ROSATOM, Ambassadors of Nuclear Education, and ROSATOM's Values. New projects and programmes are rolled out every year, such as the L&D Academy for methodologists involved in educational programmes, the {In}Visible Power leadership programme for female executives, sustainability initiatives, etc.

Opened in 2022, the Andrey Sakharov Mayak Academy in Nizhny Novgorod hosts programmes and industry events for engineers, researchers, managers, trainers, specialists in various areas and community leaders. In addition, educational and awareness-raising events are organised on behalf of the Russian Academy of Sciences, the Government of the Nizhny Novgorod Region and, of course, ROSATOM itself. The Andrey Sakharov Mayak Academy has become a top venue for employees in the nuclear industry and participants of major federal initiatives, with 15 events held in 2022 and attended in person by more than 2,000 people.

The portfolio of the Rosatom Corporate Academy comprises more than 550 training programmes. These include online and video courses, face-to-face and mixed-format programmes. A variety of training formats are used. They include conventional, innovative and even experimental ones, for instance, the edutainment format, which helps to make the learning process exciting, or My Best Mistake sessions, during which managers tell trainees about those mistakes from which they have been able to learn. Yet another example of an experimental format is immersive oculography: employee training and testing through simulation of a workplace situation in virtual reality.

As part of a microlearning project, 68 videos on vocational topics (digital skills, the Internet of things, project management, etc.) have been developed; 53 of them have garnered more than 1,000 views.

One of the main objectives of the organisation is to create an ecosystem for human development to meet today's challenges. In 2022, the amount of face-to-face and online training delivered by the Rosatom Corporate Academy (measured as the number of participants multiplied by the number of completed courses) exceeded 1 million person-courses. Over 4,300 events were held during the year, including 2,800 training events. The overall reach of training and development activities exceeded 15 million user touchpoints.

The Rosatom Technical Academy specialises in continuing professional education and retraining of executives and specialists in the nuclear power industry. It is ROSATOM's educational, research and guidance centre focused on the safe use of nuclear energy, state security, operational and supporting processes. In addition, the Rosatom Technical Academy is an international platform for knowledge sharing and competence development in the nuclear industry; it also acts as a technology integrator providing training for the personnel of nuclear power plants.

The Rosatom Technical Academy has the status of the world's first IAEA Collaborating Centre which works in three programmatic areas: nuclear knowledge management, human resource development for nuclear power and nuclear security, and non-energy applications of nuclear and radiation technologies.

In addition, the Rosatom Technical Academy is a member of the Moscow Centre of the World Association of Nuclear Operators (WANO) under the auspices of JSC Rosenergoatom.

The portfolio of the Rosatom Technical Academy comprises more than 400 continuing professional education programmes focused on nuclear and radiation safety, industrial safety, information security, occupational safety and health, NPP operation, design and construction, IT solutions that do not rely on imported technology, etc. The Rosatom Technical Academy conducted 1,021,100 man-hours of training in 2022, including 450,000 man-hours for foreign professionals as part of ROSATOM's international commitments in the sphere of NPP construction.

GRI 404-1 Overall, 67% of employees across the industry were covered by training programmes in 2022. The number of training hours per employee averaged 40.07 hours[1].

Percentage of employees in the nuclear industry who underwent training in 2022, %

Executives	15.3%
Specialists and white-collar workers	47.5%
Blue-collar workers	37.2%
Gender	
Male	69.3%
Female	30.7%

1. Based on the actual number of employees on the payroll. Based on the average headcount, the figure stood at 41.06 hours per employee.

Average annual training hours per employee in the nuclear industry by gender, hours

Gender	2022
Male	46.67
Female	27.09

Average annual training hours per employee in the nuclear industry by category, hours

Employee category	2020	2021	2022
Executives	51.5	72.0	73.9
Specialists and white-collar workers	24.4	35.6	36.0
Blue-collar workers	31.3	44.3	37.1

Training hours in the nuclear industry by employee category, hours

Employee category	2022
Executives	2,937,943.26
Specialists and white-collar workers	5,162,131.71
Blue-collar workers	5,417,416.70

Personnel training for overseas customers as a business

In 2022, the Corporation completed an investment project titled 'Development of the Rosatom Technical Academy between 2018 and 2022'. The goal of the project was to launch an integrated export product, namely training and continuing professional education for personnel operating nuclear infrastructure, contractor personnel and operating personnel of Russian-design nuclear power plants under construction abroad, in order to increase industry profits and fulfil ROSATOM's international obligations.

As part of the project, 167 new-generation instructors were trained who are fluent in English, have knowledge of the best training practices and the qualifications required for the supervisory and operating personnel of NPPs in operation.

During 2022, they took part in the training of personnel for overseas NPPs, namely Rooppur, Akkuyu, El Dabaa, and Paks II NPPs: they provided theoretical and simulator training, developed teaching materials and acted as interpreters for personnel doing internships at Russian NPPs.

To give greater focus to practical training, the sites of the Rosatom Technical Academy in Saint Petersburg, Novovoronezh and Obninsk have been equipped with state-of-the-art analytical simulators of the NPP control room; the Novovoronezh site has also been equipped with a full-scale simulator. All this has enabled ROSATOM to develop a top-quality educational product that is unique in the world.

Commissioned training equipment:

Obninsk	Novovoronezh Branch	Saint Petersburg Branch
NPP-2006 multifunctional simulator for the NVNPP-2 and LNPP-2 projects	Full-scale simulator and NPP-2006 multifunctional simulator for the NVNPP-2 and LNPP-2 projects	NPP-2006 multifunctional simulator for the NVNPP-2 and LNPP-2 projects
	Training facility for practising the skills required for safe work in confined and enclosed places	
	Training facility for practising the skills of maintenance and repair of thermal and electrical equipment at NPPs and TPPs	

As part of cooperation with international customers under contracts for NPP construction abroad, by year-end 2022, the Rosatom Technical Academy provided training for 2,325 people.

Personnel training for the Belarusian NPP was completed in full (631 people); this is the first power plant for which ROSATOM has provided comprehensive personnel training.

A total of 605 people completed training to operate Rooppur NPP in Bangladesh (42% of the NPP personnel requirements); 776 people underwent training to operate Akkuyu NPP (Turkey) (60% of the NPP personnel requirements).

Between 2019 and 2022, the Rosatom Technical Academy provided training for 280 repair and maintenance specialists for overseas NPPs.

The first 60 specialists from Egypt started their training to work at El Dabaa NPP in 2022.

Currently, the Rosatom Technical Academy is providing training for 357 specialists working at four nuclear power plants: Rooppur, Akkuyu, El Dabaa, and Paks NPPs.

In addition, in 2022, the Technical Academy started to provide training at foreign customer sites in Bangladesh and Turkey. The Academy is ready to provide its own human resources, equipment and facilities for all simulator training programmes.

In 2022, the Rosatom Technical Academy generated RUB 1.1 billion in revenue from this business outside the scope of the Corporation (2021: RUB 1.46 billion).

Other educational and methodological services of the Rosatom Technical Academy are also in demand on the open market; these include the training of non-operational personnel under programmes included in the product portfolio.

Distance learning

GRI 404-2 ROSATOM continues to develop distance learning formats in order to create a comprehensive digital learning environment. In 2022, the share of distance learning in the industry reached 37%.

Training remains accessible on any device anywhere 24/7 through the RECORD Mobile training platform. The RECORD Mobile platform is available as both a mobile app and a web app. In 2022, users of the platform completed 1,188,182 training courses totalling 1,351,230 man-hours (an increase of 13% over 2021). The catalogue of the app contains 3,472 units of educational content. The number of courses available on the platform more than doubled in 2022. During the reporting year, almost 40,000 new users signed in on the platform (162,426 users at year-end 2022, including 43,076 active users, i.e. those who completed at least eight hours of training during the year). On average, users open the app 2,190 times a day (530 more times than in 2021). The user satisfaction rating stands at 4.2 out of 5 points.

In 2022, new functionality was introduced on the platform enabling users to create and upload their own courses; 22 users created their own original courses and shared them within the industry. In addition, an English version of the application is now available for overseas employees.

In 2022, junior and middle-level executives continued to receive training as part of the Executive E-School industry-wide programme, which is aimed at promoting a uniform approach to the development of managerial competences in the industry and providing high-quality training for executives and their successors. 14,637 employees took lessons at the School in the reporting year; a total of 27,088 people have completed training at the School since its establishment in 2019.

In order to maintain traditions and preserve the acquired expertise, provide opportunities for dialogue within the expert community, solve 'real-life' cases and establish a base of lessons learned, the Corporation develops technological schools based on industry centres of expertise. Two new schools were launched in 2022: the IT School (at JSC Greenatom) and the School of Design Engineers (at JSC Atomenergoproekt). In 2022, more than 250 people completed training at the IT School in five disciplines: JS Junior, JS Full Stack, 1C Analyst, 1C Developer, and DevOps Basics. 363 people completed training at the School of Design Engineers.

GRI 404-2

Training in digitisation

To achieve technological leadership, ROSATOM continued to take steps to improve digital literacy among its employees. 41,877 people have completed digital literacy training. This helps to meet the industry's demand not only for talented IT specialists, but also for a high level of digital culture among all employees without exception.

Two programmes have been implemented to support the development of digital competences of executives of ROSATOM's enterprises: the Digital Production Management programme run jointly with Peter the Great St. Petersburg Polytechnic University and the Digital Transformation Management programme targeted at chief digital officers, which is a joint project with the SKOLKOVO School of Management. The coverage of the programmes has exceeded 250 person-courses.

In the reporting year, a new event was held for IT specialists: the IT Core conference, where representatives of the country's largest companies discussed the role of digital specialists in ensuring Russia's technological sovereignty, as well as matters related to cooperation between major Russian businesses and students and teachers in the training of IT specialists.

The amount of training as part of a programme to assist end users in the transition to domestic software (Astra Linux and My Office) totalled 154,399 person-courses.

Information security is a top priority of ROSATOM's digitisation programme. The goal of the information security culture is to develop those competences that every individual will need in the age of global digitisation. In 2022, the relevant events hosted by the Rosatom Corporate Academy were attended by more than 1,000 participants. More than 92,500 people completed remote courses on the RECORD Mobile platform.

In 2022, a total of 1,108 information technology and information security specialists of ROSATOM's organisations completed professional development programmes in information security, programming, network and system administration at the Rosatom Technical Academy. New training programmes on the DevOps methodology and the Java programming language for software engineers were developed and implemented. To maximise the share of practical training in training programmes, ROSATOM uses a virtual classroom designed in-house and based on software that does not rely on imported technology. A cyber range has been put into operation; it is widely used in the training process to exercise practical skills required for responding to cyberattacks. A conference titled 'ROSATOM. Information Security 2022' was held for industry specialists in information security; it was attended by more than 200 representatives of the industry.

GRI 404-2

Building a continuous development ecosystem

The Corporation continues to build an ecosystem for continuous development of engineering competences at each stage of the talent pipeline:

- ROSATOM's Juniors for schoolchildren aged between 10 and 17;
- New Talents for students aged between 17 and 25;
- ROSATOM's Professionals for industry employees aged 18+.

More than 62,000 schoolchildren, more than 300 teachers and over 80,000 representatives of the parents' community were involved in activities forming part of the ROSATOM's Juniors project aimed at promoting engineering and blue-collar skills prioritised by ROSATOM among the younger generation and creating an environment for widespread advancement of engineering and technical creativity. 540 people participated in ROSATOM's Juniors project engineering sessions in 2022. Young researchers developed and presented 30 team projects. Preschoolers displayed their projects for the first time.

SCHOOLCHILDREN

WERE INVOLVED IN ACTIVITIES FORMING PART OF THE ROSATOM'S JUNIORS PROJECT

Members of ROSATOM's Junior Council continued their work in 2022. They implemented 10 project ideas and initiatives.

More than 20 events and training courses for the Corporation's employees were held by Centres for Continuous Development of Engineering Competences; these were attended by over 700 people from 21 Divisions and 100 enterprises of the Corporation, including over 450 blue-collar workers and engineers from 38 towns and cities.

ROSATOM's experts took part in marking mock exams taken by more than 2,000 students. The average level of competences was assessed at 54.5% (up by 6% compared to 2021 and 10% compared to 2020).

The Winter and Summer Student Workshops and online workshops covering 18 competences (+13 competences compared to 2021) were held under the guidance of leading educators and experts in the industry. The programme was completed by more than 500 college and university students. In addition,

Competence Days covering 13 industry competences were organised, with more than 15,000 students watching the broadcasts.

In 2022, the Corporation became one of the key partners of the Professionality Federal Project, which is aimed at providing fast and high-quality vocational training for college students. To date, ROSATOM has fully redesigned 15 training programmes in three colleges (Kursk Assembly College, Ozersk Institute of Technology of NRNU MEPhI and Ozersk Technology College); it actively incorporates its own know-how into the programmes and shares it with all industrial enterprises and Russian regions. More educational institutions will soon join the project. 430 people have been enrolled in the first year of the project's programmes.

GRI 404-2

Training supporting the achievement of strategic goals

In 2022, 17 industry competence centres specialising in production and technology development held more than 450 online and face-to-face training events, with training provided for more than 15,000 people. These included around 220 teachers from partner educational institutions, over 1,500 schoolchildren, around 2,000 students and 11,240 employees and managers from organisations in the industry. Over 10 educational programmes and over 50 units of distance learning content were developed.

To achieve the strategic goals of reducing production costs and the lead time, the Corporation continues to provide training in the ROSATOM Production System (RPS), which helps to preserve and accumulate knowledge about lean manufacturing. In 2022, the scope of RPS training programmes totalled 85,630 person-courses.

ROSATOM continues to implement a large-scale programme for line managers and small group leaders on the shop floor, which covers more than 3,000 people. The programme includes four focus areas:

1. The Production League, a voluntary professional community for sharing experience and dealing with emerging production issues. In 2022, the Production League helped resolve 55 issues;
2. The Change Maker practical workshop, as part of which over 1,000 people have already received training; their satisfaction with the programme is assessed at 91%;
3. Line Manager Days; these are meetings of line managers and small group leaders with executives of the enterprises. 19 Line Manager Days were held, and over 500 questions were answered;
4. A new area was included in the programme in 2022, namely the RPS Competition for Small Groups and Primary Work Teams. Overall, economic benefits in the enterprises participating in the programme for the second year increased by RUB 63.7 million.

Today, the Corporation gives special focus to executives, especially frontline managers. These are not only opinion leaders, but the foundation on which all processes in the Corporation are built. With this in mind, the First Line development programme for line managers has been launched; in 2022, the programme reached an unprecedented scale, with more than 18,000 people across 150 enterprises in the industry participating in 35 events.

Work continued on the project titled 'Mission: Talent', which is aimed at creating an environment for unlocking human potential, with the reach of in-person and online initiatives under the existing road maps exceeding 15,000 people. Over 1,300 employees of the Corporation, representatives of partner organisations and governments of ROSATOM's host towns and cities took part in in-depth interviews and answered questions as part of questionnaire surveys and the monitoring of the environment for unlocking human potential. Information obtained as a result of these activities has served as input for the development of the 'Mission: Talent' environment index, which is a tool for managing its development. In 2022, over 6,500 residents of ROSATOM's host towns and cities, including schoolchildren, students and teachers, were involved in the work of project teams. A BarCamp was held for management teams; it was attended by more than 120 people, including representatives of 23 enterprises of the Corporation from 19 nuclear towns and cities, as well as employees of 40 partner organisations.

During the year, as part of the Global Professionals comprehensive development programme for globalisation leaders and participants, 863 people participated in six business clubs focused on international topics. As part of the Global Professionals programme, 99 people are receiving training in a mixed format (face to face and remotely), and 463 people are receiving training remotely.

In 2022, 2,245 specialists from the Corporation's Divisions involved in the design and construction of nuclear facilities participated in professional training programmes.

The Rosatom Technical Academy together with JSC Atomenergoproekt has participated in the launch of the School of Design Engineers and in the implementation of pilot training programmes on modern approaches to the design and construction of NPPs and nuclear facilities; 77 people have successfully completed this training.

In 2022, 2,835 people completed training as part of Rosatom English programmes, of which 1,101 people were coached by a tutor, and 439 people took industry-specific tests; in addition, 8,600 people took part in activities forming part of an English learning ecosystem.

15 people completed training as part of the Voice of Rosatom industry-wide programme in English designed to form and train a pool of ROSATOM's speakers, and 25 people became certified speakers following an assessment.

To achieve the strategic goal of developing new products for the Russian and international markets, the Corporation continued to implement the programme titled 'ROSATOM's New Products'. In 2022, 52 participants underwent training. Following the completion of training, they presented 23 projects for review. The scope of distance learning in 2022 exceeded 3,500 person-courses.

The Rosatom Corporate Academy continues to provide training as part of a programme titled 'Application of Polymer Composite Materials in the Nuclear Industry', which has been completed by employees of 16 nuclear organisations that participate in the implementation of projects to introduce polymer composite materials in the industry.

About 100 young scientists took part in ROSATOM's science schools in 2022.

In 2022, ROSATOM was systematically developing training in corporate functions, including the Procurement, Logistics and Quality School; the Law School; the HR School; the Project Management School; development programmes focused on the information security culture and property management. A total of over 25,000 people completed the relevant training online and in person.

The 2nd Industry-Wide Safety Leaders' Forum of ROSATOM was held; it was attended by more than 1,000 people. In the reporting year, the scope of face-to-face and remote training programmes focused on the culture of safe behaviour exceeded 120,000 person-courses. A total of 165 industry trainers completed training between 2019 and 2022, including 129 trainers in 2022. In the reporting year, eight organisations of the Corporation joined the project titled 'Developing a Culture of Safe Behaviour in ROSATOM'.

The L&D Academy continued to provide training for methodologists involved in educational programmes, with the 2022-2023 cohort comprising 150 participants.

Development of the youth community in the nuclear industry

The Corporation continues to actively develop the youth community. In 2018, an Industry-Wide Youth Council was established in the industry in order to represent young employees of ROSATOM's enterprises aged under 35. In 2022, the Youth Council assisted in organising a number of activities for young employees: development and educational projects, Youth Communication Days, and events aimed at promoting international youth collaboration.

ROSATOM's delegation comprising 23 young employees of 12 nuclear enterprises took part in the International Youth Nuclear Congress (IYNC 2022) held in Japan. To promote the development of international youth cooperation, a strategic session hosted by the BRICS Youth Energy Agency (YEA) was held as part of the ATOMEXPO 2022 International Forum, and the Global Partners Network initiative was launched. It is a global community of young innovators and entrepreneurs from nuclear and related high-technology sectors searching for and implementing major socially important projects.

In addition, young employees of ROSATOM take part in annual federal youth events, such as the Working Youth Forum, the Tavrida.ART Festival, the Youth Days of the Russian Energy Week, the St. Petersburg Economic Forum and the Russian Occupational Safety Week, the #WeAreTogether International Forum of Civil Participation, etc.

The final event of the year was the AtomProfi industry-wide forum for young professionals, the largest youth event in the nuclear industry, which was attended by 600 schoolchildren, students and employees of the Corporation. The programme of the AtomProfi forum featured a wide range of educational activities and debates; in addition, an overview of results achieved in 2022 and action plans for 2023 for the development of the youth community in the industry were compiled and presented to the Director General of ROSATOM.

A significant aspect of the support and development of the Corporation's youth community is the development of student construction teams (SCTs) in the nuclear industry. The total number of participants of student labour projects increased by 18.4% compared to 2021 and reached 2,144 people, which is an all-time high since the start of the project in 2008.

Training was organised for 2,144 students during the winter and summer seasons at 10 of ROSATOM's construction sites in Russia and abroad. As many as four Nationwide Student Construction Projects were launched simultaneously for the first time: Peaceful Atom – MBIR (Dimitrovgrad, Ulyanovsk Region), Peaceful Atom – PRORYV (Seversk, Tomsk Region), Norilsk (Norilsk, Krasnoyarsk Territory) and Peaceful Atom (Ozersk, Chelyabinsk Region). Student construction teams were involved in the construction of a total of 10 facilities, three of them in the international arena: in Turkey (Akkuyu NPP), Bangladesh (Rooppur NPP) and Egypt (El Dabaa NPP).

Career opportunities for female employees in the industry

ROSATOM is actively developing programmes aimed at expanding opportunities for the professional fulfilment of the Corporation's female employees. In 2022, a four-month leadership development programme titled '[in]Visible Power' was launched for female executives. Its participants included 38 junior managers, with plans to scale up the programme to cover 1,500 people in 2023.

Systematic work is underway to study existing obstacles and develop measures to support the professional development of women in the nuclear industry. For instance, the Corporation has taken part in the first industry-wide study on gender balance in the nuclear industry conducted by the OECD Nuclear Energy Agency in 34 countries. ROSATOM's representatives are also participating in an IAEA working group developing guidance on equal opportunities for countries with a nuclear industry. Proposals that take into account the special needs of women working in the high-technology sector have been prepared for the National Action Strategy for Women for the period from 2023 through 2030.

MEMBERS OF THE WOMEN IN NUCLEAR COMMUNITY

The reporting year saw the expansion of the Women in Nuclear community, which comprises 1,500 members from 37 constituent entities of the Russian Federation, as well as Turkey, Kazakhstan, Indonesia, India, South Africa and other countries. Members of the community have implemented over 100 social projects aimed at creating an environment for career development of female professionals in the high-technology sector. This included five mentoring sessions for female students of technical universities, an accelerator for social projects in the Arctic, environmental initiatives and a number of experience-sharing events, including the 4th International Women in Nuclear Forum, on the sidelines of which a number of international cooperation agreements were signed.

3.1.8. International cooperation in education

ROSATOM is actively promoting Russian engineering education abroad to popularise it and strengthen the Corporation's positions on the global nuclear technology market. ROSATOM is creating educational infrastructure required for personnel training in partner countries and is developing national nuclear education systems using Russian educational technology.

Foreign students study nuclear and related disciplines at Russian universities. Foreign students attend National Research Nuclear University MEPhI (NRNU MEPhI), as well as ROSATOM's core universities and partner universities: Tomsk Polytechnic University (TPU), Saint Petersburg State University, St. Petersburg Polytechnic University, Dmitry Mendeleev University of Chemical Technology of Russia, Moscow Power Engineering Institute, Far Eastern Federal University, Ural Federal University, Moscow Institute of Physics and Technology, Moscow State University of Civil Engineering, Bauman Moscow State Technical University, Alekseev Nizhny Novgorod State Technical University and National University of Science and Technology MISIS.

In 2022, more than 2,000 foreign students from 65 countries, including Armenia, Vietnam, Rwanda, Bolivia, Uzbekistan, Turkey, Bangladesh, Jordan, Egypt, Algeria, Nigeria, Kenya, Kazakhstan, Congo, Ethiopia, Hungary, Serbia, Bulgaria, South Africa, Ghana and other countries, studied at Russian universities.

ROSATOM's core universities continue to successfully implement international educational programmes in cooperation with foreign universities in ROSATOM's partner countries: Egypt, Bolivia, Brazil, Ghana, Armenia, Kazakhstan, Bangladesh and Rwanda (with a total of 15 programmes run by NRNU MEPhI,

Tomsk Polytechnic University, Saint Petersburg State University, Lomonosov Moscow State University and Alekseev Nizhny Novgorod State Technical University).

The Corporation continues to develop overseas branches of its core universities. In the 2022/2023 academic year, 310 people were studying at the Tashkent Branch of NRNU MEPhI under four educational programmes. At the end of this academic year, the first cohort of students will graduate from the university.

On 12 September 2022, a branch of NRNU MEPhI was opened in Almaty (Kazakhstan); two educational programmes were launched on 1 October, with 94 students currently studying under the programmes.

Foreign students show considerable interest in hackathons held with support from ROSATOM, or HackAtoms. These are competitions of student teams on nuclear topics. In 2022, such HackAtoms were held in Kazakhstan, Argentina, Bulgaria, Hungary, Armenia and Bolivia.

In order to help to provide employment for graduates of Russian universities which are members of the Association of Universities 'Consortium of Core Universities of ROSATOM', a number of career events are held to establish contact between foreign employers and graduates. More specifically, NRNU MEPhI and Tomsk Polytechnic University hosted ROSATOM's Career Days for international students, which were attended by representatives of foreign operators, regulators, national atomic energy commissions and nuclear infrastructure organisations. The events were attended by more than 220 students of core universities and 20 organisations from Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Egypt, Ghana, Nigeria, Uzbekistan, Bangladesh, Brazil, Bolivia and Zambia.

Together with Russian universities, the Rosatom Technical Academy runs Train-the-Trainers professional development courses for educators and employees in the industry with a focus on the application of radiation and nuclear technologies in industry and education. The aim of the courses is to support talent development in a partner country. Overall, more than 130 foreign participants from 28 countries joined Train-the-Trainers courses in 2022.

3.1.9. Employees' participation in external and industry-wide professional competitions

Leaders of Russia. Employees of ROSATOM and its organisations actively participate in the Leaders of Russia national management competition. 1,083 executives of the Corporation participated in the fourth season of the competition; five of ROSATOM's employees, including two women, won the super finals.

Competitions and professional events. Employees in the nuclear industry achieved impressive results in professional events and competitions. ROSATOM's team topped the medal table of the High-Tech International Competition of High-Technology Professions for the eighth time. More than 230 employees from 10 divisions in the industry, as well as students and teachers from NRNU MEPhI took part in the competition. The team members won a total of 61 awards: 20 golds, 27 silvers and 14 bronzes. This is the highest medal count in the history of the competition.

AtomSkills Industry-Wide Competition. This is the world's largest corporate professional skills competition. In the reporting year, more than 1,400 people from 40 regions of Russia took part in the event and competed in 39 professional competences. 16 teams from the Engineering, Power Engineering, Mechanical Engineering, Fuel and other Divisions of ROSATOM took part in the competition. Traditionally, the competition featured about 200 students from nine universities led by the Corporation's core university, NRNU MEPhI, as well as specialists from a number of large industrial companies, such as SIBUR, EVRAZ, etc. In addition, a junior programme was held for the first time; it was prepared by the Junior Council of the Corporation and ambassadors of the ROSATOM's Juniors movement.

DigitalSkills. In September 2022, the team of ROSATOM and NRNU MEPhI competed in 11 out of 29 competences represented in the 4th Industry-Wide Professional Skills Competition in the Field of Information Technology DigitalSkills 2022 and won 10 awards.

Optimisation and Productivity Competition. The 2nd Optimisation and Productivity Competition held as part of the Labour Productivity National Project featured more than 400 contestants and experts across eight competition areas. ROSATOM was represented in the competition by 53 representatives of six divisions in the industry. The Corporation's team won the main prize of the Competition, the Trophy for the Highest Overall Score, having scored the highest number of points in the 'Engineering Thinking. Karakuri' competence.

World Construction Championship. The Corporation's team participating in the 2nd World Construction Championship comprised 165 people and won prizes in 16 out of 20 categories. ROSATOM's team won 26 medals: four bronzes, 13 silvers and nine golds, including in one of the biggest and most prestigious categories, The Best Construction Site, where the Corporation ranked first and second.

ROSATOM's participation in competitions and awards won in 2022

Competitions	Competences represented	Total medal count	Gold	Silver	Bronze
National competitions					
High-Tech 2022	25	61	20	27	14
2nd Optimisation and Productivity Competition	4	7	3	2	2
DigitalSkills 2022	11	10	4	1	5
2nd World Construction Championship	20	26	9	13	4
Total	**-**	**104**	**36**	**43**	**25**

ROSATOM's Person of the Year

An industry-wide recognition programme titled 'ROSATOM's Person of the Year' covers three key areas: divisional professions, corporate professions and special nominations put forward by the Director General. The main selection criteria in these categories include performance, engagement, commitment to ROSATOM's values and professional qualities of the participants. An employee can become a nominee for the recognition programme independently, with approval from their line manager, or be nominated by their line manager or colleagues.

The purpose of the recognition programme is to reward outstanding employee achievements, encourage employees to contribute to the overall performance, and highlight the role model of leaders and teamwork on a project.

The number of applications submitted by employees in the nuclear industry in 2022 for the anniversary 10th ROSATOM's Person of the Year Industry-Wide Recognition Programme reached a record high of 3,520 applications, up by 23% year on year. This is an all-time record in the history of the programme, with a total of about 20,000 applications submitted since its launch.

The competition featured workers, engineers, researchers and employees of corporate functions. A record number of finalists were chosen: 543 employees won awards in 68 team and individual categories. In addition, a special prize marking the anniversary of the programme was awarded by the Chairman of the Supervisory Board for projects that have made a significant impact on the Corporation's development over the past 15 years.

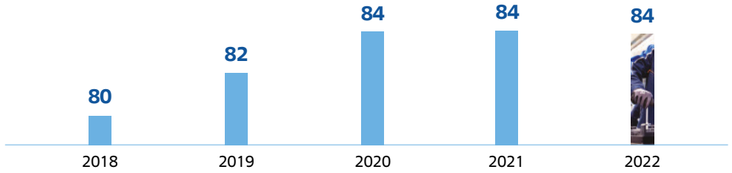
Programme finalists were invited to the award ceremony together with an accompanying person: a spouse or a child over 12 years of age. In addition to the traditional 'atomic Oscars', mini statuettes were made for the winning teams to commemorate the anniversary of the industry-wide recognition programme, so that each finalist could keep a memento of the celebrations, while the big statuette was sent to the organisation. In addition, first-, second- and third-class ROSATOM's Person of the Year anniversary medals and exclusive personalised solar-powered watches were made for the finalists.

The 2022 awards ceremony was held in 2023 in Saint Petersburg and was attended by 1,200 guests. In addition, on the previous day, an anniversary corporate film titled 'This is US' was screened; it featured finalists of the programme from various years.

3.1.10. Employee engagement[1]

In 2022, the employee engagement rate in the industry remained at 84%, on a par with the world's best employers.

Changes in employee engagement rate in ROSATOM and its organisations between 2015 and 2022, %



In 2022, in addition to an employee engagement survey, the Corporation conducted two pulse surveys (in June and October) to assess employees' emotional state. During the year, the employee engagement rate was maintained at a high level, with pulse surveys showing an engagement rate of 82% (June) and 84% (October).

A change support team (CST) is an important tool for driving transformation across the industry. Projects implemented by CSTs enable the Corporation's management to gain an insight into people's major concerns and identify areas that require more attention. Participation in a CST project provides employees with opportunities for personal development and the acquisition of team management and leadership-without-authority skills, as they learn to influence, convince, form and motivate teams.

The findings of the annual employee engagement survey indicate that CST members are more engaged than people in the industry on average, with a difference of several percentage points. In addition, 91% of CST members said that they understood how their company contributed to achieving ROSATOM's 2030 Vision.

1. Engagement is an emotional and intellectual state encouraging employees to do their job to the best of their abilities. Employee engagement surveys have been conducted in the Russian nuclear industry since 2011 under the international methodology with assistance from an independent expert organisation. The engagement rate is defined as the share of engaged employees as a percentage of the total number of respondents.

In 2022, more than 6,600 employees in the industry were involved in change projects through the CSTs. They took part in the implementation of 64 new projects supporting ROSATOM's key initiatives, 42 of which formed part of the Becoming the Best in Unlocking Talent prioritised area of ROSATOM's 2030 Vision, with 12 projects focused on Safety, 13 projects focused on People, Towns and Cities, and four projects focused on Reducing Red Tape. CSTs also implemented 10 projects supporting the One ROSATOM priority, five projects supporting the Technological Leadership priority and four projects supporting the New Product Share priority.

In 2022, the feedback channel for change support team leaders continued to function as part of the project appraisal process at the Division level. As a result, 100% of projects were supported by industry executives (the top 1,000). Executives assessed the CST performance in 2022, with 43% rating it as good, 22% rating it as positive and 21% rating it as satisfactory. The following points were listed as areas for development: increasing the number of projects, improving their quality, expanding their reach, strengthening the link between CSTs and the business, and introducing a systematic approach.

Work with CSTs remains focused on assisting the participants of the movement in developing their change management and project management competences. In 2022, 611 change experts were trained. In addition, team leaders received training in project development; their satisfaction with this programme was rated at 100%.

Industry-wide Communication Days and Director's Days

During the year, ROSATOM was actively developing a project titled 'New Opportunities Offered by Communication Days' to enable every employee in the industry to ask the management a question and get a reply; to learn directly from the management about the current situation and the development strategy in the enterprise and the industry as a whole. Over three years, the reach of the Communication Day online broadcasts expanded from 16,000 to 100,000 employees in 135 nuclear enterprises, and the practice of watching the broadcast and asking questions via the AtomSpace messaging app was introduced. Following the 2nd Communication Day held in 2022, 98% of employees expressed a positive opinion of the event, and 81% of employees who had submitted questions confirmed that they had received a reply.

3.2. HUMAN RIGHTS

ROSATOM actively supports and complies with employment standards pursuant to the legislation of the Russian Federation, industry-wide and internal regulations, the Social Charter of the Russian Business and the Industry-Wide Agreement on Nuclear Power, Industry and Science.

The Industry-Wide Agreement on Nuclear Power, Industry and Science and ROSATOM's internal regulations contain no provisions barring people from being employed in the industry on the grounds of gender, ethnicity, background, the level of personal wealth, marital or social status, position, age, place of residence, attitude towards religion, political opinions or membership of public associations.

GRI 2-23 The principles of ROSATOM's Code of Ethics[1] and the Uniform Industry-Wide Human Rights Policy of ROSATOM and Its Organisations are aligned with regulations ratified by the Russian Federation, the Constitution of the Russian Federation and UN conventions, including the Universal Declaration of Human Rights, the Guiding Principles on Business and Human Rights, the OECD Guidelines for Multinational Enterprises and the Voluntary Principles on Security and Human Rights. In 2020, the Corporation joined the United Nations Global Compact. ROSATOM is committed to complying with the Ten Principles of the United Nations Global Compact, including the principles pertaining to human rights.

The Human Rights Policy states that people have always been the top priority for the nuclear industry; accordingly, primary importance is attached to ensuring their safety, supporting them and respecting their rights. ROSATOM has traditionally supported entire towns and cities, promoting the well-being not only of employees in the industry and their families, but also of local residents in the regions of operations.

The industry-wide policy sets out seven key principles underpinning ROSATOM's approach to people:

1. **Occupational health and safety is fundamental to working in the nuclear industry.** People are the Corporation's main asset. Protecting their lives and health, improving safety and security is a top priority. The Corporation joined the Vision Zero campaign in 2019 and promotes the safety culture in the industry through training and risk awareness. The Corporation seeks to achieve a zero injury rate, and nuclear organisations work systematically towards this goal.
2. **Prevention of forced and child labour.** The Corporation does not tolerate situations when people are forced to work through violence or intimidation. The Corporation provides an environment in which people work willingly and efficiently, and fulfils all its obligations in terms of salary and social benefits. The Corporation not only avoids the use of child labour, but seeks to eliminate it completely. In Russia, children can get employment, even if it is just a summer part-time job, only after reaching the minimum age specified in the ILO Convention Concerning Minimum Age for Admission to Employment. The Corporation operates in multiple countries and communicates its principles and culture across its regions of operation. Therefore, it can be said that we protect childhood not only in Russia, but also abroad.
3. **Prevention of harassment and abuse in any form:** physical, verbal, psychological or sexual. Aggressive behaviour, threats and insults are not allowed either in or outside the workplace. The Corporation and its organisations protect the dignity of individuals from any such attacks and adhere to the principles of equality.
4. **Prevention of any discrimination.** Every person is unique. And everyone has equal rights, regardless of ethnicity, colour, gender, religious beliefs or any other characteristics. ROSATOM values all its employees. Accordingly, any personnel management decisions, from hiring to retirement, are based on the principle of equal opportunities.

1. Full name: Code of Ethics and Professional Conduct for Employees of ROSATOM.

5. **Equal access to opportunities and fair remuneration.** All employees in the nuclear industry receive competitive salaries and have equal access to opportunities: social security and training enabling both professional and personal development. In addition, the Corporation and its organisations comply with the laws in their regions of operation and local traditions regarding working hours and time off work. The Corporation is committed to maintaining a healthy work-life balance for its employees, which helps everyone unlock their potential.
6. **Freedom of association and the right to collective bargaining.** ROSATOM and its organisations support freedom of association, recognise employees' inalienable right to collective bargaining and the right of each employee to collective representation of their interests, and employees' right to membership in organisations aimed at safeguarding and promoting their interests.
7. **Development of the regions of operation and local communities.** ROSATOM and its organisations have adopted a responsible approach to respecting the rights and promoting the well-being of local communities in their regions of operation, cooperate with government bodies and treat local residents in these regions with respect.

EMPLOYEES COMPLETED HUMAN RIGHTS TRAINING

Rules of ethical conduct are applied to ROSATOM's relations with business partners, suppliers and contractors through the following documents (including but not limited to):

- The Code of Ethics and Professional Conduct for Employees of ROSATOM;
- The Uniform Industry-Wide HR Policy;
- The Uniform Industry-Wide Human Rights Policy of ROSATOM and Its Organisations;
- The Uniform Industry-Wide Guidelines on the Movement of Employees of ROSATOM and Its Organisations in Russia;
- The Uniform Industry-Wide Procedure for the Investigation of Reports on Corruption and Other Offences Received via the Hotline and Other Channels;
- The Uniform Industry-Wide Anti-Corruption Policy of ROSATOM and Its Organisations;
- The Industry-Wide Agreement on Nuclear Power, Industry and Science;
- Agreements with the trade union;
- The Uniform Industry-Wide Procedure for the Contracting Process, which establishes a procedure for the conclusion of all international contracts.

GRI 2-26 ROSATOM has established an Ethics Board, which is tasked with assessing compliance of actions taken by employees of the Corporation and its organisations with the Code of Ethics and the Human Rights Policy. Any employee in the industry may submit reports or enquiries to the Ethics Board. The Corporation's Ethics Board is chaired by the First Deputy Director General for Nuclear Energy, who is responsible for coordinating ROSATOM's activities across all aspects of compliance with ethical norms at the industry level. The Deputy Chair of the Ethics Board is the Deputy Director General for HR, who is in charge of coordinating the Corporation's human rights activities.

Employees are informed about an industry-wide hotline which can be used for submitting reports, including complaints and enquiries from individuals and organisations, to safeguard their right to apply in person and to submit individual and group enquiries to protect the rights and legitimate interests of the company, its organisations and their employees.

Complaints and enquiries can be sent by mail or email to executives of the Corporation's organisations, including the Director General. The complaints and enquiries are recorded on the day of receipt and are reviewed within the time frame prescribed by Russian laws; investigations are conducted if necessary. A system is being developed to monitor the handling of enquiries/complaints and replies to them.

Complaints/enquiries related to social and labour relations, including complaints/enquiries related to human rights, are reviewed jointly with a representative body acting on behalf of employees. At the highest level (that of the industry), complaints/enquiries are reviewed by the Industry-Wide Commission for Social and Labour Relations; at the Division level, they are handled by commissions for social and labour relations established in the Divisions; at the level of organisations, this function is performed by commissions for social and labour relations and collective bargaining agreements in the organisations.

The investigation of human rights violations involves a comprehensive review of complaints/enquiries to determine if they are valid (with documents and other sources supporting specific arguments attached to the reply) and assessing the accuracy of reported information by establishing the facts of the case. This also involves preserving the evidence of reported wrongdoings and protecting whistle-blowers and their personal data by implementing measures stipulated by Russian legislation.

Regular employee surveys enable ROSATOM to detect problems, including human rights violations, at an early stage and take the necessary steps to prevent them.

In 2022, new human rights training programmes were developed and delivered, including the following online training courses:

- Human Rights in the Business Context;
- Human Rights in ROSATOM;
- Gender Balance in Business;
- Gender Equality as a Driver of Sustainable Development;
- Inclusive Communications.

A total of 8,245 employees completed training. The amount of training under these programmes totalled 45,800 person-courses.

In 2023, ROSATOM plans to update its Code of Ethics, improve the performance of the Ethics Board and develop it as a tool for engagement, continue to run large-scale human rights training programmes for employees, ensure that enquiries and complaints are handled more efficiently by monitoring the procedures for recording complaints and enquiries and replies to them, improve the feedback mechanisms, guarantee confidentiality, prevent discrimination and review the outcomes of the handling of complaints and enquiries on a quarterly basis.

For more details on collective bargaining agreements, see the section 'Social Partnership in the Nuclear Industry'.

3.3. SOCIAL POLICY

3.3.1. Social policy approaches and principles

ROSATOM's social policy is designed to:

- Make the Corporation more attractive as an employer;
- Recruit and retain young professionals and highly skilled specialists;
- Improve the efficiency of social assistance and social expenditure.

ROSATOM's social policy is based on the following principles:

- Commitment to the UN Global Compact;
- Regular monitoring of the fulfilment of social responsibility commitments undertaken by ROSATOM;
- Information disclosure and transparency of social and labour relations.

ROSATOM's values

Uniform Industry-Wide Social Policy of ROSATOM and Its Organisations:

3.3.2. Social programmes

GRI 403-6 Benefits provided to employees and retirees are aligned with the Uniform Industry-Wide Social Policy, which is based on standardised corporate social programmes.

The structure of corporate social programmes and the relevant expenses are determined on the basis of the Corporation's priorities in personnel management:

- Importance of maintaining health and a long working life;
- Protecting the health of people working in conditions that deviate from the standard conditions (which is why the bulk of funding is allocated for additional personal insurance and health resort treatment for employees);
- Paying attention to retired employees who had worked in the industry for a long time;
- A policy focused on promoting the development of mass sports, providing additional pensions, and supporting families with children, young professionals and people in need.

Compensation and benefits under corporate social programmes implemented by the Corporation are provided to full-time employees.

In 2022, expenditure on programmes aimed at maintaining employees' health and promoting a healthy lifestyle accounted for 48% of the total expenditure on social programmes.

Expenditure on corporate social programmes in ROSATOM and its organisations, RUB billion

Corporate social programmes	2020	2021	2022
Voluntary health insurance and personal insurance against accidents and illness	2.9	3.3	3.8
Health resort treatment and recreation for employees and their children, including:	0.5	1.0	1.5
— health resort and rehabilitation treatment for employees	0.4	0.7	1.1
— health resort treatment and recreation for children	0.1	0.3	0.4
Provision of housing for employees	0.9	0.8	0.9
Private pension plans	0.7	0.8	1.0
Support for retirees	1.2	1.2	1.8
Sporting and cultural events	1.5	1.6	2.0
Assistance to employees	1.6	1.8	2.4
Other	0.7	0.9	1.8
Total	**10.0**	**11.5**	**15.2**

As part of the Uniform Industry-Wide Social Policy, ROSATOM implements corporate social programmes focused on voluntary health insurance, voluntary insurance against accidents and illness, and health resort treatment for employees. Their main goal is to maintain and protect employees' occupational health, including rehabilitation and health improvement after occupational diseases and accidents.

In 2022, about 79% of employees in the industry (260,000 people) had quick access to medical care covered by voluntary health insurance. More than half of employees in the industry (182,000 people) had insurance against accidents and illness, i.e. were entitled to additional payments upon the occurrence of insurable events, which include not only workplace accidents but also non-occupational diseases.

In 2022, 100% of employees who needed health resort treatment based on the findings of a regular health check-up were given vouchers for health resort and rehabilitation treatment.

About 1,000 young specialists and highly skilled workers facing financial difficulties received additional social assistance totalling over RUB 101.6 million, including 640 young specialists who received one-time payments totalling over RUB 31 million upon employment.

The Corporation attaches great importance to encouraging its employees, their family members and residents of its regions of operation to regularly exercise and do sports. One in every six employees in the industry regularly does sports.

For the third year in a row, ROSATOM won in the Ready for Labour and Defence National Festival held among employee teams. The Corporation ranked second in the Russian Futsal Cup among corporate teams.

The town of Usolye-Sibirskoye in the Irkutsk Region has hosted a major sporting event, AtomFest, for two years in a row. The number of local residents participating in the event grows year by year: it increased from 4,000 people in 2021 to almost 6,500 people in 2022. Entire families, including both adults and children, can participate in the event. To encourage them to do so, family relay races are organised, which help to promote traditional family values and bring together different generations. In 2022, as part of the event, special shooting, darts, chess and ring toss competitions were organised for people with disabilities.

In 2022, ROSATOM continued to implement measures forming part of its programme developed in 2019 to support soon-to-retire employees of the Corporation and its organisations. As part of the programme:

- 867 employees underwent health screenings;
- 610 employees were given vouchers for health resort treatment;
- 38 employees switched over to flexible working hours;
- 5,037 employees underwent training and retraining.
- RUB 89 million was spent on employee training.

The biggest sporting event over the past four years has been the Running Race of Nuclear Towns and Cities: the number of its participants increased from 7,000 people in 2019 to 20,000 people in 2022, with the geographical scope of the competition and the number of categories of participants continuously expanding. In 2022, ROSATOM's employees, their family members, students and residents of 26 of the Corporation's host towns and cities, including in Belarus and Turkey, took part in this event offline. More than 3,000 employees and their family members from 80 Russian towns and cities participated in the event online.

To promote a healthy lifestyle in the industry, the Corporation has launched a sports project titled 'ROSATOM's Healthy Lifestyle Ambassador: Running Race of the Divisions'. The idea of the project is for active employees to form teams of like-minded people and lead a healthy lifestyle using a special mobile app, Atom Sport. The Atom Sport app is an ecosystem for keeping fit and enjoying a healthy lifestyle; not only the Corporation's employees, but also students of specialised universities and residents of nuclear towns and cities can now sign up in the app.

The project has been running for three years, and the number of its participants is constantly growing:

Indicator	2020	2021	2022
Number of towns and cities	48	62	187
Number of participants	1,900	3,939	11,054

An industry-wide sporting event, the Winter Nuclear Games 2022, was held in a new format for the first time. The finals in six sports were held in three Russian cities, with over 370 participants from nine Divisions. Employees of Akkuyu NPP (Turkey) participated in the event for the first time. Over three days, broadcasts of the Nuclear Games garnered over 21,000 views.

In 2022, teams from Turkey and Belarus took part in the International Futsal Tournament held to commemorate Efim Slavsky. A total of 41 teams participated in this tournament.

The Orange Atom Basketball Cup of ROSATOM was held for the first time, with 40 teams from nuclear organisations competing in the tournament.

In 2023, ROSATOM plans to actively involve students of specialised universities and even more residents of nuclear towns and cities in large-scale industry-wide sports initiatives.

ROSATOM's success in promoting a healthy lifestyle has been reflected in victories and awards:

- The project titled 'ROSATOM's Running Race of the Divisions' became a prize winner in the Fitness and Sports Projects category at the Sports and Russia Forum, and won in the Development of a Sporting Culture category at the 'Investing in the Development of a Healthy Country. Best Corporate Practices 2022' Forum and in the Best Online Project to Involve Employees in Sports and Promote a Healthy Lifestyle category of the National Corporate Sports Award;
- An industry-wide sports event, the Nuclear Games, became a prize winner in the Corporate Projects category at the Russia's Best Social Projects Forum;
- The project titled 'ROSATOM's Healthy Lifestyle Ambassador' won in the High Start category of the Creating the Future Forum.

In 2022, ROSATOM was included in the top Platinum category in the ranking of the best employers in Russia according to the *Forbes* business magazine. The Platinum category included employers with the highest scores for the following ESG metrics: Employees and Society (S), Environment (E), and Corporate Governance (G). The founders of the ranking placed a special emphasis on social aspects: they assessed whether companies had in place policies to ensure the well-being of employees that go beyond the standard benefits package, and took into account which employers managed to avoid lay-offs in times of crisis and to increase salaries, as well as transparency indicators used by the companies.

3.3.3. Support for industry veterans

Nuclear enterprises continue to pay great attention to veterans and retirees who worked in the industry for more than 20 years (over 117,000 people): in 2022, 5,515 retirees were given vouchers for treatment at health resorts and wellness centres (worth a total of RUB 277 million); more than 82,000 retirees received financial assistance exceeding RUB 1.1 billion, and more than 17,000 retirees receive monthly supplements to state pensions (totalling RUB 256 million).

In order to provide additional social assistance to veterans and retirees facing financial difficulties, one-time benefits of RUB 5,000 were paid to more than 82,600 people (a total of more than RUB 413 million), and additional social assistance worth RUB 18.6 million was provided to 780 single pensioners and disabled persons requiring special care.

3.3.4. Social partnership in the nuclear industry

ROSATOM adheres to the Industry-Wide Agreement on Nuclear Power, Industry and Science for 2018-2020 (the Agreement), which was extended until the end of 2022. The Agreement is based on the established practice of social partnership in the nuclear industry and is aimed at implementing the Occupational Health and Safety Management System, the Integrated Standardised Remuneration System and the Uniform Industry-Wide Social Policy.

The Agreement has been drafted and is being implemented jointly with the Russian Trade Union of Nuclear Power and Industry Workers (RTUNPIW). 130,514 employees of ROSATOM's organisations covered by the activities of the RTUNPIW, or 39.6% of the total headcount, are trade union members.

The Agreement gives priority to the protection of employees' lives and health. Jointly with the trade union, employers maintain records of and analyse morbidity among employees, including based on records of periodic medical examinations and sick leave, and develop a comprehensive health improvement programme titled Health. The Agreement incorporates the opportunities provided by the legislation on special assessment of working conditions (SAWC). It also establishes an additional mechanism for cooperating with the trade union in carrying out SAWC and analysing its findings.

GRI 2-30 The Agreement provides a basis for collective bargaining agreements concluded in nuclear organisations. The collective bargaining agreements support the implementation of the Agreement and regulate social and labour relations taking into account operational, technological and regional features of each organisation. The collective bargaining agreements cover 79% of employees in ROSATOM's organisations.

The Industry-Wide Agreement reflects the employer's obligations related to salary indexation and social benefits. The Agreement has also provided the industry-wide trade union, local trade union cells and trade union committees with a more important role in maintaining social stability among the workforce in ROSATOM's organisations. In 2022, the RTUNPIW focused mainly on ensuring compliance with the current Agreement, assisting local trade union cells in drafting and signing collective bargaining agreements, and actively participating in the work of the Russian Trilateral Commission on the Regulation of Social and Labour Relations.

For details on the implementation of the occupational safety and health policy, see also the chapter 'Safety Report'.

130,500

EMPLOYEES

OF ROSATOM'S ORGANISATIONS ARE TRADE UNION MEMBERS

3.3.5. Cooperation with universities and recruitment of young professionals

ПRecruitment of young professionals is supported by ROSATOM's systematic youth talent development efforts at all levels, from kindergartens, schools and universities to enterprises.

For schoolchildren, ROSATOM offers early career guidance, job try-outs, open lectures, engineering and design sessions, championships, academic competitions, contests, and classes in laboratories and workshops. Every year, more than 8 million school students from all constituent entities of the Russian Federation take part in events hosted by the Corporation.

The grade point average of university graduates hired by the Corporation's organisations in 2022 stood at 4.44. 30.5% of university graduates hired by ROSATOM had graduated with honours.

As part of its engagement with students, the Corporation actively cooperates with specialised educational institutions, including more than 40 colleges and universities, 18 of which form part of a consortium of core universities. In 2022, more than 100 nuclear enterprises participated in career guidance events hosted by educational institutions and advertised about 500 vacancies; key formats of these events included open days and job fairs, which were attended by more than 200,000 people.

In 2022, ROSATOM's enterprises arranged internships and work placements for more than 8,700 students; about 2,500 university and college graduates were hired in the industry.

In order to encourage promising young specialists to work in the industry and to generate interest in STEM disciplines and engineering professions among school and university students, the Corporation actively participated in federal events and projects. ROSATOM is a partner and co-organiser of the following projects: a nationwide student competition, Your Move; the Big Break Nationwide Competition for Schoolchildren; an academic competition, I'm a Professional; the Career Time nationwide campaign, including the Golden Internship competition, as well as the Russian Znanie Society. Cooperation between ROSATOM and the Talent and Success Educational Foundation involves running joint partner educational programmes and opening specialised laboratories and centres. ROSATOM has a presence in the Sirius Federal Territory and cooperates with the Sirius Educational Centre, the Sirius Lyceum and the Sirius University. In 2022, more than 61 joint events were organised by the Corporation and the Talent and Success Educational Foundation with a total reach of more than 250,000 schoolchildren and students.

The annual reach of the federal projects exceeds 10 million views. There were more than 100 events involving technical experts from nuclear organisations and trainers from the Rosatom Corporate Academy and visits to ROSATOM's production sites. In 2022, the winners and best participants of federal projects were invited to participate in the Icebreaker of Discovery educational expedition to the North Pole, the Atom Discovery research and educational tour of the Kola Peninsula, technical tours of the industrial sites of JSC Atomenergoproekt, the Khlopin Radium Institute, Kola NPP, etc.

One of the key tools to support career guidance initiatives in the nuclear industry is ROSATOM's Employer Brand Ambassadors, an awareness-raising project targeted at schoolchildren and students. It is implemented by active employees of nuclear enterprises and students of the core universities. In 2022, the Ambassadors participated in over 70 awareness-raising events for schoolchildren and students with a total reach of over 10 million views.

ROSATOM's expertise in working with young people is also sought after on the external market. The Corporation's experts are members of working groups and commissions under federal executive bodies, such as the State Council Commission on Youth Policy, the Public Council of the Federal Agency for Youth Affairs (Rosmolodezh), the State Duma Committee on Youth Policy, the Coordination Council of the Civic Chamber of the Russian Federation for the Development of Communities of Young Professionals, the Coordination Council on Youth Affairs in Science and Education under the Presidential Council on Science and Education, etc.

3.4. CORPORATE VOLUNTEERING

3.4.1. ROSATOM's approaches and principles of volunteering

In 2018, ROSATOM made an official decision to launch a corporate volunteering programme. ROSATOM, jointly with volunteers from its key Divisions, has identified the following five main areas of volunteer activity: environmental conservation (awareness campaigns, clean-ups, planting of seedlings, waste management); supporting socially disadvantaged groups (low-income families, orphans, the elderly) and veterans; promoting a healthy lifestyle (blood donations, sporting events); career guidance and mentoring (lessons in schools, guided tours for the general public, intellectual games, competitions); intellectual volunteering (leveraging employees' professional skills in the regions of operation). In 2022, the Corporation conducted about 400 volunteer campaigns, including 12 industry-wide campaigns. There are about 40,000 volunteers in ROSATOM. The total number of beneficiaries has exceeded 800,000 people.

Historically, ROSATOM has always been actively involved in social projects in its regions of operation and has assumed responsibility for maintaining a high standard of living for local residents. In 2020, when the National Development Goals and the focus areas of sustainable development (including green development) of the Russian Federation were approved, the Corporation undertook to promote volunteering and social initiatives not only among its employees, but also externally, among local residents in its regions of operation, educational institutions, youth communities, non-profit organisations and business partners, as well as small and medium-sized businesses.

40,000

PERSONS

TOTAL NUMBER OF VOLUNTEERS IN ROSATOM

This task has been prioritised by young activists in the nuclear industry and endorsed by the Corporation's management. The programme to develop volunteering is currently targeted at several audiences: employees in the industry, local residents in ROSATOM's regions of operation (including young people) and the business community.

3.4.2. Prioritised areas of volunteer activity

ROSATOM's volunteers are actively involved both in the implementation of traditional industry-wide projects (in areas such as blood donations, career guidance and mentoring, environmental volunteering, support for veterans, the elderly, socially disadvantaged groups and animals) and in the promotion of new practices, such as the development of local communities, support for creative industries, social adaptation and provision of training for people with disabilities.

In 2022, ROSATOM launched a large-scale industry-wide project to help stray animals, the Fluffy Atom. During the year, 37 of ROSATOM's enterprises joined the project and supported 22 animal shelters across Russia.

Ahead of the New Year, the Corporation's volunteers and participants of the #WeAreTogether International Forum of Civil Participation sent more than 1,500 New Year greetings cards to elderly people supported by the Joy of Old Age Foundation. The cards were illustrated with drawings made by children of employees in the industry that had been submitted to the Energy of Kindness children's drawing contest.

Employees of nuclear enterprises regularly participate in blood donation campaigns; this includes undergoing blood typing in order to join the bone marrow register. Blood donation campaigns are held regularly, with the number of donors increasing year by year. For instance, in 2022, ROSATOM's employees donated their blood more than 3,200 times as part of the Industry-Wide Donor Months (in April and October). An industry-wide donor register was compiled in order to promptly replenish blood banks.

With active support from ROSATOM's volunteers, work was initiated to create an integrated information resource on bone marrow donation, cancer prevention and grant writing.

As part of environmental volunteering, more than 200 environmental campaigns were conducted; more than 20 tonnes of municipal solid waste were collected, and 11,000 trees were planted.

Intellectual volunteering included developing dozens of innovative solutions using digital technologies for urban infrastructure development (digital twins of towns and cities, systems for the optimisation of public transportation, BIM projects, digital products for tourists); more than 1,000 awareness-raising events were held to promote science, blue-collar and engineering jobs and the environmental culture.

To encourage a more active public dialogue between businesses, non-profit organisations and the government, a unique social design centre model has been developed and piloted in the town of Snezhinsk. As part of this initiative, a variety of projects with a total reach of about 350,000 people have been implemented in the Chelyabinsk Region.

3.4.3. Volunteer training

To improve the quality of social projects and expand the range of formats of volunteer activity, more than 150 hours of educational content were created for volunteers and leaders of the volunteer community; a CSR University was launched to study the basics of community engagement and various approaches to CSR, such as programmes and grant writing. The CSR Accelerator project was implemented. As part of the project, participants from across Russia developed and scaled their projects, with the best practices presented to the Director General of ROSATOM.

3.4.4. CSR project competition and other events

In 2022, volunteering practices expanded beyond ROSATOM and nuclear towns and cities. More than 15 companies became partners of projects run by the ROSATOM's Volunteers movement. A number of cross-corporate meetings, joint campaigns and business events were held in 2022, enabling representatives of various companies to meet in person and share their experience. All this has been an important driver of the development of volunteering in the industry.

Representatives of universities are also actively involved in volunteer campaigns (for instance, every year, more than 300 students of NRNU MEPhI take part in environmental field trips).

Special mention should be made of a project titled 'Social Leader of Usolye-Sibirskoye'; this is a grant competition enabling the town's volunteers to submit their project idea and join the project teams of other applicants (non-profit organisations, educational institutions or entrepreneurs) and subsequently take part in the implementation of the winning projects. Following the 2021/2022 competition, 18 winning projects were successfully implemented, with the total number of beneficiaries exceeding 7,500 people.

An important focus area during the year was the development of volunteer communities within the industry and in towns and cities, and integration with federal projects. For example, ROSATOM became a partner of the Dobro.Centres franchise, where it supervises the environmental track, and jointly with the Autonomous Non-Profit Organisation National Priorities conducted a wide-ranging survey of environmental habits of Russian people. In addition, ROSATOM's volunteers took part in the Clean Arctic and Garden of Memory campaigns and joined nationwide campaigns such as BumBatl (which involved collecting 25 tonnes of waste paper) and the Volga Day.

This work has been appreciated by experts and recognised at the federal level. In 2022, ROSATOM's volunteering and CSR programmes received key federal awards: WeAreTogether, Champions of Good Deeds, the Crystal Pyramid in the CSR Project of the Year category, Investment Leaders, People Investor, the National Environmental Award presented by the *Komsomolskaya Pravda* newspaper, etc.

3.4.5. Key projects implemented in ROSATOM

Project objective	Project outcomes	Project team	Geographic coverage
Encouraging employees in the nuclear industry and local residents in ROSATOM's host towns and cities to donate blood, its components and bone marrow as part of the Pulsation project	In 2022, employees in the nuclear industry donated blood more than 3,200 times as part of the Pulsation blood donation project	Volunteers from ROSATOM	Nationwide
The Clean City project is aimed at promoting the development of environmental culture among local residents of all ages, incorporating environmental topics into the educational system, developing convenient infrastructure and providing opportunities for local residents to participate in environmental projects, and developing an incentive system to encourage both local residents and organisations of various types to adopt environmental solutions and habits	A comprehensive programme has been launched in the Corporation's regions of operation with a focus on greening urban spaces and encouraging employees and local residents to adopt an environmentally friendly lifestyle. As part of the project, more than 3 tonnes of plastic packaging have been collected and recycled; 10 tonnes of sorted waste have been collected and handed over for recycling; 7.6 tonnes of waste paper have been collected; and more than 1,000 kg of batteries have been handed over for recycling. The Environmental Taxi campaign has been held for the first time. 11,300 tree saplings have been planted. More than 400 environmental awareness events have been organised for local residents in the regions. More than 100 clean-up days have been held. Over 5,000 people have been directly involved in the project. More than 500 news items have been published as part of media coverage of the project. A cumulative points system has been developed and introduced to reward project participants for active participation in environmental activities in the city of Volgodonsk. The project's target audience exceeds 400,000 people (residents of the host towns and cities).	Volunteers from the Power Engineering Division of ROSATOM	Volgodonsk, Novovoronezh, Kurchatov, Zarechny, Sosnovy Bor, Desnogorsk
Activities to raise awareness of various formats of animal shelter support, consolidation of requests from shelters, assistance in rehoming animals from shelters and promoting a responsible attitude towards animals	In 2022, the Corporation launched a large-scale industry-wide project to help stray animals, the Fluffy Atom. During the year, 37 of the Corporation's enterprises joined the project and supported 22 animal shelters across Russia.	Volunteers from all divisions of nuclear organisations	Over 40 towns and cities

3.4.6. Anatoly Alexandrov Corporate Social Responsibility and Volunteering Competition

In order to promote the development of the volunteer movement and generate new initiatives, the Anatoly Alexandrov Corporate Social Responsibility and Volunteering Competition[1] is held in the industry on an annual basis. The competition helps to identify best practices, develop the system for managing social projects and volunteering, communicate the UN Sustainable Development Goals to employees, establish criteria for evaluating the effectiveness of social projects and subsequently form cross-divisional teams focused on specific thematic areas.

More than 160 applications were submitted for the competition in 2022 from all Divisions of ROSATOM and numerous organisations outside the scope of the Divisions. The total number of participants exceeded 800 people. The winners were awarded prizes by Alexey Likhachev, ROSATOM's Director General, at an award ceremony in Moscow on the Volunteer Day.

3.5. LONG-TERM PROJECTS IN THE SPHERE OF HR AND SOCIAL POLICY

Building a talent development ecosystem

Recruitment of young professionals is supported by ROSATOM's systematic efforts at all levels, from kindergartens, schools, colleges and universities to enterprises. A project titled 'ROSATOM's School' has been launched in the Corporation's host towns and cities; it supports the development of preschoolers, schoolchildren and teachers. The project involves holding up to 200 events every year, organising 'nuclear classes' and opening innovative kindergartens and schools. To date, 10 schools have already joined the project, and 67 'nuclear classes' with a focus on physics and mathematics have been opened, where about 60,000 schoolchildren study in various formats.

The Corporation has launched the Parent Academy, an educational platform for those seeking to unlock their children's potential in collaboration with the best teachers and psychologists, and ROSATOM's Council of Educators, which comprises leading academics, mentors and winners of teaching excellence contests. A diagnostic assessment of more than 600 schoolchildren has already been carried out with assistance from the Council of Educators; following the assessment, each school student received recommendations for further development. Collaboration with teachers also includes activities forming part of the Big Break project. In 2022, more than 84,000 people from the Corporation's host towns and cities and various regions of Russia participated online in events forming part of the Parent Academy project, such as meetings with experts, researchers in the field of pedagogy and psychology, supervisors of federal projects and leading teachers.

As part of its engagement with students, ROSATOM actively cooperates with specialised educational institutions, including more than 40 colleges and universities, 18 of which form part of the consortium of core universities. In 2022, more than 100 nuclear enterprises participated in career guidance events hosted by educational institutions and advertised about 500 vacancies; key formats of these events included open days and job fairs, which were attended by more than 200,000 people. More than 3,000 young professionals join the industry every year.

A new area of partnership is the Corporation's participation in the Professionality Federal Project. Its goal is to align the curricula of secondary vocational education institutions with the needs of employers as closely as possible in order to enable graduates to quickly become involved in the production process.

1. The regulations on the competition were approved by Order No. 1-1/399-R of ROSATOM dated 8 July 2020.

The Corporation's experts have completely redesigned 15 training programmes in three educational institutions: Ozersk Institute of Technology, Ozersk Technical College and Kursk Assembly College. More educational institutions will soon join the project. 430 people have been enrolled in the first year of the project's programmes.

Student construction teams (SCTs) are a separate focus area of ROSATOM's career guidance efforts. In 2022, 2,144 people took part in the winter and summer work terms. Following the completion of this work, 51 people were hired by nuclear enterprises.

Ensuring succession for critical senior management positions

In 2022, 69 members of the executive succession pool ('ROSATOM's Assets' and 'ROSATOM's Assets. Basic Level') completed the ESP development programme. A ranking was compiled following the completion of the two-year development programme; it is based on a number of parameters, such as performance, proactive behaviour and participation in the programme titled 'ROSATOM for ROSATOM'.

A support programme continues to be implemented and an alumni club has been established for the members of the 'ROSATOM's Assets' and 'ROSATOM's Assets. Basic Level' programmes.

In 2022, the share of ESP members among those appointed to vacant top and senior executive positions totalled 70.82%. The share of ESP members among those appointed to the positions of Chief Executive Officer and Deputy CEO for core operations in ROSATOM's organisations stood at 75.86% and 79.17% respectively.

The career and succession planning process is a mandatory requirement and is applied in all key organisations in the industry, with succession plans prepared for critical positions.

Development of digital services for employees

ROSATOM continues to develop a digital environment for employees to provide them with digital tools at all stages of their professional journey in the industry.

The RECORD 2.0 system developed by JSC Greenatom has been rolled out in all divisions of the nuclear power sector. The system is used in more than 100 organisations for performance evaluation, training and career planning.

2022 saw the launch of a mobile version of the Employee's Personal Account, an online HR service for employees. The application can be used by workers and employees who have no access to desktop computers.

In 2022, ROSATOM's integrated career portal at https://rosatom-career.ru (a digital platform for the recruitment and hiring of candidates) was visited by 750,000 people, with 31,000 people responding to vacancies. More than 2,500 vacancies were posted simultaneously on the career portal.

In 2022, the functionality and reach of the corporate social media platform was expanded. Since its launch, the platform has been used by 55,000 employees, and 900 communities have been created.

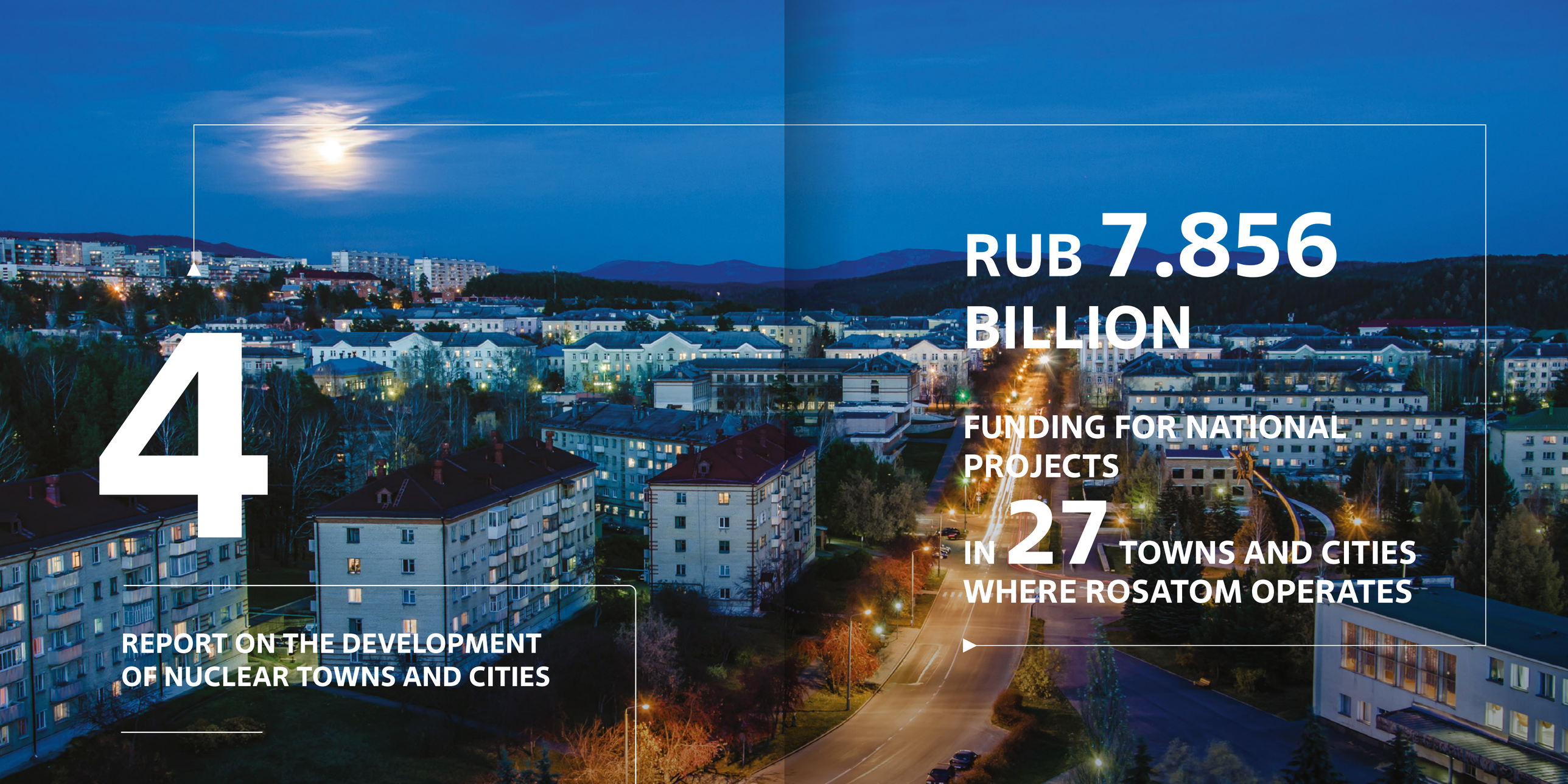
ROSATOM is actively developing its own software products to ensure the industry's technological self-sufficiency in the area of HR process automation. In 2022, the Atomkor personnel accounting and payroll system, which does not rely on imported solutions, was developed for the site of the Engineering Division in Egypt. The system incorporates the provisions of both Russian and Egyptian legislation. The interface is available in two languages (Russian and English). Starting from January 2023, salaries are paid to local and Russian personnel (more than 3,000 employees) using the new system. Based on this development, ROSATOM plans to roll out a full-scale payroll system for the industry to replace SAP HCM.

The scope of services provided by the Industry-Wide HR Service Centre is expanding year by year. As at 31 December 2022, the HR Service Centre provided services to 146 organisations in the industry with a total of 197,406 employees. The quality of services provided by the HR Service Centre reached 99.99%, while labour productivity grew by 11.66%. In 2022, the level of employee satisfaction with the HR function in the organisations serviced by the Centre stood at 6.1 out of a possible 7 points.

Developing a culture of transparency and trust

The Corporation fosters a special culture of openness, trust, respect, fairness and equal opportunities, which is a necessary prerequisite for unlocking talent. This is accomplished through the use of a wide range of tools that have been proved to be effective. These include cascading a single message from the Director General to every employee, targeted engagement with the most active employees in the industry (young people, line managers, volunteers, change support teams, blue-collar workers and engineers), constantly requesting feedback from employees and immediately responding to it.

Throughout 2022, the Corporation's executives maintained an ongoing open dialogue with employees of enterprises and organisations in the industry. Executives answered questions during Communication Days and Director's Days, cascaded ROSATOM's 2030 Vision by outlining everyone's role in achieving the Corporation's strategic goals, and conducted pulse surveys and focus groups. These activities enabled ROSATOM to maintain the employee engagement rate at 84% at year-end, on a par with the world's best employers.



4

REPORT ON THE DEVELOPMENT OF NUCLEAR TOWNS AND CITIES

RUB 7.856 BILLION

FUNDING FOR NATIONAL PROJECTS

IN 27 TOWNS AND CITIES WHERE ROSATOM OPERATES

STATEMENT OF THE HEAD OF DEPARTMENT FOR LIAISON WITH REGIONS

Today, an important strategic task is to ensure the technological sovereignty of Russia, and ROSATOM's enterprises can contribute to its achievement. Key industry enterprises are concentrated in 27 towns and cities where nuclear facilities are located. We proudly call them nuclear towns and cities. Their residents make high demands with regard to the standards of consumption, quality of services and the standard of living, expecting them to match those in large metropolitan cities. The world is changing, regional capitals are improving, and towns and cities need to keep pace with these changes; the more attractive nuclear towns and cities are as a place for people to live in, the higher their economic and social potential.

Competition for high-quality human capital necessitates, among other things, a rethinking of approaches to the management of urban development, the modernisation of urban spaces, and the creation of an attractive and comfortable urban environment. We have been doing this systematically for more than five years, and the residents of nuclear towns and cities see how exciting our towns and cities are becoming and appreciate it. Moreover, as part of our efforts to create a comfortable urban environment, we address a wide range of issues, from urban improvement to the development of digital urban services. All senior officials of nuclear towns and cities are concerned with creating a new image of these towns and cities, the digitisation of services, the modernisation of public spaces and the rethinking of the urban culture in general, which directly contributes to improving the quality of life in the modern world.

Our key priority is to increase the effectiveness of participation of our host towns and cities in the implementation of national projects and the achievement of the Sustainable Development Goals. For instance, in 2022, the total volume of funding for national projects in 27 towns and cities where ROSATOM operates increased by 37% year on year and reached RUB 7,856.31 million, including capital investments totalling RUB 4,669.49 million.

In 2022, eight nuclear towns and cities won the 6th National Competition for the Best Projects to Create a Comfortable Urban Environment, which totals 5% of the nationwide figures.

22 out of 27 nuclear towns and cities (81%) have been assigned an urban environment quality rating indicating a favourable urban environment.

22.7 RUB BILLION

RETURNED IN TAXES BY ORGANISATIONS OF THE CONSOLIDATED TAXPAYER GROUP

The closed administrative and territorial formation (CATF) of Sarov was given the highest score (235 points).

We have continued to support and develop the town of Usolye-Sibirskoye, where over 20 large-scale initiatives have been implemented.

A set of measures taken to support the healthcare sector in nuclear towns and cities has made it possible to increase the level of satisfaction of their residents with medical care provided to them to 61% (2021: 36%).

GRI 203-2

However, there have also been certain decisions that are beyond our control. More specifically, the institution of the consolidated taxpayer group (CTG) has been abolished as from 1 January 2023. Under agreements with regions that have been in force since 2013 and have been implemented by the entities forming part of ROSATOM's CTG, over RUB 222.5 billion has been reinvested in nuclear towns and cities, which has greatly facilitated their modernisation. In 2022, RUB 22.7 billion was returned in taxes.

Due to these circumstances, we are constantly taking steps to leverage other social and economic support mechanisms and attract investments for urban development. For instance, at year-end 2022, the number of registered resident companies in all of the Corporation's PDAs, including single-industry towns and cities, totalled 160 companies; investments under agreements grew to RUB 75.9 billion, and the number of new jobs reached 9,397.

Thanks to a systematic approach to investor relations, the number of PDA residents in closed nuclear towns and cities has increased from two to 87 since 2019. During 2022, 23 new resident companies were attracted, and the area of the PDAs was expanded by 166 hectares.

In the reporting year, ROSATOM established its representative offices in all federal districts in order to promote civilian products of the Corporation and its integrators on regional markets.

The 6th Forum of Towns and Cities with High Science and Technology Potential in 2022 was structured as a series of expert discussions that were distributed over time (during six months) and held in various Russian cities (Moscow, Cherepovets, Obninsk and Sevastopol).

Given the main focus of its efforts to promote social development, the Corporation implements industry-wide social initiatives in nuclear towns and cities, such as ROSATOM's School, ROSATOM's Territory of Culture and numerous projects of the Nuclear Towns and Cities Union. In 2022, as part of these initiatives, organisational and methodological support was provided for more than 350 events.

Throughout the past year, commissions and community liaison offices of ROSATOM's Public Council were active in the field of environmental protection, healthcare, environmental education and the development of nuclear towns and cities.

I am confident that information presented in the report will be useful to stakeholders. ROSATOM's efforts to create a comfortable and exemplary social environment in nuclear towns and cities will accelerate progressively. After all, it is the residents of our host towns and cities who drive scientific progress, help to ensure technological sovereignty and promote innovative development in the nuclear industry and the country as a whole.

Andrey Polosin

Head of Department for Liaison with Regions[1]

1. In 2022.

Key Results in 2022

- Funding for national projects in 27 towns and cities where ROSATOM operates increased by 37% (RUB 7.856 billion).
- 22 towns and cities were assigned an urban environment quality rating indicating a favourable urban environment.
- The level of satisfaction of local residents with medical care provided to them stood at 61% (2021: 36%);
- Investments by PDA residents grew to RUB 75.9 billion.
- The number of new jobs to be created was projected at 9,397.

Key Events in 2022

- ROSATOM established its representative offices in federal districts in order to promote the Corporation's civilian products on regional markets.
- As part of industry-wide social initiatives, organisational and methodological support was provided for more than 350 events.
- Eight nuclear towns and cities won the 6th National Competition for the Best Projects to Create a Comfortable Urban Environment.

GRI 3-3

4.1. DEVELOPMENT PRIORITIES

The operations of ROSATOM's largest organisations determine the social and economic climate in towns and cities where nuclear power plants are located, in closed administrative and territorial formations (CATFs) and priority development areas (PDAs). Therefore, the Corporation attaches great importance to improving the quality of life in nuclear towns and cities, promoting effective communication and cooperation with governments at all levels and with local communities, maintaining the talent pipeline and encouraging investments.

Given the scale of its operations in Russia and abroad, the Corporation recognises its responsibility towards a wide range of stakeholders for protecting the environment, ensuring industrial and radiation safety, ensuring the safety and protecting the health of employees in the nuclear industry, contractors and the general public, and for operating in a manner promoting long-term sustainable development in its regions of operation.

One of the key sustainable development objectives for ROSATOM and its organisations is to drive systematic improvement in the standard of living of employees and their families by promoting social and economic development in the regions where nuclear facilities are located.

Initiatives focused on the development of nuclear towns and cities are implemented by ROSATOM's Department for Liaison with Regions (hereinafter referred to as the Department).

Key objectives of the Department are:

- To coordinate the activities and enable effective cooperation between the Department and civil society organisations, governments and the relevant departments of organisations operating in nuclear towns and cities;
- To involve civil society organisations and local governments in joint initiatives aimed at creating a favourable social and political climate in the regions where nuclear facilities are located, matching a new stage in the development of the nuclear industry; to switch from the policy of control to cooperation.

Unified Industry Policy on Sustainable Development of ROSATOM and Its Organisations:

The performance of the Department is assessed annually on the basis of KPI targets. The assessment is conducted by ROSATOM's Director General. In 2022, all KPI targets were achieved.

GRI 3-3

4.2. CONTRIBUTION TO THE IMPLEMENTATION OF NATIONAL PROJECTS

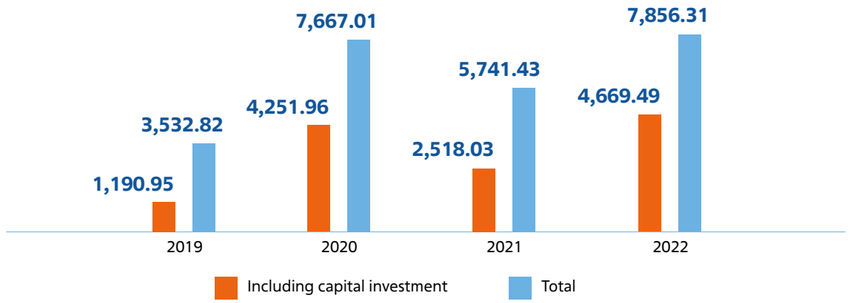
In 2022, ROSATOM continued to support the participation of nuclear towns and cities in national and federal projects aimed at implementing Decree No. 474 of the President of the Russian Federation dated 21 July 2020 on the National Development Goals of the Russian Federation until 2030.

ROSATOM continues to provide methodological support to the towns and cities in order to increase the efficiency of their participation in the implementation of national projects.

In 2022, a practical workshop involving experts of the Institute for Urban Economics Foundation was held in order to inform municipal administrations about ongoing changes at the federal level which are relevant to the national projects. As part of the workshop, an updated methodology for the participation of towns and cities in the implementation of national and federal projects was presented. In addition, illustrations were provided of changes in the regulatory framework which had been implemented or were scheduled for implementation and which affected the municipalities.

In 2022, total funding for national projects in 27 of ROSATOM's host towns and cities increased by 37% year on year.

Total funding of national projects in ROSATOM's host towns and cities, RUB million



There was a significant increase in the amount of funding for national projects in 13 towns and cities, with the biggest increase recorded in the following towns and cities: the CATFs of Zelenogorsk, Zheleznogorsk, Lesnoy and Sarov; Balakovo, Bilibino, Volgodonsk, Dimitrovgrad, Zarechny (Sverdlovsk Region), Kovrov, Polyarnye Zori, Udomlya and Elektrostal.

The largest number of towns and cities are involved in the implementation of the following national projects: Housing and Urban Environment, Education, Culture, and Ecology.

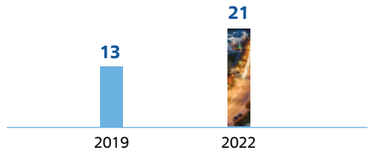
In 2022, all nuclear towns and cities continued to implement the Housing and Urban Environment National Project. Funding for this project increased by a factor of 2.5, from RUB 1,188.1 million in 2019 to RUB 2,944.1 million in 2022.

The federal project titled 'Creating a Comfortable Urban Environment', which forms part of this national project, is being implemented in all nuclear towns and cities, except for Bilibino. The cost of measures implemented over four years totals RUB 6,031.6 million, including RUB 1,554.1 million in 2022.

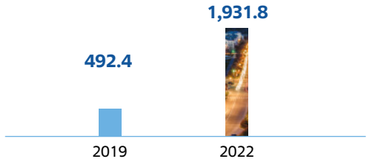
As part of the Housing and Urban Environment National Project, work is underway in 10 nuclear towns and cities to reduce the substandard housing stock (the CATF of Zelenogorsk, Balakovo, Bilibino, Polyarnye Zori, Dimitrovgrad, Obninsk, Glazov, Kovrov, Usolye-Sibirskoye and Elektrostal).

The Clean Water Federal Project was included in the Housing and Urban Environment National Project in 2021. Its implementation between 2019 and 2021 enabled a significant improvement of the water supply and sewerage system in the CATF of Ozersk (RUB 497.5 million). In 2022, similar work began in the CATF of Seversk.

Number of towns and cities involved in the implementation of the Education National Project



Funding for the Education National Project, RUB million



Number of towns and cities implementing activities forming part of other federal projects

The majority of towns and cities take part in the Culture National Project (25 towns and cities). The average annual cost of measures implemented as part of the project totals RUB 140 million, including RUB 180.3 million in 2022. As part of the project, culture development centres, modular municipal libraries and virtual concert halls have been established; children's art schools have been provided with musical instruments; grants are awarded every year to support creative teams.

In 2022, the four towns that have been participating in the implementation of the Ecology National Project since 2019 (the CATFs of Ozersk, Snezhinsk and Tryokhgorny, and Bilibino) were joined by eight more towns and cities (the CATFs of Lesnoy, Novouralsk and Sarov; Kurchatov, Sosnovy Bor, Dimitrovgrad, Usolye-Sibirskoye and Volgodonsk). 11 towns and cities actively participate in the Clean Country and the Integrated System for the Management of Municipal Solid Waste Federal Projects. Large-scale work is underway as part of the Environmental Improvement of the Volga River Federal Project in the town of Sarov (RUB 1,307.5 million) and in the city of Dimitrovgrad (RUB 103.1 million).

Urban environment

BBetween 2018 and 2022, nuclear towns and cities received methodological assistance in shaping and developing the urban environment. Lectures and expert discussions were held; master plans were developed for six projects in five towns and cities (Zelenogorsk, Zheleznogorsk, Novouralsk, Elektrostal and Krasnokamensk); applications were prepared for participation in the National Competition for the Best Projects to Create a Comfortable Urban Environment (hereinafter referred to as the Competition), which is held by the Russian Ministry of Construction, Housing and Utilities.

Systematic methodological work with municipal administrations and the participation of nuclear towns and cities in the Competition have made it possible to develop a comprehensive vision of projects focused on urban improvement and the development of the urban environment and the towns' and cities' long-term plans to develop the urban environment, which successfully combine solutions for urban improvement and business development.

Winning projects of the 6th National Competition for the Best Projects to Create a Comfortable Urban Environment

Towns (Population of 50,000 to 100,000 People) category

CThe amount of the grant is RUB 95 million for each town.

Five winners:

- Sosnovy Bor (Leningrad Region), a project titled 'Landscaping of the Mini Park near the Stroitel Community Centre and the Children's and Youth Sports School';
- Usolye-Sibirskoye (Irkutsk Region), a project titled 'The Town Viewed from a Tram Window: Concept of Improvement of Internatsionalnaya Street';
- Zelenogorsk (Krasnoyarsk Territory), the Lake Park project;
- Glazov (Republic of Udmurtia), a project titled 'Cultural Neighbourhood: Kirov Street Improvement Project, Stage 2';
- Zarechny (Penza Region), a project titled 'Zarechye Park: Discover for Yourself'.

Towns (Population of 20,000 to 50,000 People) category

The amount of the grant is RUB 85 million for each town.

Three winners:

- Desnogorsk (Smolensk Region), a project titled 'Landscaping of the Atompark 2 Public Space';
- Novovoronezh (Voronezh Region), a project titled 'Landscaping of the Town Embankment';
- Zarechny (Sverdlovsk Region), a project titled 'Landscaping of the Zarechny Park Public Space'.

In 2022, eight nuclear towns and cities won the 6th National Competition for the Best Projects to Create a Comfortable Urban Environment, which totals 5% of the nationwide figures, 15.6% in the Towns with Population of 50,000 to 100,000 People category and 5.1% in the Towns with Population of 20,000 to 50,000 People category.

A total of RUB 730 million was raised from the federal budget.

Mechanisms for the funding of projects aimed at developing a comfortable urban environment, modern infrastructure and services include the concession mechanism.

As part of efforts to develop services improving the standard of living in towns and cities, an initiative has been launched to develop projects focused on creating modern social infrastructure in nuclear towns and cities using the concession mechanism. Two working groups have been formed; a quadripartite agreement on strategic cooperation has been signed with companies that establish senior centres.

The working groups have determined the focus areas for pilot projects (schools, housing and utilities, cultural facilities, digital economy, senior centres, management of municipal solid waste and medical waste).

Preliminary agreement has been reached with the Government of the Krasnoyarsk Territory to establish a senior centre in the CATF of Zheleznogorsk.

Urban environment quality ratings assigned to nuclear towns and cities

The average urban environment quality rating for 1,117 towns and cities of the Russian Federation in 2022 stood at 192 points[1].

22 out of 27 nuclear towns and cities have been assigned an urban environment quality rating above the benchmark (180 points).

NUCLEAR TOWNS AND CITIES HAVE BEEN ASSIGNED AN URBAN ENVIRONMENT QUALITY RATING ABOVE THE BENCHMARK

More than 80% of nuclear towns and cities have a favourable urban environment. In 2022, the average urban environment quality rating of nuclear towns and cities increased by 10 points compared to 2021 and stood at 205 points. Furthermore, the average rating assigned to closed towns and cities stood at 213 points, while the average rating assigned to open towns and cities stood at 205 points, which indicates a favourable urban environment (a score of up to 180 points indicates an unfavourable urban environment, while a score of 181 points and more indicates a favourable urban environment). In 2022, the average rating assigned to open towns and cities increased by 24 points compared to 2018, when the average urban environment quality rating stood at 175 points, which indicated an unfavourable urban environment.

The highest urban environment quality rating among nuclear towns and cities in 2022 was assigned to the CATF of Sarov, which was given a score of 235 points. The CATF of Lesnoy ranked second with a score of 233 points. The CATF of Zarechny (Penza Region) ranked third with a score of 229 points.

Activities in Usolye-Sibirskoye

In 2022, ROSATOM continued to implement an approved industry-wide project to promote the development of Usolye-Sibirskoye pursuant to Order No. 189-rp of the President of the Russian Federation dated 30 July 2020. The project is scheduled to run until 2024.

The goal of the project is to facilitate the implementation of industry-wide projects in Usolye-Sibirskoye and implement a set of measures between 2021 and 2024 to ensure that Usolye-Sibirskoye contributes to the achievement of seven of the development targets established by Decree No. 68 of the President of the Russian Federation dated 4 February 2021.

1. Methodology for calculating the urban environment quality rating: http://static.government.ru/media/files/wbRiqrDYKeKbPh9FzCHUwWoturf2Ud0G.pdf

The project combines measures aimed at determining and developing the town's economic specialisation and industry-wide social initiatives covering Usolye-Sibirskoye since 2021 (ROSATOM's School, ROSATOM's Territory of Culture, educational projects of ROSATOM's Corporate Academy, etc.).

In addition to the achievement of the main goal, all activities are aimed at creating a favourable environment for restoring the town's chemical manufacturing cluster.

The key outcome of this work were instructions from the Deputy Prime Minister of the Russian Federation, Minister of Industry and Trade Denis Manturov[1] to develop a federal project to establish a Federal Chemical Industry Hub in Usolye-Sibirskoye (Irkutsk Region).

Pursuant to the instructions, strategic sessions were held in 2022 with major producers and consumers of chemicals in the industry, leading scientific, educational and research organisations specialising in the chemical industry in the Russian Federation. The potential for developing the business of JSC Rusatom Greenway at the Usolyekhimprom site was assessed taking into account the construction of the Vostok industrial facility and the establishment of the federal chemical industry hub.

The work initiated in 2022 to identify key measures for the development of the federal project will continue in 2023.

Key results of industry-wide social initiatives in 2022 included the following:

- The Usolye-Sibirskoye Town Festival was organised, which was attended by 12,000 residents of Usolye-Sibirskoye;
- The Atomfest 2022 town sports festival was held, in which 6,200 people took part;
- Funding was provided for the construction of a pump track.

Support for education and culture in the town:

- Repairs were carried out in the building of a school and a kindergarten included in the ROSATOM's School Innovative Network of Educational Organisations;
- Equipment was provided for a chemical laboratory of the Mendeleev class;
- The Running Book educational campaign was conducted, in which 100 people took part;
- Online classes were provided for 4,000 residents of Usolye-Sibirskoye;
- 80 college and school teachers completed training and advanced training (remotely and in person) as part of the ROSATOM's School programme;
- 50 students and schoolchildren from the town took part in AtomSkills / WorldSkills competitions;
- A competition of volunteer and social projects was held; 25 applications were processed, and grants were awarded to the winners in January 2023.

Healthcare development in nuclear towns and cities

In 2022, work continued to prevent the spread of COVID-19 in nuclear towns and cities and in enterprises in the industry. 88% of ROSATOM's employees were vaccinated and received booster shots, and 75% of local residents were vaccinated.

1. Instructions No. MD-P9-16735 dated 5 October 2022.

In 2022, ROSATOM and the Federal Medical and Biological Agency (FMBA) of Russia launched a joint project to upgrade primary healthcare in the Corporation's host towns and cities; the aim of the project is to implement a modern organisational model for municipal, onsite and children's clinics which is based on the principles of accessibility, openness and the use of state-of-the-art technologies.

The project has been piloted in Sarov, Snezhinsk, Dimitrovgrad, Novouralsk and Desnogorsk. In 2022, RUB 426.9 million was allocated for the project by ROSATOM, and RUB 882.9 million was allocated by the FMBA of Russia.

Healthcare institutions in pilot regions have met the 'basic' criteria set as part of a federal project titled 'New Model of a Healthcare Institution', which has produced the following transformation effects:

- The amount of time required for employees to undergo regular and pre-shift medical examinations has been halved;
- The waiting time for scheduled hospital admission has been reduced three-fold;
- The waiting time for receiving information has been reduced five-fold;
- New operating standards have been implemented for reception areas in organisations of the FMBA of Russia.

Major repairs have been carried out in municipal, children's and onsite clinics with a total floor area of 5,789 m^2. The required medical furniture, medical equipment and specialised vehicles have been purchased.

One of the indicators characterising the accessibility of medical care is the availability of medical personnel to the population. As part of the project, personnel training and retraining programmes have been developed and approved. 13 apartments have been purchased in the towns and cities for arriving medical specialists. Joint efforts made it possible to attract 68 medical specialists in 2022, including 21 under the Rural Doctor programme. The target (75%) for the availability of medical personnel, taking into account a ratio of positions to personnel numbers of 1.2, was achieved in Sarov, Dimitrovgrad and Desnogorsk. In Snezhinsk and Novouralsk, this figure stood at 73% and 71% respectively.

This set of measures has made it possible to increase the level of satisfaction of local residents with the medical care provided to them to 61% (2021: 36%).

4.3. CONTRIBUTION TO THE ECONOMY

4.3.1. Improving the management of nuclear towns and cities

Implementation of agreements with constituent entities of the Russian Federation in 2022

The Corporation enters into cooperation agreements with constituent entities of the Russian Federation to support their participation in the development of nuclear towns and cities and implementation of investment programmes and projects.

As part of implementation of the agreements, in 2022, programmes were approved to promote social and economic development of nuclear towns and cities. They had been developed by municipalities in coordination with ROSATOM's organisations.

Implementation of the Corporation's agreements with regions in 2022

Funded activities by focus area (as at 31 December 2022)	2022 (RUB million)	Share in total funding, %
Capital construction (renovation)	1,566.6	45.2
Major repairs of infrastructure facilities (housing and utilities)	124.8	3.6
Urban improvement	1,236.7	35.7
Major repairs of residential buildings and buildings of state-funded organisations	289.5	8.4
Support for education, culture and sports programmes	214.3	6.2
Support for small and medium-sized enterprises	32.0	0.9
Total	**3,464.0**	**100.0**

Between 2013 and 2022, organisations forming part of ROSATOM's CTG transferred RUB 465.3 billion to the budgets of the constituent entities of the Russian Federation with which such agreements had been signed. This includes additional tax payments for the period totalling RUB 222.5 billion.

RUB 27.3 billion was allocated for the implementation of activities under the agreements between 2013 and 2022.

Funding of initiatives between 2013 and 2022 by expenditure item.

Focus areas of funded initiatives	Amount, RUB million	Share in total funding, %
Capital construction (renovation)	9,995.6	36.6
Major repairs of infrastructure facilities (housing and utilities)	2,583.0	9.4
Urban improvement	5,737.2	21.0
Major repairs of residential buildings and buildings of state-funded organisations	4,001.4	14.7
Support for education, culture and sports programmes	1,846.8	6.8
Support for small and medium-sized enterprises	1,076.2	3.9
Providing support to local budgets to maintain the financial stability of housing and utility organisations	2,062.0	7.6
Total	**27,302.2**	**100.0**

The institution of the CTG has been abolished as from 1 January 2023. The Corporation is preparing for the signing of new cooperation agreements with constituent entities of the Russian Federation which provide for their involvement in the development of ROSATOM's regions of operation and support for the implementation of investment programmes and projects as part of ROSATOM's strategy, as well as the implementation of measures aimed at achieving the goals set in Decree No. 474 of the President of the Russian Federation dated 21 July 2020 on the National Development Goals of the Russian Federation.

GRI 203-2

Priority development areas (PDAs)

Priority development areas (PDAs) have been created under the resolution of the Government of the Russian Federation in eight out of 10 CATFs where ROSATOM operates (Sarov in the Nizhny Novgorod Region; Ozersk and Snezhinsk in the Chelyabinsk Region; Lesnoy and Novouralsk in the Sverdlovsk Region; Zarechny in the Penza Region, Seversk in the Tomsk Region, and Zheleznogorsk in the Krasnoyarsk Territory) in order to preserve competences and maintain a high level of social and economic development in nuclear towns and cities.

In 2022, the management company JSC ATOM-TOR started to provide support to PDAs in single-industry towns and cities where the Corporation's enterprises operate: Glazov in the Udmurt Republic, Dimitrovgrad in the Ulyanovsk Region, Krasnokamensk in the Zabaykalsky Territory, and Usolye-Sibirskoye in the Irkutsk Region.

At year-end, the number of registered resident companies in all of ROSATOM's PDAs, including single-industry towns and cities, totalled 160 companies; investments under agreements grew to RUB 75.9 billion, and the number of new jobs to be created by the resident companies reached 9,397.

Number of registered resident companies and total investment in PDAs in CATFs and single-industry towns and cities (as at 31 December 2022)

CATFs / PDAs	Number of resident companies	Investment, RUB million		Number of jobs		Taxes and customs duties paid, RUB million	Benefits, RUB million
		Stipulated in the agreement	Actual	Stipulated in the agreement	Actual	Actual	Actual
CATFs, total	87	55,350.2	4,595.2	3,379	1,618	625.9	333.0
Single-industry towns and cities, total	73	20,621.0	4,769.4	6,018	4,771	1,377.2	665.1
TOTAL	**160**	**75,971.2**	**9,364.6**	**9,397**	**6,389**	**2,003.1**	**998.1**

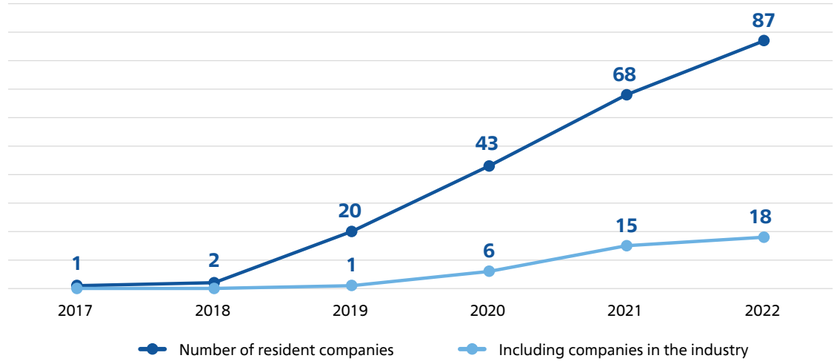
Services provided to resident companies include the following:

- Construction, development and operation of PDA infrastructure;
- Provision of property for the sites;
- Granting of the PDA resident status;
- Provision of resident companies with land plots;
- Comprehensive support of resident companies' projects;
- Promotion of resident companies' products and assistance in entering new markets;
- Advisory support (obtaining the supplier status, etc.);
- Organisation of events for resident companies (round-table discussions, conferences, etc.).

Thanks to a systematic approach to investor relations, the number of PDA residents in closed nuclear towns and cities has increased from two in 2019 to 87 at present. During 2022, 23 new resident companies were attracted.

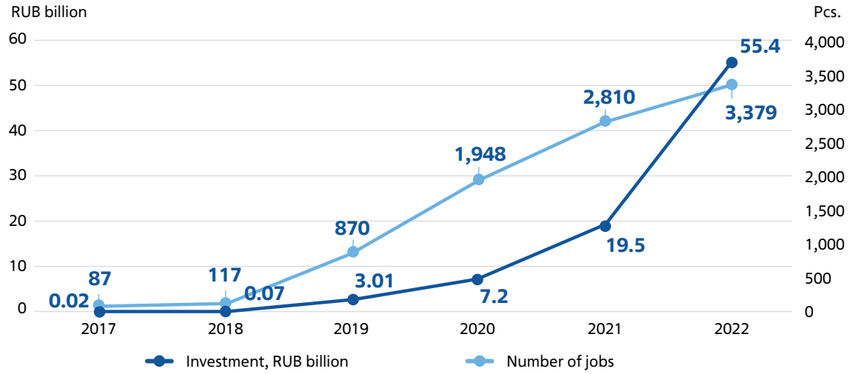
GRI 203-2

Growth of the number of PDA residents in CATFs



Planned investments by PDA residents in the CATFs will total RUB 55.4 billion, and 3,379 new jobs are to be created.

Growth of investments and the number of jobs created under agreements



Business plans for 28 potential residents are being prepared.

Supplementary agreements were signed for 21% of the projects, including those providing for a significant increase in project parameters.

In 2022, the area of the PDAs was expanded by 166 hectares.

Success stories

Enterprises in various segments are successfully developing in almost all of ROSATOM's PDAs in CATFs.

Examples of the largest investment projects (RUB 250 million or more):

Project name	Aim of the project	Investment, RUB billion	Number of jobs
RG-Western Siberia (Seversk PDA)	Building an environmental technology park for the treatment and recycling of hazard class 1 and 2 waste	20.2	250
MikAtom (Seversk PDA)	Launch of batch production of gallium nitride electronic components	18	251
Siberian Titanium (Seversk PDA)	Launch of production of titanium dioxide pigment based on the fluoride process	5.5	99
Aurora Chemicals (Seversk PDA)	Development of technologies for the production of fluorine-containing products for the nuclear fuel cycle	4.4	59
EcoAlliance (Novouralsk PDA)	Manufacture of automotive catalysts	2.6	18
Tefra (Seversk PDA)	Processing of ash and slag waste from coal-fired combined heat and power plants	431.6	55
CentroTech Research and Production Association (Novouralsk PDA)	Modernisation of production facilities, pilot R&D site for the development of electrolysis units	405.1	203
Industrial Equipment Plant (Seversk PDA)	Manufacture of loader excavators	300.0	91
Atommashcomplex (Novouralsk PDA)	Launch of production of pipe assemblies (up to 650 mm)	251.5	138
Medtekhnologii-N (Novouralsk PDA)	Launch of Russia-based production of automatic microbiological analysers and vials with a growth medium for the needs of healthcare institutions	251.0	51
AK-PROF (Zarechny PDA)	Production and painting of aluminium alloy extrusions	250.0	50
NPK VAB-70 (Seversk PDA)	Establishment of a modern machinery factory	250.0	150
Standartstroy (Zarechny PDA)	Establishment of an industrial facility to produce construction materials	248.9	100

ROSATOM's representative offices in federal districts

In September 2022, a network of ROSATOM's Representative Offices was created under Private Institution Atom-Region in federal districts of the Russian Federation in order to promote civilian products of ROSATOM and its integrators on regional markets.

During the four months since the establishment of the new entity, 57 meetings were held with representatives of regional governments, as well as 10 quadripartite meetings involving ROSATOM's integrators, representatives of the coordination centre, directors of the Corporation's representative offices in the federal districts and representatives of regional governments. Meetings with the authorities of constituent entities of the Russian Federation were held to discuss the promotion of products of the following organisations: the Nuclear Weapons Division (civilian products), JSC Rusatom Infrastructure Solutions, JSC Rusatom Healthcare, JSC NovaWind, JSC Atomenergomash, JSC Medscan, LLC Rusatom Digital Solutions, Private Enterprise Cifrum (ROSATOM's digital products), etc.

An agreement has been reached to discuss the matter of servicing traction batteries in the Sakhalin Region and to hold trilateral negotiations in 2023. The construction of medium-sized NPPs in the Primorsky and Khabarovsk Territories is being discussed.

In the Republic of Bashkortostan, negotiations are underway for JSC Rusatom Healthcare to continue the construction of a medical facility. The construction of a campus at Novosibirsk State University is being negotiated jointly with the NWD.

As a result of a meeting in the Government of the Republic of Tyva, agreement has been reached to discuss the start of mining at a number of mineral deposits in the Republic, as well as the construction of the necessary infrastructure.

At the same time, the Representative Offices in the federal districts have examined the matter of conducting business missions in Russian regions in 2023, including in the Krasnodar and Krasnoyarsk Territories and the Novosibirsk Region.

JSC Rosenergoatom is taking part in developing a plan to systematically develop charging infrastructure in the regions and to make ROSATOM's charging infrastructure available in constituent entities of the Russian Federation.

In addition, the Representative Offices in federal districts have compiled information on promising start-ups and developments in regional universities in areas that may be of interest to JSC InnoHub, JSC Rusatom Healthcare and other divisions of the Corporation.

Sixth Forum of Towns and Cities with High Science and Technology Potential in Russia

In 2022, the 6th Forum of Towns and Cities with High Science and Technology Potential was structured as a series of expert discussions that were distributed over time (during the first six months of the year) and held in various Russian cities (Moscow, Cherepovets, Obninsk and Sevastopol).

Partners of the Forum organised by ROSATOM in 2022 included large industrial enterprises, the Commission of the Civic Chamber of the Russian Federation for Economic Development and Corporate Social Responsibility, and deputies of the State Duma of the Russian Federation.

Regular expert engagement involved contacts not only at the level of partner companies, but also at the level of host towns and cities. In June 2022, a business visit to the city of Cherepovets was organised. During the visit, the participants were provided with an overview of best practices of cooperation and communication between businesses and the municipal government, the practices of economic integration of resources of large and medium-sized enterprises in order to improve the standard of living in the city and provide employment for the core working-age population.

In July 2022, the Archipelago 2022 Project and Educational Workshop was held, which was focused on the technological foresight for the next 10 years. Its participants included management teams comprising leaders of various professions and specialisations from constituent entities of the Russian Federation.

In accordance with the decision of the Supervisory Board of the Agency for Strategic Initiatives, the Corporation assisted in the preparation of pilot projects focused on service and infrastructure development in towns and cities (15 pilot towns and cities, all of which have high science and technology potential).

The 6th Forum of Towns and Cities concluded with an expert discussion forming part of the Archipelago 2022 Project and Educational Workshop. The participants of the Forum searched for solutions that will help to ensure Russia's technological sovereignty and strategic leadership in the long term through a service- and infrastructure-oriented approach to cooperation with regions. Discussion at the forum centred on the results achieved as part of the track of regional development teams, best practices of leading Russian corporations in the development of their regions of operation, as well as the possibility of incorporating products and solutions offered by technological leaders participating in the National Technology Initiative into services provided for population.

4.3.2. ROSATOM's impact on other areas of development in nuclear towns and cities

ROSATOM's organisations make significant contributions to budget revenue in nuclear towns and cities. The Corporation is a major taxpayer in Russia. In 2022, it paid RUB 291.4 billion to budgets of all levels..

Generating employment through NPP construction

The construction and commissioning of nuclear facilities, including NPP power units, create new jobs, as organisations often hire employees from local communities.

Employment in key NPP construction projects (as at 31 December 2022)

Region	Actual headcount, including contractor organisations, persons (2022)	Including employees recruited from local communities, persons* (2022)	Number of local building contractors engaged in construction between 2020 and 2022
Russia (Kursk NPP-2**)	9,439	8,426	31
Foreign NPPs (Belarusian NPP, Rooppur, El Dabaa, Paks)	31,432	23,154	34
TOTAL	**40,871**	**31,580**	**65**

* Employees who are nationals of the countries where the NPPs are being built.
** The figure for Kursk NPP-2 represents the number of employees who are Russian nationals.

4.4. SOCIAL DEVELOPMENT

Improving the standard of living in towns and cities is one of the top priorities of ROSATOM's strategic agenda.

ROSATOM's School

As part of the project titled 'ROSATOM's School', in 2022, systematic work was organised to design effective education models for preschoolers and schoolchildren; this involves using a mobile application, Russia Begins Here, developed as part of the project. It enables children and adults to work together to develop a value-based understanding of such concepts as 'Motherland', 'one's birthplace', 'compatriot', 'citizen of the country'. Two campaigns were held covering 100% of towns and cities participating in the project. Towns and cities participating in the Atom Class programme across the country, from Kamchatka to Kaliningrad, also joined the campaign.

As part of the campaign, in the reporting year, 10 AR objects were created based on sketches made by children's teams. Members of winning teams participating in the campaign took part in an educational event, New Year with ROSATOM's School, in December 2022. They will also participate as co-organisers of the campaign titled 'Russia Begins Here' as part of industry shifts for gifted children from ROSATOM's host towns and cities at the Orlyonok Russian Children's Centre and the Artek International Children's Centre in 2023.

The Corporation has implemented a pilot project titled 'Together across Our Russia', which involved schoolchildren from its host towns and cities working together to design an educational and tourist route for exploring the country and conducting creative volunteer events at its destination. Two teams from Volgodonsk and Sarov, who became the winners of the pilot project, qualified for an educational trip.

In the reporting year, as part of a focus area titled 'Design of Digital Didactics to Make Education More Efficient', more than 50 remote events were held for students of the Atom Class Network of ROSATOM's School, with more than 5,000 schoolchildren participating in the events. The events are aimed at developing the formats and content of subject-oriented teaching of students in mathematics, physics, chemistry, biology and computer science and at developing students' transferrable skills such as teamwork, the ability to leverage up-to-date knowledge, process information, communicate successfully, etc.

To support and develop children's talents, over 60 events were held in a variety of areas: the Project School, the Snowy Cartoons festival for preschoolers, the Spaceball Championship for Preschoolers, the Engineering and Technology Festival, the Metadisciplinary Academic Competition, as well as a wide range of competitions for preschoolers and schoolchildren. A total of over 25,000 children and over 400 educational institutions from all 23 towns and cities participating in the project took part in the events. The models used in these events are being rolled out in the towns and cities as formats for their own municipal initiatives aimed at developing children's talents.

As part of ROSATOM's School, annual events are held to develop children's creative talents:

- A Festival of Original Music and Poetry 'U-235. New Songs' (for children aged between 5 and 18);
- The Olympus Theatre Art Festival of School Theatre Groups (for children aged between 7 and 18);
- The Snowy Cartoons Festival of Children's Animation (for children aged between 3 and 11).

These events held on an annual basis have determined the relevant focus areas for educational institutions.

At year-end 2022, the Innovative Network of Educational Organisations included 10 schools that had been selected on a competitive basis and had introduced technologies that help to ensure the fullest possible compliance with the requirements of Federal State Educational Standards (FSES) for general education

levels (the CATFs of Zarechny, Novouralsk, Sarov, Zelenogorsk, Tryokhgorny, Novouralsk, Snezhinsk and Lesnoy (two schools), and the town of Usolye-Sibirskoye).

Each of the schools received RUB 12 million over three years to equip the OpenSpace state-of-the-art high-technology open space, with equal amounts of funding provided by the municipality and ROSATOM's School. In 2022, equipment was provided for two out of ten schools forming part of the Innovative Network (Municipal State-Funded Educational Institution General Secondary School No. 64 in Lesnoy and Municipal State-Funded Educational Institution Gymnasium No. 9 in Usolye-Sibirskoye). The provision of equipment for these schools will continue in 2023.

In 2022, the staff of all ten educational institutions received training to prepare for the introduction of effective Russian technologies that ensure the fullest possible compliance with FSES requirements for general education levels. All 10 schools forming part of the Innovative Network are currently leaders in the educational systems in their respective towns and cities and constituent entities of the Russian Federation. Two schools received recognition at the federal level and were ranked in the top 30 schools in the Big Break competition, a presidential platform project: Municipal Autonomous Educational Institution Lyceum in Lesnoy (in 2020, 2021 and 2022) and Municipal State-Funded Educational Institution Gymnasium No. 2 in Sarov (in 2022).

Municipal State-Funded Educational Institution General Secondary School No. 135 in Snezhinsk and Municipal State-Funded Educational Institution General Secondary School No. 109 in Tryokhgorny served as regional innovation platforms. Absolutely all schools forming part of the Innovative Network have become regional reference platforms for the implementation of effective educational technologies in general education, which reflects the recognition of the credibility of the Innovative Network at the level of constituent entities of the Russian Federation.

At year-end 2022, the Innovative Network of Educational Organisations included 16 kindergartens that had been selected on a competitive basis and had introduced technologies that help to ensure the fullest possible compliance with the requirements of Federal State Educational Standards for preschool education.

Each of the kindergartens forming part of the Innovative Network received RUB 6 million over three years to equip the OpenSpace state-of-the-art high-technology open space, with equal amounts of funding provided by the municipality and ROSATOM's School. In 2022, equipment was provided for seven out of 16 kindergartens forming part of the Innovative Network (in Polyarnye Zori, Usolye-Sibirskoye, Dimitrovgrad, Lesnoy, Zarechny (Sverdlovsk Region), Tryokhgorny and Sarov).

In the reporting year, the staff of all 16 educational institutions received training to prepare for the introduction of effective Russian technologies that ensure the fullest possible compliance with FSES requirements for preschool education. All 16 kindergartens forming part of the Innovative Network are currently leaders in the educational systems in their respective towns and cities and constituent entities of the Russian Federation.

The participants of the ROSATOM's School Innovative Network (16 kindergartens and 10 schools) arrange practical training for teachers from their towns and cities and the relevant constituent entities of the Russian Federation and for teachers from all towns and cities participating in the ROSATOM's School project.

ROSATOM's Territory of Culture programme

Launched 15 years ago, the programme titled 'ROSATOM's Territory of Culture' includes projects involving famous artists and ensembles, workshops held by leading experts, educational and awareness campaigns, large-scale social and cultural projects, some of which have expanded beyond nuclear towns and cities and have become a major nationwide phenomenon. The programme also involves providing methodological assistance to theatres, museums, libraries and other cultural institutions in nuclear towns and cities, implementing innovative managerial and strategic decisions, holding professional development events for specialists in the relevant areas of expertise to enable gradual modernisation in the sphere of culture 'from the inside'.

In 2022, as part of the programme, a total of more than 100 events of various scale were held across various areas, styles and genres. An official celebration of the 15th anniversary of ROSATOM's Territory of Culture was held in the form of a gala concert at the Et Cetera Theatre in Moscow. The key project in the sphere of musical education in 2022 was the 5th Music Academy of Nuclear Towns and Cities under the auspices of Yuri Bashmet in Obninsk. 2022 saw the launch of a collaboration between ROSATOM's Territory of Culture and the State Museum and Exhibition Centre ROSIZO, which resulted in a major exhibition project run in a number of nuclear towns and cities.

#ROSATOMVMESTE ('ROSATOM Together') competition of social projects

In 2022, the competition programme included three focus areas: the competition of social projects, the Urban Project competition and the Day of Nuclear Towns and Cities.

The competition of social projects featured 49 video interviews with social project coordinators, which garnered a total of 78,500 views. The competition of social projects was won by the coordinator of the School Science Parks project from Novouralsk.

18 towns and cities participated in the Urban Project competition. About 490,000 people voted for the best urban project. The competition was won by the town of Novouralsk with a project titled 'Movement with ROSATOM'.

The Day of Nuclear Towns and Cities was held online in 2022.

Official website of the #ROSATOMVMESTE project:

Website of the 'Glory to Creators' competition:

Website of the Best Municipal Practices project:

'Glory to Creators!' National Creativity Competition

This is a communication project involving both senior citizens and young people. Its goal is to preserve the memory of the residents of ROSATOM's host towns and cities who have contributed to the establishment and development of the nuclear industry and nuclear towns and cities.

Since 2021, the competition has been held online on the VKontakte social media platform. This year there were two categories in the competition: 'Just like the Creator' and 'A Comic about the Creator', in which 1,056 and 405 schoolchildren competed respectively. Every year, the Parades of Creators are held in nuclear towns and cities, featuring the heroes and authors of creative works. Since the launch of the competition, more than 14,500 video interviews and video stories have been filmed (the total reach of the competition has exceeded 63,000 people); 23,500 essays have been written, and more than 3,000 online applications have been submitted via the VKontakte platform

Best Municipal Practices competition

The competition has been held since 2017, with 27 nuclear towns and cities participating every year. Since the launch of the competition, a total of 508 practices and initiatives focused on social and economic development have been submitted; over 23 training events have been held for leaders of municipal practices. 34 practices have been declared winners and received financial support.

Citizen of ROSATOM's Country project

The key objective of the project is to enable effective communication between governments and the public to promote the development of 28 nuclear towns and cities. Information is posted on the official portal of the project and is made available via the Grazhdanin Strany ROSATOM ('Citizen of ROSATOM's Country'; GSR) mobile application, which serve as permanent discussion platforms for the community of proactive citizens. The project has been run since 2016. The application was launched in 2019. Between 2020 and 2022, about 160 online quizzes were held using the GSR application, with more than 25,000 participants. The media platforms of the project contain both news items and background information on current events in the towns and cities.

Official website of the Citizen of ROSATOM's Country project:

Social Design: Accelerator of Social Projects

Representatives of 13 nuclear towns and cities took part in the project in 2022. 318 social projects were presented as part of the Accelerator. 108 best social projects received financial support in the form of grants.

GRI 203-2

School for Leaders training programme

The programme is targeted at representatives of the nuclear industry, senior municipal officials and representatives of local governments. Its aim is to improve core management competences. The training programme was launched in 2020. More than 100 senior municipal officials of ROSATOM's regions of operation have participated in the project.

Training website of the School for Leaders programme:

In 2022, educational materials were developed which are designed to support the development of professional skills and new competences and improve the performance of representatives of the nuclear industry and local governments; these included materials on the following topics: 'Urban Development and Participatory Budgeting' and 'Urban Landscape Development'. An online forum titled 'Self-Employment as a Trend of the Future' was held to discuss topical issues of participation of self-employed individuals in government contracts and procurement, measures to support self-employed individuals, as well as successful practices for the development of self-employment in ROSATOM's regions of operation.

Atomic Quiz project

In 2022, about 8,000 people registered to participate in the project, including about 3,500 residents of nuclear towns and cities. Residents of Volgodonsk, Glazov and Balakovo showed the greatest interest in the project. More than 4,300 people successfully completed the quiz and were awarded diplomas.

School: Third Age – the Whole World Ahead

The project titled 'School: Third Age – the Whole World Ahead' is aimed at encouraging senior citizens to be socially active in order to implement social projects, find opportunities to acquire new knowledge and skills and generate new employment ideas, and develop creative abilities.

The project has been run since 2019 in 13 nuclear towns and cities. More than 700 people have participated in the project. In 2022, 173 online and offline meetings were arranged and held for the participants of the project, and two handbooks titled 'Handicraft Therapy' and 'Windowsill Gardening for Beginners' were developed.

Atomic Workout project

The Atomic Workout project is designed to promote a healthy lifestyle by offering local residents an accessible way to exercise and do sports in the courtyards, parks and sports grounds near their homes.

The tournament programme includes power workout competitions, prize contests with spectators, workshops and a show programme by the Russian Street Workout Federation. The project has been run since 2018. In 2022, eight nuclear towns and cities took part in the project, and over 5,500 people participated in more than 50 competitions.

In 2022, the project finals were held in Glazov. The runners-up were from Snezhinsk and Zheleznogorsk, and an athlete from Novouralsk won the top prize.

GRI 2-29

4.5. Work of ROSATOM's Public Council and Community Relations

ROSATOM's Public Council was established in 2006 as a collective expert body tasked with providing support for communication and cooperation between the Corporation's organisations and individuals, non-profit organisations, regional and local governments in Russia and abroad.

The Public Council includes representatives of the Corporation, the scientific community, non-governmental and environmental organisations. The Council members work on a pro bono basis. The Public Council is chaired by ROSATOM's Director General.

The work of the Public Council is governed by the Regulations on ROSATOM's Public Council, as well as by the Constitution of the Russian Federation, universally recognised principles and norms of international law, federal laws and other regulations of the Russian Federation.

Key areas of work of the Public Council include:

- Organising annual meetings of ROSATOM's representatives with government bodies and the general public represented by international and Russian civic organisations;
- Implementing socially important projects in nuclear towns and cities;
- Publishing and circulating research and popular science publications on the peaceful use of nuclear energy;
- Arranging visits to Russian and overseas nuclear facilities in order to study experience in the field of nuclear and radiation safety, environmental protection, engagement with regional and local governments and community relations.

Official website of ROSATOM'S Public Council:

Since 2021, the Public Council has acted as a public advisory board under the programme titled 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024'.

As part of virtual meetings, members of the Public Council led by ROSATOM's Director General performed nine public reviews of various areas of the programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024', as stipulated by Decree No. 270 of the President of the Russian Federation dated 16 April 2020 on the Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation, as well as federal projects forming part of the programme.

In 2022, ROSATOM's Public Council held two in-person and eight virtual meetings.

Since 2020, the Public Council has acted as a public advisory board under the programme titled 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024'; in addition, since 2022, it has acted as a public advisory board for the following federal projects: 'Construction of New and Modernisation of Existing Power Units', 'Construction of Nuclear Power Plants Abroad' and 'Establishment of the National Centre for Physics and Mathematics', which are not included in national projects.

As part of virtual meetings, members of the Public Council led by ROSATOM's Director General performed eight public reviews of various areas of the programme 'Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation until 2024', as stipulated by Decree No. 270 of the President of the Russian Federation dated 16 April 2020 on the Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation, as well as federal projects forming part of the programme and federal projects outside the scope of the programme.

In 2022, ROSATOM's Public Council and the Russian Society of Nature Protection (VOOP) signed a Memorandum of Cooperation in the Implementation of Projects and Environmental Initiatives.

A programme titled 'Russia's Unique Water Bodies' launched under the Memorandum in 2022 in 19 regions of Russia has become a successful joint project. Federal experts on ecology, representatives of local environmental NGOs, regional and local governments, ROSATOM and its organisations participated in holding technical tours, round-table discussions, excursions and environmental campaigns in Novovoronezh, Ozersk, Polyarnye Zori, Sarov and Sosnovy Bor, with more than 1,500 people involved in environmental activities, including students, employees of nuclear organisations and members of the general public.

In 2022, there were five permanent commissions under the Public Council: the Healthcare Commission, the Regional Development Commission, the Environmental Commission, the Commission on the Russian Arctic and the Northern Sea Route, and the International Affairs Commission.

Healthcare Commission

The Healthcare Commission, its working groups and experts, with the active involvement of the Russian Union of Patients' Public Societies and in cooperation with ROSATOM and the Federal Medical and Biological Agency of Russia, manage initiatives to identify the most pressing issues of the healthcare system in ROSATOM's host towns and cities and to find mechanisms for addressing them.

Between 2018 and 2022, the Commission implemented the Right to Health project supported by the Presidential Grants Foundation and the Russian Union of Patients' Public Societies. The third stage of this project was implemented in the Far North and the Arctic. One of the starting points of the project was an expert opinion survey titled 'Problems of Interaction between Patients and the Healthcare System in the Regions of the Far North and the Russian Arctic and Resources for Addressing Them'. It was aimed at assessing the availability of medical care for the population of the northern regions, identifying problem areas and opportunities to improve the quality of healthcare.

On 23 November 2022, a round-table discussion titled 'Development of Patient-Oriented Healthcare in ROSATOM's Regions of Operation, including in the Far North and the Russian Arctic' was held at the venue of the 13th National Congress of Patients 'Development Trajectory: Patient-Oriented Healthcare'.

Cooperation between the Commission members and heads of the Community Liaison Offices of the Public Council at the 13th National Congress of Patients

ROSATOM's Public Council

Healthcare Commission under the Public Council

Regional working groups

Regional action groups

Community liaison offices of ROSATOM's Public Council

COOPERATION

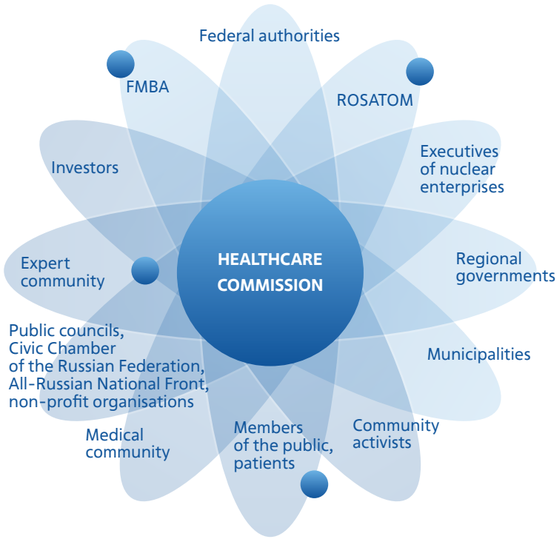
Representatives of medical units of the FMBA in the regions

Representatives of municipal governments

Representatives of civil society organisations and citizen activists

Representatives of regional media outlets and TV channels

Goal: to pool the resources of experts, the patient community, government bodies, the Corporation and its partners in order to improve healthcare in the regions



Scope:
6 working groups, 6 action groups

Human resources:
140 experts

In 2021, a joint project was launched to improve the quality and accessibility of medical care in ROSATOM's host towns and cities. Its funding totalled RUB 1,306.8 million. Five healthcare organisations under the FMBA of Russia participated in the project, and five more healthcare organisations will join the project

in 2023. Long-term plans include the construction of industrial medicine centres, repairs to outpatient clinics, the construction of housing for medical personnel, and the purchase of diagnostic equipment with financial support from ROSATOM and the FMBA of Russia. In 2022, the Healthcare Commission of the Public Council provided public oversight of the implementation of the project.

Environmental Commission

ROSATOM takes an active part in the implementation of the Ecology National Project and is involved in three federal projects forming part of the Ecology National Project: Infrastructure for the Management of Hazard Class 1 and 2 Waste, Clean Country and Preservation of Lake Baikal. The Environmental Commission actively assisted in organising over 45 events involving the general public and in conducting public reviews of ROSATOM's project implementation.

Traditionally, the Working Group on the Safe Management of Radioactive Waste and Spent Nuclear Fuel and Decommissioning of Facilities Posing Nuclear and Radiation Hazards functions under the Environmental Commission.

In order to improve transparency and public oversight and raise awareness among local communities, public monitoring of the system for permanent isolation of radioactive waste and for ensuring that its storage is safe for local residents and the environment was conducted in 2022.

A conference held on 15 and 16 November in Murmansk was devoted to the results of efforts to eliminate the nuclear legacy in the North-West. It was organised by ROSATOM's Public Council and the Directorate for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning. On the first day of the conference, presentations were made by ROSATOM's representatives, specialists from the relevant enterprises and scientists from the Kola Branch of the Russian Academy of Sciences. On the second day, a technical tour of Andreev Bay was organised for the conference participants, where specialists from the North-West Centre for Radioactive Waste Management (SevRAO) provided the conference participants with a detailed overview of the results of the work performed at the site and plans for the future.

An expert opinion of epidemiologists was obtained to confirm the compliance of the site with the requirements of sanitary regulations. The participants and experts attending the event confirmed the high importance of projects to eliminate the nuclear legacy, especially in such a densely populated city as Moscow, and noted the significant contribution of the Programme to improving the country's environmental safety.

In 2022, activities hosted by the EcoStart platform, a unique educational environmental platform designed to help schoolchildren and students to develop project- and technology-oriented thinking, were conducted in the CATF of Novouralsk (Sverdlovsk Region). Schoolchildren and students from 11 educational institutions of Novouralsk take part in the platform's activities. Research, methodological, informational and organisational support for project activities of the platform's participants is provided by the Environmental Projects Consulting Institute (Autonomous Non-Profit Organisation), the Novouralsk Administration, JSC UEIP, FSUE National Operator for Radioactive Waste Management (NO RWM) in Novouralsk, MUE Vodokanal, etc. In 2022, the participants of the EcoStart platform independently identified the town's current environmental problems and began to develop more than 20 youth environmental research projects, 12 of which were presented at the final town-wide conference. The final conference was attended by 50 participants, including schoolchildren, teachers, students, representatives of the town administration and enterprises. Educational, research and practical events were held as part of the EcoStart platform; these included video conferences to discuss youth project initiatives aimed at addressing current urban environmental problems, practical research training, a colloquium and research consultations aimed at helping schoolchildren and students to develop project-oriented skills in the field of environmental protection and in the social sphere.

In 2023, the Environmental Commission will review not only the traditional areas of the Corporation's business in the field of nuclear power development, but also advanced new areas, such as wind power, innovative materials and digital software products. The Commission will place a special emphasis on ROSATOM's environmental and educational projects.

Regional Development Commission

In 2022, two meetings were held with academics and industry researchers to discuss the prospects of sustainable development of nuclear towns and cities. Forming an expert community and establishing an expert agenda is a vital prerequisite for successful implementation of spatial and regional development models in the current environment. Approaches to the work of the Commission were developed for 2023. They can be generally described as the Knowledge Community, which involves leveraging collective mechanisms and points of convergence for the expert community whose members have, among other things, practical experience and empirical knowledge across a variety of human activities such as business, philosophy, design, ecology and economics, in order to identify areas for the development of nuclear towns and cities.

Presentations and discussions on the application of an infrastructure- and service-oriented approach to the development of towns and cities with high science and technology potential were hosted by the Civic Chamber, the Agency for Strategic Initiatives and the Centre for Strategic Research. A presentation was made at the Strategic Planning Leaders Forum in Saint Petersburg. Work with local communities and indigenous peoples of the North was started. A specialised round-table discussion was organised as part the business programme of the Art and Industry Exhibition in 2022. As part of the Priority 2030 programme, MGIMO University prepared a research paper titled 'Consequences and Impact of the COVID-19 Pandemic on the Population in the Arctic'.

Commission on the Russian Arctic and the NSR

In 2022, the Commission focused on research and environmental safety monitoring above and below water along the Northern Sea Route (NSR), as well as public oversight of the implementation of the instructions of the President of the Russian Federation to approve the NSR development plan until 2035. The Commission members were provided with progress updates on the implementation of the NSR development plan, including the construction of the icebreaker fleet, the performance of the Marine Operations Headquarters, the performance of the hydrographic enterprise, the renovation of port infrastructure, etc. A separate report was made on the roll-out of an integrated platform for digital services provided along the NSR.

In 2022, a cooperation agreement was signed between ROSATOM and the Marine Research Centre of Lomonosov Moscow State University. The purpose of the cooperation agreement is to continue comprehensive research and environmental safety monitoring above and below water in the Arctic waters of the Russian Federation in 2022 and 2023. The efforts of the Marine Research Centre of Lomonosov Moscow State University and the international expert community made it possible to carry out unique comprehensive studies at 50 monitoring stations along the NSR in 2021 and 2022. The key conclusion based on the findings of these studies is that commercial shipping does not currently have any significant impact on marine ecosystems in the Arctic. Research carried out this year will inform the development of a comprehensive environmental monitoring programme covering the NSR, which is expected to form the basis of a separate state environmental monitoring subsystem.

In 2022, the Commission members made a technical tour to Murmansk. During the tour, they visited the *Arktika* icebreaker, which is the flagship of the Russian nuclear-powered fleet, and were provided with an overview of the activities of the Marine Operations Headquarters.

International Affairs Commission

As part of cooperation between Russia and Belarus in addressing a set of tasks related to ensuring nuclear and radiation safety, including at nuclear legacy sites that have emerged as a result of the Chernobyl disaster, a visit of Russian experts and members of ROSATOM's Public Council to Belarus was organised.

Matters reviewed in the reporting year included setting safety requirements for RAW management at NPPs, and adopted approaches to establishing a national operator responsible for RAW management in the Russian Federation and for the construction and operation of RAW disposal facilities.

During the visit, proposals concerning certain areas of cooperation were discussed, a number of measures were proposed for implementation as part of developing a new programme of the Union State, and approaches to the regulation of activities in radiation-contaminated areas were considered.

The delegates visited the Polesye State Radioecological Reserve in the Belarusian sector of the Chernobyl Exclusion Zone. In addition to working consultations, the guests were provided with an overview of the results of activities carried out in the Reserve over more than 30 years. Visits to research facilities, a firefighting station, a museum, a horse farm and a bison farm forming part of the Reserve were organised, and an overview of its facilities and equipment was provided. Representatives of the local government provided information about social and economic development in the region.

During the tour of the region most affected by the Chernobyl nuclear disaster, the delegates also visited the Republican Scientific and Practical Centre for Radiation Medicine and Human Ecology (Gomel).

GRI 413-1

Activities of the Public Council Community Liaison Offices

Community Liaison Offices of the Corporation's Public Council serve as a platform for dialogue with the general public, civic associations, regional and local governments, professional associations and nuclear enterprises.

The Community Liaison Offices operate in 15 nuclear towns and cities in 13 constituent entities of the Russian Federation. In 2022, a Community Liaison Office was opened in Zarechny in the Penza Region.

The Community Liaison Offices played an active role in the field of environmental protection, healthcare, culture, promotion of a sporting lifestyle, development of the urban environment, primary and higher education, the youth policy, etc.

Plans for 2023

Under instructions of ROSATOM's Director General, the People, Towns and Cities programme has been launched; starting from 2023, it sets even more ambitious goals than before and combines a number of project initiatives within a single concept. The People, Towns and Cities programme includes industry-wide initiatives such as ROSATOM's School, ROSATOM's Territory of Culture and projects of the Nuclear Towns and Cities Union of Nuclear Organisations. The People, Towns and Cities programme was first presented at the 7th Forum of Nuclear Towns and Cities on 17 March 2023. In accordance with the new programme, all of ROSATOM's social initiatives will be divided into four main focus areas: strategies for towns and cities, a modern urban environment, active urban life and better education.

JSC Atom-TOR will continue to take systematic steps to search for and attract new resident companies to PDAs, taking into account promising investment opportunities and the development of cooperation chains; it will also continue to develop infrastructure projects, which will involve creating industrial parks and technology parks, promoting investment opportunities in PDAs, launching and maintaining an information channel for resident companies. In order to support PDAs in single-industry towns and cities, a partnership network is to be developed at the regional and federal levels, which will involve enhancing cooperation with existing partners and attracting new partners.

The PDA boundaries are to be further optimised to make the sites more attractive to investors and meet the needs of potential resident companies. Support for resident companies will include continued systematic efforts to promote products offered by PDA residents, which will involve filling the catalogue and the online store, holding pitch sessions, posting information on partner websites, verifying compliance of PDA residents with the terms of agreements, and expanding information and advisory support for resident companies.

Plans also include organising and conducting educational events on issues relevant to resident companies in order to promote deeper integration with ROSATOM.

In 2023, the Corporation's Public Council plans to expand cooperation with the Civic Chamber of the Russian Federation, implement public oversight projects, manage the work of public environmental experts and develop the activities of its Commissions taking into account the expansion of the scope of ROSATOM's business. Events scheduled for 2023 include the 16th Regional Public Dialogue Forum titled 'National Interests, Environment and Safety' commemorating the 120th anniversary of the birth of Academician Igor Kurchatov (Chelyabinsk), and a workshop on government policy on RAW and SNF management (Murmansk).

The implementation of comprehensive regional development plans will continue in Usolye-Sibirskoye, the CATF of Sarov and other nuclear towns and cities. More specifically, the federal project to establish a Federal Chemical Industry Hub in Usolye-Sibirskoye is to be developed and approved by the Government of the Russian Federation in 2023.

THE COMMUNITY LIAISON OFFICES OPERATE

CONSTITUENT ENTITIES OF THE RUSSIAN FEDERATION

5

SAFETY REPORT

RUB 24.65 BILLION

EXPENDITURE ON ENVIRONMENTAL PROTECTION

STATEMENT OF THE INSPECTOR GENERAL

Dear colleagues,

I would like to present the report on ROSATOM's activities in 2022 aimed at managing and ensuring nuclear and radiation safety, industrial, fire and occupational safety and environmental protection (hereinafter jointly referred to as 'safety') at its production sites and nuclear facilities operated by organisations under the Corporation's management.

The data provided in this report confirm the high level of safety of nuclear technology. The accident-free operation of nuclear power plants, nuclear fuel cycle enterprises, the Nuclear Weapons Division and other industrial enterprises in 2022 was made possible due to the hard work and dedication of a large number of industry executives and specialists.

The Corporation is a global leader in terms of all internationally-accepted indicators which characterise the sustainability of nuclear facilities, as well as nuclear, radiation, industrial, fire and occupational safety and environmental protection.

The data presented in the report demonstrate that, in 2022, ROSATOM ensured nuclear and radiation safety at its nuclear facilities using nuclear power for civilian and defence purposes. The trend towards a decrease in the number of deviations in the operation of NPPs continued. Similarly, there were no deviations classified according to the International Nuclear and Radiological Event Scale (INES) in the operation of nuclear research facilities or marine nuclear propulsion units. There were no radiation incidents or instances of exceeding the statutory limit on radiation exposure of employees in the industry. The individual average annual effective radiation dose and the collective radiation dose of personnel continued to decrease.

The best nuclear safety practices adopted in the industry are being rolled out to other non-nuclear businesses of the Corporation. Injury rates in the industry are consistent with global best practices and are significantly (more than five times) lower than the nationwide figures, as well as the rates achieved by major Russian companies.

In the reporting year, there were no accidents at hazardous industrial facilities in the industry. The number of recorded fires and the total cost of damage from fires decreased.

OF RADIATION-CONTAMINATED SITES HAVE BEEN REHABILITATED

Environmental safety performance also remained strong in 2022. The share of the Corporation in the total pollutant emissions and discharges and waste generation in the Russian Federation does not exceed 1.3%. The findings of measurements showed that in 2022, radiation levels at production sites and other facilities posing nuclear and radiation hazards were within the range of background radiation levels; radionuclide content in the environment did not exceed reference levels. Special focus is given to the review of initiatives aimed at reducing the negative man-made impact on the environment and implementing carbon footprint controls, including the development of the Industry-Wide Radiation Monitoring System as a subsystem of the Integrated State Automated Radiation Monitoring System in the Russian Federation.

In 2022, ROSATOM continued to implement the Federal Target Programme on Nuclear and Radiation Safety for the period from 2016 through 2020 and for the period until 2035 (FTP NRS 2), including the following activities:

- Decommissioning industrial uranium-graphite reactors in FSUE Mining and Chemical Plant and JSC Pilot Production and Demonstration Centre for Decommissioning of Uranium-Graphite Nuclear Reactors and the BR-10 research reactor;
- Decommissioning facilities forming part of the radiochemical plant in FSUE Mining and Chemical Plant, as well as disused buildings and structures at the radiochemical plant and liquid radioactive waste storage sites in FSUE Mayak Production Association;
- Maintaining the Techa Cascade of Reservoirs in a safe condition;
- Preparing the shut-down power units at Novovoronezh, Leningrad, Bilibino and Beloyarsk NPPs for decommissioning;
- Ongoing construction of SNF and RAW management infrastructure at Leningrad, Smolensk and Kursk NPPs;
- Rehabilitation of radiation-contaminated sites with a total area of 110,900 m².

The decommissioning of nuclear plant U-5 in Moscow and seven buildings and structures of FSUE Mayak Production Association in Ozersk was completed.

At year-end 2022, all targets under FTP NRS 2 were achieved, with progress towards the achievement of the main goal of FTP NRS 2 totalling 33.8% as against the target of 33%.

I hope that information provided in this report will be of interest and relevance to a broad range of stakeholders and specialists.

Sergey Adamchik
Inspector General

Key Results in 2022

- There were no events rated at level 1 or higher on the INES scale.
- The injury frequency rate and the lost time injury frequency rate (LTIFR) stood at 0.25 and 0.11 respectively.
- Individual radiation risk was calculated for 65,729 people using the IRAW system.
- A total of 1,007.93 tonnes of SNF were removed from nuclear facilities in the Russian Federation.
- 132.99 tonnes of SNF were reprocessed.
- Reprocessed SNF accounted for 24.1% of the total volume of SNF generated in the Russian Federation during the year.
- Radiation-contaminated sites with a total area of 110,900 m^2 were rehabilitated.

Key Events in 2022

In 2022, there were no events classified as an 'accident' or 'incident' at ROSATOM's industrial facilities[1].

The statutory limit on radiation exposure of employees was not exceeded in 2022.

The number of violations detected by supervisory authorities at potentially hazardous nuclear facilities in 2022 decreased by 20.35% as compared to the findings of previous inspections.

5.1. OCCUPATIONAL HEALTH AND SAFETY

Occupational health and safety management system

Since 2019, ROSATOM has been involved in the Vision Zero international campaign and seeks to achieve a zero injury rate in nuclear organisations.

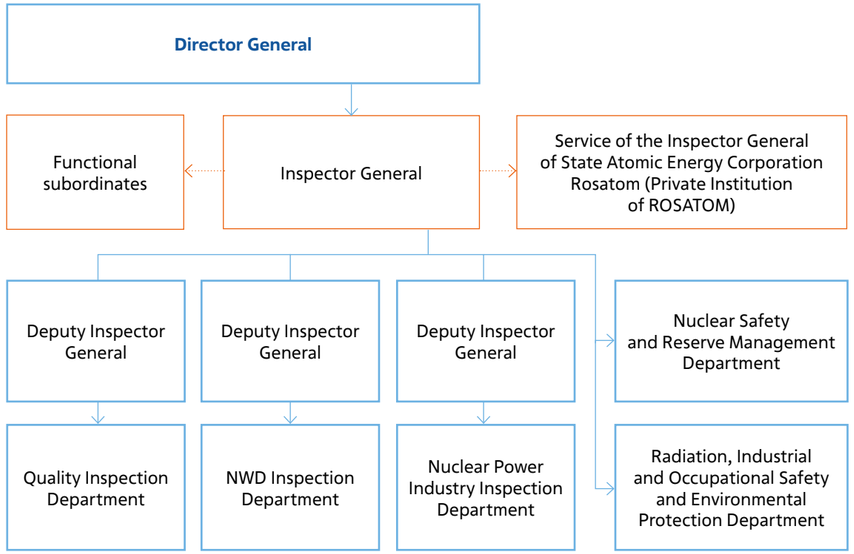
One of the fundamental priorities for ROSATOM is to protect the life and health of employees in the industry. Internal regulations adopted in ROSATOM and its organisations (primarily the Uniform Industry-Wide Policy on Occupational Safety and Health) are aimed at preventing workplace accidents and occupational diseases, systematically monitoring working conditions and occupational safety performance, ensuring the safety and protecting the health not only of employees of ROSATOM and its organisations, but also of employees of contractors and subcontractors involved in the operation of nuclear facilities. The requirements of the occupational health and safety management system (OHSMS) are binding on all employees and all persons who are on the premises of the Corporation and its organisations, in their buildings and structures.

ROSATOM and its organisations recognise their responsibility for the safety of production processes, occupational safety and health, given that the rapid development of the nuclear power industry makes it crucially important to guarantee compliance with fundamental principles whereby priority is given to protecting employees' life and health and enhancing the protection of people and the environment against radiation exposure.

ROSATOM's Inspector General is in charge of safety and control of the use of nuclear energy for civilian and defence purposes by the Corporation's organisations.

1. An accident means the destruction of structures and/or technical equipment used at a hazardous industrial facility, an uncontrolled explosion and/or release of hazardous substances. An incident means a failure of or damage to technical equipment used at a hazardous industrial facility, a deviation from established process parameters.

Diagram of safety management (including occupational safety) in ROSATOM



Key functions of the Inspector General include the following:

- Timely and full detection of non-compliance with Russian laws and local regulations of ROSATOM on occupational safety and health;
- Responsibility for the exercise of powers and performance of functions related to nuclear and radiation safety by the Corporation as a government regulator controlling the use of nuclear energy, as well as the functions of a regulator in the sphere of industrial and fire safety, the safety of hydraulic structures, occupational safety and health and environmental protection in ROSATOM's organisations;
- Ensuring that the Corporation has in place the relevant methodological framework, which is complete and of appropriate quality and is aligned with Russian occupational safety laws.

The performance of the Inspector General is evaluated annually based on indicators specified in the approved KPI map. Key indicators include the reduction in the severity of injuries at facilities of the Corporation's organisations, including contractors (average, against the previous three years as a baseline period).

GRI 403-1
GRI 403-3

The Corporation adheres to the Uniform Industry-Wide Policy on Occupational Safety and Health, which stipulates the goals, key principles and obligations of ROSATOM in the sphere of occupational safety and health. Its principles underpin the occupational health and safety management systems used by ROSATOM's organisations.

The Uniform Industry-Wide Policy on Occupational Safety and Health is designed to support the implementation of the main provisions of the Constitution and legislation of the Russian Federation, the norms of international law recognised by the Russian Federation and the provisions of international treaties, the Basic Principles of Government Policy on Nuclear and Radiation Safety in the Russian Federation until 2025 and other fundamental documents supporting the main areas of government policy of the Russian Federation in the field of occupational safety and health and national regulatory requirements for occupational safety and health.

GRI 403-1 The policy applies to all of ROSATOM's employees; in addition, ROSATOM requires its contractors and subcontractors to comply with occupational safety and health standards adopted in the Corporation.

The key principles underlying occupational safety initiatives of ROSATOM and its organisations include the following:

- Giving priority to employees' lives and health over operational performance;
- Continuously improving performance and enhancing employees' safety competences;
- Planning and implementing measures aimed at reducing injury and occupational disease rates;
- Systematically providing employees with state-of-the-art personal protective equipment to protect them against occupational hazards;
- Disclosing material information on occupational safety and health initiatives;
- Setting uniform occupational safety and health requirements aligned with Russian laws and regulations and global expertise in ROSATOM and its organisations;
- Seeking to ensure that all employees of ROSATOM and its organisations are aware that compliance with occupational safety requirements is an integral part of their work.

Uniform Industry-Wide Policy on Occupational Safety and Health of ROSATOM and Its Organisations:

GRI 403-8 The percentage of employees covered by an OHSMS that has been internally audited as part of internal safety and quality control totals 100%; the percentage of employees covered by an OHSMS that has been internally audited in accordance with the Action Plan to Improve Sustainability Maturity in the Industry for 2022 stands at 62.1%. In 2022, 128,122 employees (43.1%)[1] worked for ROSATOM's organisations that have a GOST R ISO 45001 or ISO 45001-certified occupational health and safety management system.

GRI 403-2
GRI 403-3

Managing occupational safety and health risks

As part of the occupational health and safety management system, the Uniform Industry-Wide Guidelines on Occupational Risk Management in ROSATOM's Organisations were adopted in 2020 in order to improve the performance of ROSATOM's organisations in the sphere of occupational risk management within the occupational health and safety management system.

Occupational risk management in ROSATOM's organisations involves the following:

1) Identifying hazards in the workplace;
2) Assessing occupational risk levels in the workplace;
3) Developing measures to reduce occupational risk levels.

Occupational risk management commissions are established in the organisations, with members of employees' professional associations (where such associations exist) involved in the work of the commissions. Members of the commissions are trained in occupational risk management.

1. As a percentage of the total headcount in nuclear organisations in Russia.

The results of hazard identification are formalised in the organisation's Safety Hazard Register. The occupational risk level is assessed by ROSATOM's organisations for each identified hazard in the following order:

1) Assessing the level of occupational risk;
2) Assessing the acceptability of the occupational risk level (acceptable, tolerable, unacceptable).

An occupational risk assessment card is generated for each workplace.

Based on the occupational risk assessment results, the organisation develops an action plan to improve the effectiveness of existing and implement additional occupational risk management measures. The occupational risk management commission annually reviews the findings of the monitoring of occupational risk assessment and management activities in order to ensure that all measures at the planning and implementation stages have been implemented in full and on time. Based on the results of the annual review, a plan of corrective actions (measures) is formed, which is aimed at improving the effectiveness of occupational risk management.

ROSATOM has set up and operates a hotline to receive employees' enquiries and reports concerning working conditions and occupational safety and health.

Accidents are investigated by commissions set up in ROSATOM's organisations in accordance with the Labour Code and Order No. 223n of the Ministry of Labour and Social Protection dated 20 April 2022. Depending on the severity of the accident, a government labour inspector, representatives of Rostekhnadzor (if the accident has occurred at a hazardous industrial facility), executive authorities, insurance companies and the Social Insurance Fund take part in the work of the commission. Following the investigation, the commission draws up a Form N-1 report (if the accident is related to production operations and is required to be registered and recorded by the organisation) or a free-form report (if the accident is not related to production operations and is not required to be registered or recorded by the organisation); based on the findings of the investigation, the organisation issues an order stipulating measures to prevent similar accidents.

The Fifth Industry-Wide Dialogue Forum titled 'Nuclear Power and Industry Safety Day' was held in October 2022. Following the event, resolutions were adopted to improve the occupational safety system based on the principles of injury prevention and a risk-based approach, including a Road Map for the Implementation of Safety Improvement Initiatives in the Nuclear Industry.

Work continued to develop a digital tool, an Integrated Industry-Wide Occupational Safety System, designed to automate and digitise occupational health and safety and occupational risk assessment processes.

GRI 2-25

Prevention and minimisation of occupational injuries

Organisations in the industry implement a number of measures on an ongoing basis, which are approved by ROSATOM's Director General:

1. The List of Instructions of ROSATOM's Director General on Preventing Injuries when Working with Electrical Equipment.
2. The List of Instructions of ROSATOM's Director General on Improving Process Discipline in ROSATOM's Organisations during Construction, Renovation, Upgrade and Repairs of Facilities.
3. The Order of ROSATOM on Approval of an Action Plan for the Prevention of Occupational Injuries at the Facilities of ROSATOM's Organisations When Working at Heights.
4. The Order of ROSATOM on Approval of an Industry-Wide Plan of Urgent Measures to Ensure Safety and Reduce Occupational Injuries.

5. The Order of ROSATOM on Approval of a Comprehensive Programme for Preventing Occupational Injuries in the Nuclear Industry.

ROSATOM's safety culture[1]

GRI 403-4 In terms of a safety culture, ROSATOM and its organisations focus on shaping and developing those characteristics of their operations and individual employee behaviour that help to maintain an acceptable safety level, protect people and the environment against the negative impacts of their operations and ensure that employees of the Corporation and its organisations are committed to safety as the main goal and are guided by fundamental safety principles.

GRI 403-7 The requirements of the occupational health and safety management system (OHSMS) are binding on suppliers and contractors operating at ROSATOM's facilities. Contractors also undertake to comply with occupational safety and health legislation and to ensure compliance by their subcontractors. The Corporation does not impose any other occupational safety and health requirements on suppliers and contractors.

GRI 403-5 Every year, ROSATOM's Technical Academy hosts the International Safety Culture School. ROSATOM's Corporate Academy is implementing a project to promote a culture of safe behaviour in nuclear organisations. The Corporation also holds annual Safety Days involving discussions of the status and development of its safety culture.

Occupational safety and health performance

GRI 403-9 One of the occupational safety objectives of ROSATOM's organisations is to ensure occupational safety and provide safe working conditions for employees operating buildings, structures and equipment and working with radioactive materials, flammable and explosive substances.

In 2022, ROSATOM's organisations implemented preventive measures on an ongoing basis to enhance the workplace safety culture. While there was a slight increase in the total number of accidents (by 4%), the number of severe injuries and fatalities decreased by 19%. There were a total of eight fatalities, all eight of them men.

GRI 403-5 ROSATOM works continuously to ensure compliance with instructions from the Director General on the implementation of safety measures to prevent any injuries, regardless of their severity. In addition, based on statistics on injury rates, ROSATOM has developed and implements the following on an ongoing basis:

- A comprehensive programme of measures to prevent workplace injuries in the industry;
- Prioritised measures to prevent accidents during the operation of metal-working machines in ROSATOM's organisations;
- Measures to prevent road accidents that are not related to operations but have negative consequences for employees.

1. The principles, approaches, policies and mechanisms for managing the safety culture are described in detail in the 2021 Annual Report of POSATOM, pp. 295–298.

GRI 403-9 **Occupational injury rates in ROSATOM between 2020 and 2022**

Indicator	2020	2021	2022
Number of people injured in accidents	50	70	73
Number of fatalities	5	15	8
Injury frequency rate (FR)	0.18	0.24	0.25
LTIFR[1]	0.09	0.08	0.11
Number of people newly diagnosed with an occupational disease	10	6	16

Occupational safety and health performance of ROSATOM's organisations in 2022

Indicator	Value
Number of man-hours worked	506,260,165
Number of serious injuries	17
Number of people newly diagnosed with an occupational disease	16
Fatality rate (per 1 million man-hours)	0.016
Fatality rate (per 200,000 hours)	0.003
Serious injury rate (per 1 million hours)	0.034
Serious injury rate (per 200,000 hours)	0.007
Reported occupational injury rate (excluding / including fatalities) (per 1 million hours)	0.13/0.14
Reported occupational injury rate (excluding / including fatalities) (per 200,000 hours)	0.026/0.029
Occupational disease rate (per 1 million hours)	0.032
Occupational disease rate (per 200,000 hours)	0.006
Number of people injured in accidents in contractor organisations[2]	7

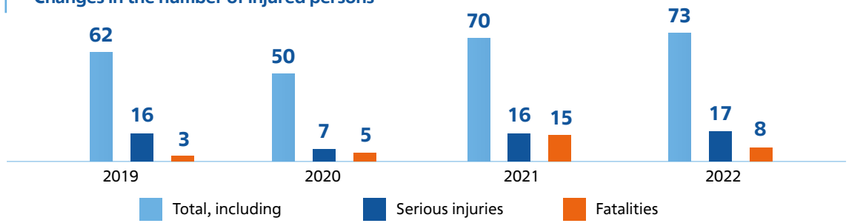
Number of injured persons by injury factor in ROSATOM

Injury factor	2020	2021	2022
Falling from a height	8	2	8
Electric shock	3	6	2
Falling on the premises (on the surface of the same level, with a difference in heights, etc.)	16	18	24
Road accident	3	25	8
Impact of moving or scattering objects, structures or parts	9	4	12
Fall of an object on the victim	2	5	8

1. Lost Time Injury Frequency Rate (LTIFR) = number of lost time injuries / man-hours worked × 1 million man-hours.
2. No data are available on man-hours worked or newly diagnosed occupational diseases in contractor organisations.

Injury factor	2020	2021	2022
Burns (thermal, etc.)	6	5	4
Other (unclassified factors)	1	1	2
Sports-related injury	2	1	1
Animal bite	0	1	0
Poisoning	0	0	4
Impact from physical contact/crushing	0	2	0
Total	**50**	**70**	**73**

Changes in the number of injured persons



A total of 73 people were injured in 2022, including 52 men and 21 women. This included 17 people who suffered serious injuries and eight fatalities.

Causes of the accidents included:

- Non-compliance with road safety rules;
- Inadequate work organisation;
- Non-compliance with operational procedures;
- Design flaws and poor equipment reliability;
- Negligence on the part of the victims.

Between 2020 and 2022, all fatalities were men.

Region	2020	2021	2022
Leningrad Region			1
Murmansk Region			2
Kursk Region	1	2 m	0
Rostov Region			2
Primorsky Territory	1		0
Chelyabinsk Region	1		0
Saratov Region	1		0
Kurgan Region	0		1
Moscow Region	1	1 m	2
Smolensk Region		1 m	
Samara Region		3 m	
Sverdlovsk Region		4 m, 5 f	
Total	**5**	**15 (10 m, 5 f)**	**8 m**

m – male **f** – female

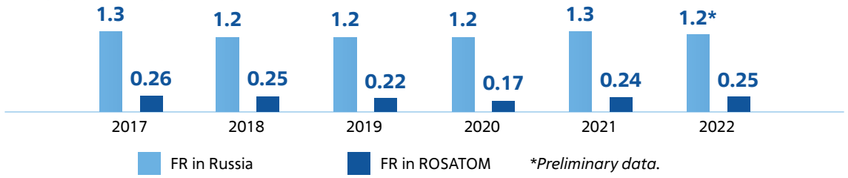
GRI 403-10 A total of 16 people were newly diagnosed with occupational diseases in 2022; all of them are employees of JSC Atomredmetzoloto (PJSC PIMCU).

The occupational disease risk remains high in PJSC PIMCU.

The main occupational hazards posing a high risk of occupational diseases include general and local impacts of vibration on the body and noise exposure affecting hearing.

In 2022, the FR stood at 0.25, as against 1.2 across Russia.

Comparative data on industrial injuries in Russia and in ROSATOM, injury frequency rate (FR)



The risk of injuries remains high for employees who violate safety rules during the operation and maintenance of equipment, and for those employees who do not follow safety precautions when moving around the premises of an organisation.

In addition to the injury frequency rate (FR), ROSATOM also uses the lost time injury frequency rate (LTIFR), which enables it to benchmark the injury rate in the Corporation against that of other companies and countries. The LTIFR has been included in the KPI maps of all Division executives.

The LTIFR reference value for the Divisions, units, holding companies and the Corporation as a whole has been set at 0.5, which is a good result for any company in any country in the world.

Average LTIFR values achieved in Divisions, units and holding companies within ROSATOM over the previous three years have been accepted as baseline (initial, to be improved) values for those Divisions, units and holding companies.

Reference LTIFR values are set individually for the Divisions, units and holding companies within the Corporation but do not exceed the baseline values.

LTIFR between 2020 and 2022

Division/complex/unit	2020	2021	2022
Mining Division	0	0.22	0.21
Fuel Division	0.02	0.05	0.09
Mechanical Engineering Division	0.07	0.07	0.19
Engineering Division	0.02	0.05	0.04
Power Engineering Division	0.03	0.04	0.12
Environmental Solutions	0.30	0.18	0.12
Nuclear Weapons Division	0.16	0.11	0.08
Innovation Management Unit	0.07	0.06	0.06
Total across ROSATOM	**0.09**	**0.08**	**0.11**[1]

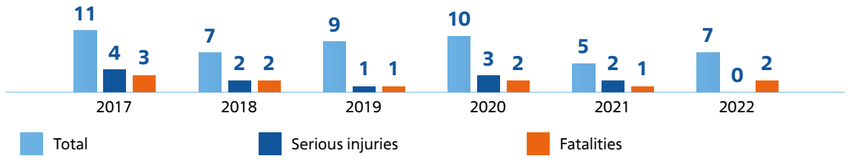
To reduce the injury rates in its organisations, ROSATOM will implement measures focused on improving production processes, upgrading machine tools, developing a safety culture and enhancing controls.

Occupational safety in contractor organisations

In recent years, there has been a downward trend in injury rates in contractor organisations. In 2022, the total number of injured persons increased slightly; at the same time, there were no severe injuries, while the number of fatalities remains relatively stable.

GRI 403-9

Number of injured persons in contractor organisations



1. LTIFR estimates do not include 17 employees injured in accidents caused by third parties (including road accidents) and those whose health suddenly deteriorated due to an illness. At the same time, two employees injured in 2021 were included following the conclusion of accident investigations in 2022. In addition, four employees injured in accidents were not included, as the relevant investigations continued into 2023.

The injury rate in contractor organisations is relatively low due to cooperation between the occupational safety functions of customer organisations and contractors, as well as stricter safety requirements for contractors performing work at the production sites in the industry.

Main causes of industrial injuries in contractor organisations in 2022

Inadequate work organisation	83%
Operation of malfunctioning machinery and equipment	17%

Injury factors, by number of injured persons

Falling from a height	1
Electric shock	2
Fall of an object on the victim	4

Analysis of accident investigation records showed that the main causes of accidents included inadequate work organisation and the operation of malfunctioning machinery and equipment. This was due to shortcomings in the work of the management team during the preparatory phase of the work:

- Assignment of work not stipulated by the employment contract;
- Lack of supervision of work on the part of line managers;
- Allowing an employee to perform work while under the influence of alcohol;
- Violation of procedures regulating the issue of permits for hazardous work.

5.2. NUCLEAR AND RADIATION SAFETY

Key results in 2022

- There were no events rated at level 1 or higher on the INES scale.
- Individual radiation risk was calculated for 65,729 people using the IRAW system.

5.2.1. Nuclear and radiation safety management system

GRI 3-3 ROSATOM focuses on the effective exercise of powers and performance of functions related to managing the use of nuclear energy, as determined by the laws of the Russian Federation, with safety and environmental protection as the top priority. This task is addressed by various divisions of ROSATOM and its organisations using all key government and non-governmental regulation mechanisms.

Nuclear and radiation safety management functions are performed by the following divisions of ROSATOM:

- The General Inspectorate participates in the preparation of proposals for shaping the government policy on nuclear and radiation safety, implements measures to ensure the safety of nuclear facilities and monitors safety in ROSATOM's organisations;
- The Nuclear and Radiation Safety, Licensing and Permitting Department ensures that personnel and equipment are ready to respond to emergencies at nuclear facilities and monitors the implementation of emergency prevention measures;
- The Directorate for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning plays a leading role in the management of government programmes aimed at addressing nuclear legacy issues;
- The Technical Regulation Department updates the system of technical specifications for the safe use of nuclear energy.

5.2.2. Nuclear and radiation safety at nuclear facilities

GRI 3-3 In 2022, ROSATOM ensured safe and steady operation of nuclear organisations. There were no incidents involving radiation leaks. Limits on employee radiation exposure were not exceeded.

No licences were revoked in the nuclear industry.

There was no significant deterioration in the epidemiological situation or an increase in the risk of COVID-19 spread in 2022. Nevertheless, some of the targeted inspections organised by the General Inspectorate and other divisions of the Corporation in early 2022 were carried out remotely.

Nuclear power plants

The safety status of nuclear facilities is assessed based on the number and scale of recorded deviations in their operation, which are benchmarked against the IAEA International Nuclear and Radiological Event Scale (INES). Events on the scale are rated at seven levels: the upper levels (4–7) are termed 'accidents', while the lower levels are 'incidents' (2–3) and 'anomalies' (1). Events that have no safety significance are classified as below scale, at level 0. Events that have no safety relevance are classified as 'out of scale'.

No events rated at level 1 or higher on the international INES scale have been detected at Russian nuclear power plants since 2018[1].

In 2022, there were 37 deviations rated at level 0 and out of scale. JSC Rosenergoatom investigated all deviations in accordance with the prescribed procedure. Their causes were identified: most of the deviations were caused by failures of thermal and electrical equipment due to manufacturing defects, which had not been detected during the installation and adjustment of the equipment. Other deviations were caused by errors on the part of employees. The Corporation rated each event that had occurred in accordance with the INES Scale User's Manual and developed corrective measures to prevent similar failures in the future.

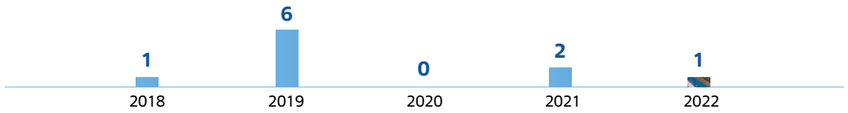
Changes in the number of deviations in NPP operation according to the INES scale

Indicator	2018	2019	2020	2021	2022
Total, including:	42	38	24	34	37
Level 0 and out of scale	40	38	24	34	37
Level 1	2	0	0	0	0

Nuclear research facilities

In 2022, there were no nuclear, radiation or technical accidents at nuclear research facilities in ROSATOM's organisations. No incidents rated higher than level 0 on the INES scale were detected during the operation of nuclear research facilities.

Changes in the number of deviations in the operation of nuclear research facilities



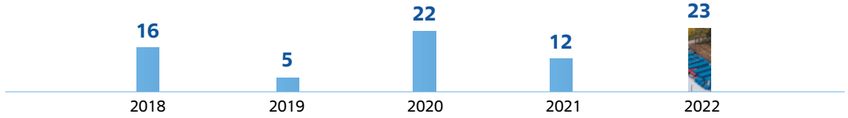
Deviations were caused by the unstable operation of thermal equipment due to failures in power systems supplying the electrical load of nuclear research facilities.

1. Level 1 and 0 deviations do not pose a risk to employees operating the facilities, the local population or the environment.

Marine nuclear propulsion units

There were no violations of safe operating limits or conditions for propulsion units of nuclear-powered vessels in 2022; the radiation level remained within permitted limits. No events rated higher than level 0 on the INES scale were detected.

Changes in the number of deviations in the operation of marine nuclear propulsion units



Most deviations in the operation of marine nuclear propulsion units were due to leaks in the pipe systems of steam generators. The recorded deviations did not affect the performance of voyage orders by the vessels.

5.2.3. Physical protection of nuclear facilities

The security and physical protection of ROSATOM's facilities posing nuclear and radiation hazards, as well as of nuclear materials and radioactive substances, including during their transportation, complies with Russian legislation and the Convention on the Physical Protection of Nuclear Material and is aligned with the recommendations of the International Atomic Energy Agency.

In 2022, ROSATOM continued to improve the regulatory and methodological framework in the sphere of physical protection and security (including anti-terrorism security) of nuclear facilities.

As part of the work to improve the regulatory framework, ROSATOM, in cooperation with the Federal National Guard Service, developed two local regulations on ensuring the protection and security of nuclear facilities by in-house security units.

Pursuant to instructions and guidelines from the National Antiterrorism Committee, the Corporation developed and approved uniform industry-wide methodological guidelines on organising information exchange in the process of monitoring the state of the national counter-terrorism system.

Pursuant to Decree No. 876 of the Russian Government dated 29 August 2014, lists of ROSATOM's facilities (premises) subject to anti-terrorism protection were updated and approved by the relevant order.

Statutory and local regulations drafted by ROSATOM have enabled the development of uniform industry-wide approaches to physical protection and security (including anti-terrorism security) of nuclear facilities.

In 2022, a draft Decree of the Government of the Russian Federation on Amendments to the Rules for the Physical Protection of Nuclear Materials, Nuclear Facilities and Nuclear Material Storage Sites was prepared and approved by the relevant federal executive authorities.

In 2023, ROSATOM plans to submit the draft Decree to the Government of the Russian Federation and to continue to improve its regulatory and methodological framework for physical protection and anti-terrorism security of nuclear facilities.

The main mechanisms for ensuring physical protection and anti-terrorism security include the following:

- Monitoring of the physical protection and anti-terrorism security of ROSATOM's facilities (premises) by the relevant departments;
- Ensuring the reliable operation of existing physical protection and security equipment at facilities, as well as its scheduled modernisation and improvement;
- Strict compliance with the requirements of federal and industry-wide regulations.

As part of departmental monitoring, 13 inspections of the physical protection of nuclear materials, nuclear facilities and nuclear material storage sites were conducted in 2022 in the Corporation's organisations, including the inspection of their anti-terrorism security status. These included 11 inspections conducted in accordance with the Consolidated Plan of Inspections and two surprise inspections. In 2020 and 2021, 8 and 11 inspections respectively were conducted as part of departmental monitoring. The findings of all inspections were documented in reports; progress is being monitored on corrective measures to eliminate the deficiencies identified in the course of inspections and implement the recommendations from the commissions.

Due to the continued threat of the entry and spread of the new coronavirus infection (COVID-19) in 2022, targeted inspections forming part of departmental monitoring in two of ROSATOM's organisations did not involve site visits by the Corporation's employees; instead, they were conducted by security specialists of these organisations.

Proposals to conduct inspections of physical protection as part of departmental monitoring at 12 nuclear facilities in 2023 have been included in the Consolidated Plan of Inspections for 2023 approved by order of the Corporation.

ROSATOM continued to improve the integrated information system for monitoring the status of the physical protection system at its facilities posing nuclear and radiation hazards. As part of Russia's import substitution strategy, the Control-SFZ-C cross-platform software was upgraded and incorporated in the said information system, enabling it to be run on various operating systems, such as Astra Linux, Windows and Android. The software is scheduled to be tested in 2023.

163 automated workstations (AWSs) for security analysts and 74 AWSs for facility inspectors have been installed in nuclear organisations. These AWSs form part of the monitoring system and have been installed at 43 industry facilities posing nuclear and radiation hazards and in the workplaces of ROSATOM's specialists. The work will continue in 2023.

Based on the findings of analysis and the summary of data provided by ROSATOM's organisations, in 2022:

- As part of the Corporation's approved programmes, efforts continued to improve physical protection and security equipment at facilities posing nuclear and radiation hazards. All physical protection and security equipment is fully operational; its maintenance is carried out as scheduled. New equipment that has been in operation for less than 10 years accounts for 73% of all physical protection equipment at nuclear facilities (74% in 2020 and 2021);
- Scheduled work was carried out to maintain automated security systems for transportation (ASSTs) installed in control centres and special vehicles (railway cars, special motor vehicles and vessels) and replace equipment that had reached the end of its specified service life.

Measures were organised and implemented in full to ensure the physical protection and anti-terrorism security of facilities (premises) of nuclear organisations.

Pursuant to instructions and directives of the President of the Russian Federation, the Government of the Russian Federation, and the National Antiterrorism Committee issued in connection with the special military operation conducted by the Russian Federation, a set of additional measures was adopted and implemented to ensure the security of the Corporation's facilities.

Measures taken in cooperation with the Federal Security Service of Russia, the Federal National Guard Service and the Ministry of Internal Affairs of Russia made it possible to prevent unlawful acts against nuclear facilities.

In 2022, as in the previous years, there were no violations of access control or internal security regulations at ROSATOM's facilities that could have resulted in the theft of nuclear materials, terrorist acts or sabotage at nuclear facilities.

5.2.4. Emergency preparedness and special transportation

In order to ensure the safe operation of the nuclear industry and protect employees, the local population and regions against the possible impacts of accidents (emergencies), ROSATOM operates and improves a functional subsystem for emergency prevention and response that covers the organisations (facilities) managed by ROSATOM and forms part of the integrated state system for emergency prevention and response.

A Programme for the Development of ROSATOM's Emergency Preparedness and Response System until 2035 and beyond has been approved by order of ROSATOM. As at 31 December 2022, 16 professional and 57 volunteer emergency response teams had undergone certification and were in a state of readiness in ROSATOM. They comprise a total of 2,173 emergency response workers.

In the reporting year, the needs of organisations in the industry for special cargo transportation were fully met. All shipments of nuclear materials, radioactive substances and products made from them fully complied with established requirements. Steps are being taken to improve the industry-wide automated system for safe transportation of radioactive substances (ASST-RS). Work was continued to produce and upgrade special vehicles and equip them with modern automated security systems.

5.2.5. Industry-Wide Radiation Monitoring System

The Industry-Wide Radiation Monitoring System (IRMS)[1] is in operation in the Russian nuclear industry as a functional subsystem of the Integrated State Automated Radiation Monitoring System (ISARMS) in Russia. It comprises the following:

- The information and analysis centre of ROSATOM's departmental radiation monitoring subsystem forming part of the ISARMS (DIAC), which integrates data from:
  - Local radiation monitoring systems;
  - The Industry-Wide Automated Radiation Monitoring System (IARMS);
  - The findings of on-site subsoil condition monitoring (OSCM).
- 30 local radiation monitoring systems are in operation in ROSATOM's organisations included in potential radiation hazard categories 1 and 2.

The local radiation monitoring systems in ROSATOM's organisations perform regular radiation monitoring in buffer areas and radiation control areas, including:

- Continuous monitoring of the gamma radiation dose rate through the ARMS;
- Periodic monitoring of the gamma radiation dose rate using portable and mobile equipment, dosimeters, radiometers and spectrometers, as well as on-site monitoring of the annual gamma radiation dose in buffer areas and radiation control areas using accumulating dosimeters;

1. Pursuant to Article 20 of Federal Law No. 170-FZ of 21 November 1995 on the Use of Nuclear Energy, ROSATOM performs state radiation monitoring in the Russian Federation in the locations of nuclear facilities owned by operators with regard to which ROSATOM exercises government control over the use of nuclear energy.

- Periodic monitoring (using portable, mobile and fixed equipment) of radionuclide content in various components of the natural environment: in the lowest layer of the atmosphere, atmospheric precipitation, soil, surface water bodies into which liquid effluents are discharged and hydrologically connected water bodies, bottom sediments, aquatic organisms, groundwater, vegetation, as well as in locally produced food products and fodder.

In 2022, the monitoring system in 30 organisations included a total of:

- 1,346 OSCM wells;
- 1,115 stations monitoring the gamma radiation exposure dose rate/ambient dose equivalent rate (EDR/ADER) that are not part of the IARMS;
- 232 stations monitoring surface water bodies;
- 420 soil monitoring stations;
- 290 stations monitoring the absorbed radiation dose;
- 375 ground vegetation monitoring stations;
- 318 snow monitoring stations;
- 291 stationary IARMS stations;
- 218 air monitoring stations;
- 142 precipitation monitoring stations;
- 47 food monitoring stations;
- 151 bottom sediment monitoring stations;
- 95 stations monitoring algae and aquatic organisms;
- 107 stations monitoring surface contamination with radioactive substances;
- 65 monitoring routes where the gamma radiation EDR/ADER and contamination with radioactive substances are measured.

The DIAC continuously exchanges data with local radiation monitoring systems.

In 2022, local radiation monitoring systems performed more than 390,000 measurements (in addition to IARMS data received automatically). Radionuclide content in various components of the environment in buffer areas and radiation control areas of ROSATOM's organisations did not exceed reference levels.

The results of processing and analysis of radiation monitoring findings suggest that normal operation of nuclear facilities has no significant impact on radiation levels.

In order to promptly respond to any changes in radiation levels in the locations of nuclear facilities, automated radiation monitoring systems integrated into the industry-wide automated radiation monitoring system (IARMS) are in operation. The IARMS consists of the following:

- An industry-wide crisis response centre (Private Institution Situation and Crisis Centre of ROSATOM), which receives real-time information (on gamma radiation dose rates and meteorological parameters) from all automated IARMS stations;
- The Control Centre of the NPP ARMS subsystem in the Crisis Centre of JSC Rosenergoatom;
- On-site automated radiation monitoring systems (ARMSs) in ROSATOM's organisations.

The IARNMS integrates local ARMSs of 32 facilities posing radiation hazards. The radiation level in the vicinity of a radioactive material storage facility of FSUE RADON is monitored by on-site ARMS stations of FUSE RADON connected to the IARMS. The IARMS integrates a total of 412 monitoring stations located at industrial sites (112 stations) and in buffer areas and radiation control areas (a total of 300 stations).

Real-time data from radiation monitoring stations in buffer areas and radiation control areas of ROSATOM's organisations are available on the website at www.russianatom.ru.

In 2022, radiation levels in the areas where ROSATOM's organisations are located were within the range of natural background radiation.

On-site subsoil condition monitoring (OSCM) is performed in all of ROSATOM's environmentally relevant organisations (the OCSM system covers 55 organisations). It provides information on the state of the geological environment and makes it possible to assess and forecast its changes taking into account protective properties of geological and man-made barriers. This information is used to validate and select design solutions, including for the decommissioning of nuclear facilities, and to assess the effectiveness of rehabilitation measures. In 2021, ROSATOM and the Federal Agency for Mineral Resources concluded a cooperation agreement to enhance cooperation in OSCM development and expert support.

Amid the ongoing development of the nuclear industry, the government and society have heightened expectations for the safety of technologies used in the industry. One of the ways to improve safety is to enhance the quality and reliability of environmental monitoring. ROSATOM has adopted the IRMS Development Programme for the period from 2021 through 2030 (the Programme). The Programme defines focus areas for future development and initiatives aimed at improving ROSATOM's IARMS; it includes 58 initiatives across eight focus areas.

In 2022, 47 initiatives were implemented under the Programme across eight areas, including:

- Improving the existing components of the IRMS and providing research and methodological support for its operation;
- Equipping and upgrading environmental radiation monitoring laboratories;
- Establishing the main IRMS laboratory;
- Developing digital information infrastructure for the IRMS;
- Ensuring the uniformity of measurements and verifying data collected by local monitoring systems;
- Personnel training.

In 2022, the most important outcomes of the Programme included the following:

- The database of the Central Hub of the OSCM Data Analytics System on the condition of subsoil and adjacent environments within the boundaries of industrial sites, buffer areas and radiation control areas of ROSATOM's organisations engaged in on-site subsoil condition monitoring was updated;
- JSC Rosenergoatom continued to improve local radiation systems in its branches;
- The upgrade of radiation monitoring laboratories was continued to support the operation of local radiation monitoring systems;
- Final versions of industry-wide regulations on radiation monitoring were developed and introduced, including guidelines on sampling atmospheric precipitation as part of radiation monitoring in ROSATOM's organisations; on monitoring radiation levels in surface air; and on the content of environmental radiation monitoring programmes/rules in the Corporation's organisations;
- Advanced training was provided for personnel involved in operating local radiation monitoring systems.

The implementation of the Programme will enable ROSATOM to obtain, analyse and report the findings of radiation monitoring and data on radionuclide content in various components of the environment using a modern research and methodological framework, software and hardware in order to take necessary measures to prevent or reduce the radiation impact on local residents and the environment.

5.2.6. Industrial safety

GRI 3-3

As at 31 December 2022, ROSATOM's organisations operated 736 hazardous industrial facilities.

Number of hazardous industrial facilities

Hazard class	2020	2021	2022
1	7	9	7
2	32	33	34
3	276	287	291
4	397	396	404
Total	**712**	**725**	**736**

In 2022, as part of efforts to ensure compliance of the industrial safety management system with new mandatory requirements, ROSATOM made amendments to the Uniform Industry-Wide Guidelines on the Establishment of an Industrial Safety Management System in ROSATOM's Organisations and continued to manage the risk of accidents at hazardous industrial facilities controlled by the Corporation. Calculations of metrics used to assess the probability of potential negative consequences of non-compliance with industrial safety requirements at hazardous industrial facilities controlled by the Corporation show that the level of risk of accidents is acceptable.

All equipment used at hazardous industrial facilities of ROSATOM's organisations undergoes timely technical inspection and industrial safety assessment. Compulsory insurance is arranged in accordance with the law on compulsory third-party liability insurance for the owner of a hazardous facility for potential damage from an accident at the hazardous facility.

Personnel operating hazardous industrial facilities have undergone a comprehensive industrial safety certification and are provided with special clothing and personal protective equipment of appropriate quality.

In 2022, there were no events classified as an 'accident' at ROSATOM's industrial facilities.

Plans for 2023 include further improvement of the industrial safety management system. ROSATOM plans to organise a meeting on industrial safety matters with representatives of holding companies of its Divisions/incubated businesses and functional organisations via video conferencing (to discuss current matters related to industrial safety) and hold an annual R&D workshop on industrial safety (to provide training and inform about the latest developments in the sphere of legal regulation). In the course of industrial safety inspections, special focus will be given to compliance with the established procedure for extending the life cycle of technical equipment operated at hazardous industrial facilities that has reached the end of its statutory service life.

5.2.7. Fire safety

The fire situation at ROSATOM's facilities is stable. In 2022, there were no fires at facilities under construction in the industry. There were 10 fires at facilities operated by ROSATOM (a 17% decrease compared to 2021). Three employees of ROSATOM's organisations were injured as a result of the fires. There were no violations of the limits or conditions of safe operation of the facilities.

The cost of damage from fires totalled RUB 57,460 (a decrease by a factor of more than 4.8 compared to 2021).

5.2.8. Radiation exposure of employees

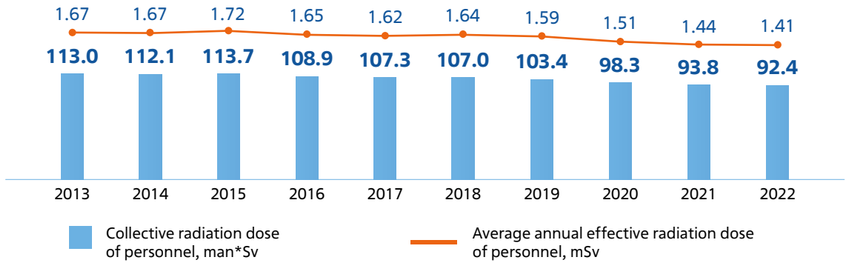
Ionising radiation is an occupational hazard specific to ROSATOM's organisations. Radiation safety criteria for personnel are laid down in the Radiation Safety Standards (NRB-99/2009), the Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010) and other regulations. Most nuclear organisations provide workplace conditions that fully meet the requirements set out in these documents.

Average annual effective radiation dose for employees

As at 31 December 2022, 65,729 people (group A personnel) in ROSATOM's organisations were under individual radiation exposure monitoring. This number increased by ~1.0% compared to 2021 but decreased by 2.7% over the last 10 years.

In 2022, the average annual effective radiation dose for ROSATOM's employees totalled 1.41 mSv. The average annual effective radiation dose for employees has been declining over the past 10 years (down by ~16% compared to 2013).

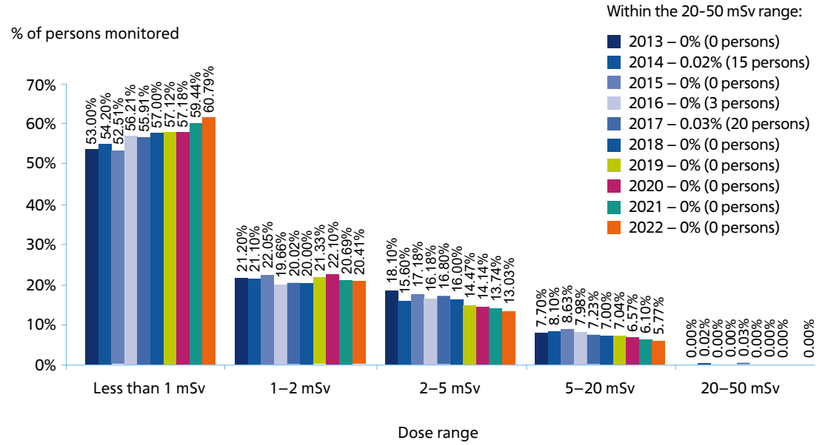
Changes in the collective and average annual effective radiation dose of the personnel of ROSATOM's organisations



The statutory limit on radiation exposure of employees was not exceeded in 2022. There were no persons with a total effective dose of more than 100 mSv over five consecutive years (from 2018 through 2022). The annual exposure limit of 50 mSv was not exceeded.

In the structure of radiation exposure of employees, the share of employees with doses ranging between 2 mSv and 20 mSv tends to decrease (from ~26% in 2013 to ~19% in 2022).

Distribution of group A personnel by dose range, %



GRI 403-2
GRI 3-3

Individual radiation risks

Individuals exposed to ionising radiation in the course of their work are at risk of damage to their health (are exposed to radiation risk) when performing their jobs. During planned occupational exposure, the main radiation health risk is an increased incidence of cancer. The likelihood of developing cancer due to occupational exposure depends not only on the rate of absorbed dose accumulation but also on other factors, such as gender, age at the time of exposure, age reached, etc. These dependencies, which have been formalised in the form of mathematical models, are used in the IRAW system to inform the assessment of individual radiation risks incurred by ROSATOM's employees during occupational exposure.

The IRAW system has been created by ROSATOM jointly with the Russian Scientific Commission on Radiological Protection. The underlying technology gained international recognition following the publication of an IAEA Technical Document (TECDOC) titled 'Assessment of Prospective Cancer Risks from Occupational Exposure to Ionising Radiation' (hereinafter referred to as the IAEA Technical Document) in December 2021. Based on the IAEA Technical Document and the findings of long-term monitoring of radiation risks of group A personnel using the IRAW system, ROSATOM is developing an industry-wide system for managing individual radiation health risks to employees associated with planned occupational exposure. This will make it possible to optimise radiation protection of personnel in both planned and emergency exposure situations by forming emergency response teams taking into account the individual radiation risks of their members.

In 2022, individual risk was calculated for 65,729 people, or 100% of the total number of group A employees. The vast majority of group A employees work in the conditions of acceptable occupational risk. For 686 people (1.04% of the total number of employees included in the IRAW system), individual risk exceeded the standard value of 10^{-3}. The high-risk group comprises mainly industry veterans, whose average age exceeds 60 years.

Over the past three years, the average individual radiation risk across ROSATOM did not exceed 6.5% of the standard value, and the maximum individual risk has been decreasing steadily.

Changes in the key indicators of the IRAW system in ROSATOM, %

Indicator	2020	2021	2022
Share of employees exposed to negligible and acceptable occupational risk	98.83	98.85	98.96
Share of employees in the high-risk group	1.17	1.15	1.04
Share of employees in the industry undergoing individual radiation exposure monitoring and included in the IRAW system	100.0	100.0	100.0

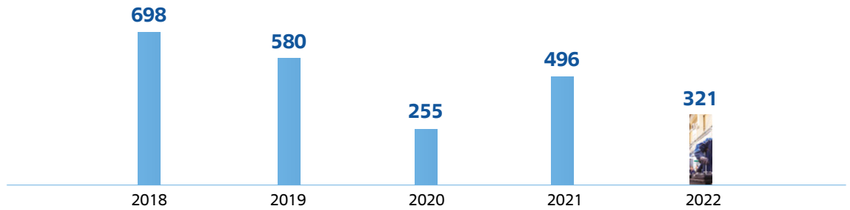
Individual radiation risks of personnel, relative units

Division/complex/unit	2020	2021	2022
Power Engineering Division	$9.3 \cdot 10^{-5}$	$9.6 \cdot 10^{-5}$	$9.0 \cdot 10^{-5}$
Mechanical Engineering Division	$3.9 \cdot 10^{-5}$	$3.9 \cdot 10^{-5}$	$4.1 \cdot 10^{-5}$
Fuel Division	$2.5 \cdot 10^{-5}$	$2.6 \cdot 10^{-5}$	$2.5 \cdot 10^{-5}$
Mining Division	$2.8 \cdot 10^{-5}$	$2.9 \cdot 10^{-5}$	$3.2 \cdot 10^{-5}$
Nuclear Weapons Division	$4.4 \cdot 10^{-5}$	$4.5 \cdot 10^{-5}$	$4.5 \cdot 10^{-5}$
Environmental Solutions	$3.7 \cdot 10^{-5}$	$3.7 \cdot 10^{-5}$	$3.8 \cdot 10^{-5}$
Science and Innovations	$7.4 \cdot 10^{-5}$	$7.2 \cdot 10^{-5}$	$7.4 \cdot 10^{-5}$
Engineering and Construction	$9.4 \cdot 10^{-5}$	$1.7 \cdot 10^{-5}$	$6.9 \cdot 10^{-6}$
Rusatom Healthcare	$1.9 \cdot 10^{-5}$	$1.9 \cdot 10^{-5}$	$1.8 \cdot 10^{-5}$
Northern Sea Route	$4.7 \cdot 10^{-5}$	$3.8 \cdot 10^{-5}$	$3.7 \cdot 10^{-5}$
Total across ROSATOM	**$6.2 \cdot 10^{-5}$**	**$6.4 \cdot 10^{-5}$**	**$6.1 \cdot 10^{-5}$**

Outcomes of inspections by supervisory authorities

The number of violations detected by supervisory authorities at potentially hazardous nuclear facilities in 2022 decreased by 20.35% as compared to the findings of previous inspections. Supervisory authorities inspected 24 organisations of ROSATOM and 13 branches thereof and conducted 44 routine benchmarking comparative inspections, with 20 inspections conducted by commissions. 23% of inspections conducted by supervisory authorities in five organisations and their branches revealed no issues.

Number of violations detected by safety regulators during routine inspections conducted by commissions at potentially hazardous facilities between 2018 and 2022



In 2022, nuclear and radiation safety inspections were conducted at 89 nuclear facilities; following 65 routine inspections, including ongoing monitoring, at 91% of the facilities no violations were detected that could affect their safe operation.

In 2022, all nuclear facilities operated reliably and safely with no violations of safe operating limits or conditions, including in terms of the safety of operating personnel and local residents.

5.2.9. Functioning of systems for technical regulation, standardisation, compliance assessment and ensuring the uniformity of measurements

Summary of measures in the sphere of accreditation, expert certification, standardisation and technical regulation. Main outcomes of standardisation activities in 2022

Pursuant to Articles 8 and 10 of Federal Law No. 317-FZ of 1 December 2007 on State Atomic Energy Corporation Rosatom, as well as Decree No. 669 of the Government of the Russian Federation dated 12 July 2016 on Approval of the Regulations on Standardisation with Regard to Products (Work, Services) Subject to Requirements for the Safe Use of Nuclear Energy, as well as Processes and Other Subjects of Standardisation Related to Such Products, the following activities were performed in 2022.

Amendments were made to the Standardisation Programme of ROSATOM by order of the Corporation. The following documents were approved:

- 32 national standards;
- 2 provisional national standards;
- 6 corporate standards of ROSATOM.

ROSATOM amended its Order on Appointing the Main Standardisation Organisation for Personal Protective Equipment and Arranging Methodological Support of the Main Standardisation Organisation for Personal Protective Equipment, as well as the Order on Standardisation Officers in ROSATOM.

In order to address the special characteristics and needs of the nuclear industry when developing and updating standardisation documents, ROSATOM's organisations are involved in the work and are members of 50 technical committees for standardisation and two project technical committees for standardisation, and are observers on two technical committees for standardisation.

In 2022, following an assessment of the performance of technical committees on standardisation (TCs) in 2021, TC 322 (Nuclear Engineering) ranked first among 230 technical committees in the ranking compiled by the Federal Agency for Technical Regulation and Metrology (Rosstandart), ahead of the leaders of recent years, such as TC 321 (Rocket and Space Engineering), TC 023 (Oil and Gas Industry) and TC 045 (Railway Transport). The functions of the secretariat for TC 322 are performed by Private Institution Atomstandart, an organisation of ROSATOM.

The secretariat of the Technical Committee of the International Electrotechnical Commission (IEC) on Nuclear Instrumentation (IEC/TC 45) has been assigned to the Russian Federation. ROSATOM supports the activities of JSC VNIIAES (All-Russian Research Institute for Nuclear Power Plants Operation), the primary organisation in charge of the IEC/TC 45 secretariat.

As part of IEC/TC 45, the following standardisation activities were carried out in 2022:

- Meetings of IEC/TC 45 and subcommittees and working groups under IEC/TC 45 were held;
- Three meetings of Russian experts sitting on IEC/TC 45 were held;
- Proposals for including a draft standard in the work programme were presented;
- Following the review of proposals, 11 standards were included in the work programme;
- Eight draft standards were reviewed; comments on three draft standards were prepared;
- Nine standards were published;
- Recommendations on the publication of two standards in Russian were issued.

The Russian Federation is a full member of the Technical Committee of the International Organisation for Standardisation (ISO) on Nuclear Energy (ISO/TC 85). In 2022, experts from ROSATOM's organisations and TC 322 were engaged in the following standardisation activities under ISO/TC 85:

- 44 draft standards and two draft amendments to a standard were reviewed;
- 14 proposals for developing and updating standards were analysed.

The Russian Federation is a full member of the Technical Committee on Additive Manufacturing (ISO/TC 261). In 2022, ROSATOM's specialists acting as official representatives of the Russian Federation on the ISO/TC 261 Technical Committee participated in the following standardisation activities:

- 19 draft standards and two draft technical reports were reviewed;
- Six proposals for developing standards were analysed.

In accordance with ROSATOM's orders, amendments were made to the consolidated list of documents on standardisation containing information about the documents (sections of documents) on standardisation whose application was mandatory.

The updated consolidated list of standardisation documents is available on ROSATOM's official website.

Information about compliance assessment activities

Mandatory product certification

To ensure the safety of nuclear facilities, in 2022, certification bodies and testing laboratories accredited in the use of nuclear energy continued to perform the certification of various products subject to requirements for the safe use of nuclear energy and intended for operation (use) at nuclear power and nuclear industry facilities.

As at 31 December 2022, 375 compliance certificates were issued based on certification results (no targets are set for the issuance of certificates).

Evaluation of technical documentation

As at 31 December 2022, expert organisations issued 750 expert opinions on the compliance of technical documentation with mandatory requirements and approved 1,543 amendments to technical documentation.

Certification testing

As at 31 December 2022, 404 certificates were issued for new welding technologies, and two certificates were issued for non-destructive testing systems.

Certification of personnel performing non-destructive and destructive testing of metal

Pursuant to federal standards and rules on the use of nuclear energy NP-071-18 Rules for Assessing Compliance of Products Subject to Requirements for the Safe Use of Nuclear Energy and Processes for Product Engineering (Including Surveys), Manufacture, Construction, Assembly, Adjustment, Operation, Storage, Transportation, Sales, Dismantling and Disposal, as approved by Order No. 52[1] of the Federal Environmental, Industrial and Nuclear Supervision Service (Rostekhnadzor) dated 6 February 2018, as at 31 December 2022, 13 documents on personnel certification in accordance with the GOST R 50.05.11-2018 standard were developed and came into force. Four bodies were authorised to perform personnel competency verification in accordance with the GOST R 50.05.11-2018 standard.

In the reporting year, 11,106 personnel certification procedures were performed, and 3,034 certificates were issued.

Information on the accreditation of certification bodies and testing laboratories (centres) and certification of accreditation experts

ROSATIOM carries out the accreditation of certification bodies and testing laboratories and the certification of accreditation experts as part of public services provided by the Corporation pursuant to Federal Law No. 210-FZ of 27 July 2010 on the Provision of Public and Municipal Services and Decree No. 612 of the Government of the Russian Federation dated 20 July 2013 on Accreditation in the Use of Nuclear Energy.

In 2022, ROSATOM received 505 requests for the provision of government accreditation services in the use of nuclear energy (six requests were subsequently withdrawn by applicants) and issued 36 accreditation certificates.

1. Registered with the Ministry of Justice of the Russian Federation on 7 March 2018, registration No. 50282.

The following decisions were made:

- To grant accreditation to seven organisations (two certification bodies and five testing laboratories (centres);
- To deny accreditation to 15 organisations (15 testing laboratories (centres);
- To expand the scope of accreditation of six organisations;
- To reduce the scope of accreditation of 15 organisations;
- To refuse to expand the scope of accreditation of seven organisations;
- To refuse to reduce the scope of accreditation of four organisations;
- To reissue the accreditation certificate for one organisation that had complied with instructions;
- To renew the accreditation certificates for two organisations that had complied with instructions;
- To invalidate the accreditation certificate of one organisation.

In 2022, 28 scheduled inspections were carried out. Based on their findings, notices were issued to two inspected organisations, and two accreditation certificates were suspended. To date, in one instance the relevant instructions have been carried out, and the competency of the accredited entity has been confirmed.

In 2022, one surprise inspection was carried out, and the competency of the accredited entity was confirmed.

Overall, as at 31 December 2022, ROSATOM accredited (as a cumulative total since the Corporation started providing the relevant government service):

- 9 certification bodies;
- 62 testing laboratories (centres) (certificates issued to two of them are currently suspended).

In 2022, ROSATOM received 16 requests for the provision of government services involving the certification of experts on accreditation in the use of nuclear energy and issued five expert certificates.

The following decisions were made:

- To grant certification to five experts on the accreditation of testing laboratories (centres);
- To confirm the competency of one accreditation expert;
- To deny the confirmation of competency to one accreditation expert;
- To invalidate one expert certificate.

As at 31 December 2022, certification was granted to a cumulative total of 42 accreditation experts, including 12 experts on the accreditation of certification bodies and 30 experts on the accreditation of testing laboratories (centres).

Proper organisation and the high quality of accreditation and certification of experts enabled ROSATOM to avoid any appeals from applicants, accredited entities or persons seeking the status of accreditation experts in 2022.

Information about the accredited entities and the persons who underwent certification is available on ROSATOM's official website[1].

Summary information on the functioning of the system for ensuring the uniformity of measurements

Regulatory framework underlying the system for ensuring the uniformity of measurements in the use of nuclear energy

Regulatory framework underlying the system for ensuring the uniformity of measurements in the use of nuclear energy:

National standards of the National Measurement Assurance System were developed and adopted, setting requirements for measurement techniques (methods) applicable to the use of nuclear energy (GOST R 8.932-2022. National Measurement Assurance System. Requirements for Measurement Techniques (Methods) in the Use of Nuclear Energy. Basic Provisions); requirements for metrological evaluation in the use of nuclear energy (GOST R 8.1015-2022. National Measurement Assurance System. Metrological Evaluation of Regulatory and Technical Documentation on the Use of Nuclear Energy. Organisation and Basic Content Requirements); and requirements for the classification of reference data used in the use of nuclear energy (GOST R 8.1009-2022. National Measurement Assurance System. Standard Reference Data Service in the Use of Nuclear Energy. Classifications of Standard Reference Data on the Properties of Substances and Materials in the Use of Nuclear Energy. Basic Provisions).

A national standard on metrological support of automated control systems was developed and approved (GOST R 70518-2022 Automated Control Systems of Nuclear Facilities. Metrological Support. Basic Provisions).

Information system and expert activities

Pursuant to Order No. 2037 of the Ministry of Industry and Trade of Russia dated 10 October 2014 on Approval of the Procedure for the Organisation and Maintenance of Sections of the Federal Information Fund for Ensuring the Uniformity of Measurements in the Use of Nuclear Energy, a total of 555,761 entries concerning measurement techniques (methods), standards of measurement, measuring instruments of the approved type and information on calibration testing of measuring instruments were made in the section of the Federal Information Fund for Ensuring the Uniformity of Measurements in the Use of Nuclear Energy as at 30 November 2022.

The following documents were reviewed in 2022:

- 170 sets of files on the testing of measuring instruments applied in the use of nuclear energy in order to approve their type;
- 20 sets of files on the certification of standards of measurement applied in the use of nuclear energy.

In accordance with the Procedure for Mandatory Metrological Evaluation in the Use of Nuclear Energy[1], mandatory metrological evaluation of 25 draft national standards and technical specifications developed for the use of nuclear energy was carried out in order to include them in the consolidated list of documents

1. http://www.rosatom.ru/about/tekhnicheskoe-regulirovanie/akkreditatsiya-v-oblasti-ispolzovaniya-atomnoy-energii-/

on standardisation; in addition, metrological evaluation of 31 draft industry standards and technical specifications applied in the use of nuclear energy was carried out.

Establishment of the Calibration System in ROSATOM

Pursuant to Order of ROSATOM No. 1/10-NPA dated 31 October 2013 on Approval of Metrological Requirements for Measurements, Standards of Measurement, Reference Standards, Measuring Instruments, Their Components, Software and Measurement Techniques (Methods) Applied in the Use of Nuclear Energy, a Calibration System for the Use of Nuclear Energy has been established. As part of the System, a core organisation of the metrological calibration service has been established by order of ROSATOM and is operating. In 2022, the competency of four organisations of ROSATOM was verified; 12 calibration techniques were developed, and metrological evaluation of one calibration technique was carried out.

Interlaboratory comparisons (ILCs)

ILCs carried out in 2022 focused on specific activity of gamma-emitting radionuclides in water solutions; measurements of the individual equivalent dose; measurements of mass concentration and isotopic abundance ratio of uranium (in nitric acid solutions); standard hardness block tests; and measurements used in radiation monitoring.

In 2022, a total of 68 organisations took part in the ILCs.

Inspection of the condition and use of measuring instruments, compliance with metrological rules and standards, and evaluation of measurement capabilities

ROSATOM's organisations carry out annual inspections of the condition and use of measuring instruments, standards of measurement, measurement, testing and monitoring techniques (methods), reference standards, certified items, testing equipment, standard reference data, tolerance monitoring instruments, compliance with metrological rules and standards (metrological supervision) and evaluation of measurement capabilities in measurement and testing laboratories.

In 2022, metrological supervision was performed in 28 organisations, and measurement capabilities were assessed in 50 laboratories of ROSATOM's organisations.

Based on the findings of metrological supervision, a consolidated report was prepared and submitted to Rosstandart in 2022 as part of federal metrological supervision.

Activity of the standard reference data service in the use of nuclear energy (SRDNE)

Certified reference data in the use of nuclear energy included data on physical properties of structural materials used in nuclear power units (EP-823, EK-164 and 12KH18N10T alloys) and thermodynamic properties of liquid metal coolants (gallium, mercury). Pursuant to Decree No. 596 of the Russian Government dated 20 August 2001 on Approval of the Regulations on the National Service of Standard Reference Data on Physical Constants and Properties of Substances and Materials, data were updated

1. Approved by Order No. 1693 of the Russian Ministry of Industry and Trade dated 29 May 2017.

on decay properties of 26 radionuclides used as primary standards of photon radiation, and on decay properties of 25 radionuclides produced as a result of uranium and plutonium fission.

Pursuant to Order No. 737-r of the Government of the Russian Federation dated 19 April 2017 on Approval of the Strategy for Ensuring the Uniformity of Measurements in the Russian Federation until 2025, Rosstandart approved the Concept of Development of the SRDNE for the Period until 2027 in consultation with ROSATOM.

ROSATOM and Rosstandart approved and issued Metrological Recommendations on Estimates of Uncertainty/Error in Model Dependence Parameters Assessed Based on Matched Measurements (MI 3663-2022). Metrological Recommendations on the Methodology for Estimating Nuclear Physics Properties of Radionuclides were developed, agreed with ROSATOM and Rosstandart and approved by the Commission on the Certification of Reference Data in the Use of Nuclear Energy.

5.2.10. Plans for 2023

The Corporation plans to update:

- Regulations on the metrological support system for the nuclear industry;
- Regulations establishing the procedure for the testing of measuring instruments applied in the use of nuclear energy in order to approve their type;
- The List of Measurements Subject to Government Regulation Aimed at Ensuring the Uniformity of Measurements and Performed as Part of Activities Involving the Use of Nuclear Energy, and the Relevant Mandatory Metrological Requirements, Including Measurement Accuracy Indicators, approved by order of ROSATOM.

ORGANISATIONS TOOK PART IN INTERLABORATORY COMPARISONS

Metrological supervision is to be performed in 27 organisations, and the assessment of measurement capabilities is to be carried out in 51 laboratories of ROSATOM's organisations.

Certified reference data on radiation, thermal physics and neutron physics are to be added to the relevant section in the Information System of the Federal Information Fund for Ensuring the Uniformity of Measurements in the Use of Nuclear Energy.

A Methodology for Expert Review of Reference Data Assessment and a Procedure for the Preparation, Documentation and Storage of Certificates for Reference Data in the Use of Nuclear Energy will be developed to support the implementation of the Concept of Development of the Standard Reference Data Service in the Use of Nuclear Energy until 2027.

Planned ICLs will be focused on the measurement of uranium content, linear and angular measurements, and mechanical properties of structural materials.

GRI 3-3

5.3. RAW AND SNF MANAGEMENT AND DECOMMISSIONING OF FACILITIES POSING NUCLEAR AND RADIATION HAZARDS

Key results in 2022

- All targets of FTP NRS 2 were achieved; progress in the achievement of the Programme's main goal totalled 33.8% (as against the target of 33%).
- Eight facilities posing nuclear and radiation hazards were decommissioned.
- The dismantling of two nuclear submarines was completed, and four storage packages from nuclear maintenance ships were placed in long-term storage.

5.3.1. Outcomes of the Federal Target Programme on Nuclear and Radiation Safety for the period from 2016 through 2020 and for the period until 2050

In 2022, ROSATOM continued to actively implement FTP NRS 2, including the following projects:

- Decommissioning industrial uranium-graphite reactors in FSUE Mining and Chemical Plant and JSC Pilot Production and Demonstration Centre for Decommissioning of Uranium-Graphite Nuclear Reactors and the BR-10 research reactor;
- Decommissioning facilities forming part of the radiochemical plant in FSUE Mining and Chemical Plant, as well as disused buildings and structures at the radiochemical plant and liquid radioactive waste storage sites and Reservoir 17 'Staroye Boloto' ('Old Marsh') of FSUE Mayak Production Association;
- Maintaining the Techa Cascade of Reservoirs in a safe condition in accordance with the developed Strategic Master Plan for Addressing Issues Related to the Techa Cascade of Reservoirs;
- Preparing the shut-down power units at JSC Rosenergoatom's NPPs (Leningrad, Bilibino and Beloyarsk NPPs) for decommissioning;
- Construction of SNF and RAW management infrastructure at Leningrad, Smolensk and Kursk NPPs;
- Rehabilitation of radiation-contaminated sites with a total area of 110,900 m^2.

The decommissioning of nuclear plant U-5 in Moscow and buildings in FSUE Mayak Production Association was completed.

In 2022, all targets under FTP NRS 2 were achieved, with progress towards the achievement of the main goal of FTP NRS 2 totalling 33.8% as against the target of 33%.

5.3.2. Development of the integrated national system for radioactive waste management

Volume of accumulated RAW (total, 'nuclear legacy', for the year, including intermediate-, high- and low-level waste)

At year-end 2022, the volume of RAW totalled 5.72×10^{8} m³, of which 5.53×10^{8} m³ were classified as accumulated RAW ('nuclear legacy').

RAW generation in 2022

RAW	Very low-level waste	Low-level waste	Intermediate-level waste	High-level waste
Solid RAW, m³	6.21×10^{5}	4.23×10^{3}	2.8×10^{3}	4.42×10^{2}
Liquid RAW, m³	–	5.9×10^{5}	9.29×10^{4}	2.59×10^{4}

In 2022, work on the third stage of development of the Integrated National System for Radioactive Waste Management (INS RWM) continued.

Commissioning of RAW disposal facilities

No RAW disposal facilities were commissioned in 2022.

On 21 March 2022, Rostekhnadzor issued Licence No. GN-03-304-4212 to operate the second stage of the near-surface disposal site for solid radioactive waste in Novouralsk (Sverdlovsk Region).

The site has a total capacity of 39,300 m³.

Outcomes and progress on plans for the construction and renovation of RAW management infrastructure

The Corporation continued to build an underground research laboratory to support the construction of the first stage of a permanent disposal facility (deep repository) for class 1 and class 2 RAW (Nizhne-Kansky Rock Massif, Krasnoyarsk Territory).

As part the projects to build a near-surface disposal site for class 3 and class 4 solid RAW (Chelyabinsk Region, Ozersk Urban District) and a near-surface disposal site for class 3 and class 4 solid RAW in the Seversk Branch of FSUE National Operator for Radioactive Waste Management (Tomsk Region, Seversk), construction of auxiliary buildings and structures, warehouses, transport infrastructure, an access road to the site, and internal and external utility networks continued in 2022.

Disposal of class 3 and class 4 RAW continued; 2,800 m³ of RAW were accepted for disposal in the reporting year.

Three deep repositories for class 5 liquid RAW were in operation in the CATFs of Dimitrovgrad (Ulyanovsk Region), Seversk (Tomsk Region) and Zheleznogorsk (Krasnoyarsk Territory).

5.3.3. SNF management

As at 31 December 2022, the volume of SNF accumulated in the Russian Federation totalled 26,199 tonnes (tHM[1]), including 16,892 tonnes of SNF in federal ownership. In the reporting year, 530 tonnes of SNF were accumulated.

In the reporting year, 1,007.93 tonnes of SNF were removed from nuclear facilities in the Russian Federation, and 132.99 tonnes of various types of SNF were reprocessed (including 64.19 tonnes of SNF in federal ownership). Reprocessed SNF accounted for 25.1% of the total volume of SNF generated in the Russian Federation during the year.

Work performed in 2022 included the following:

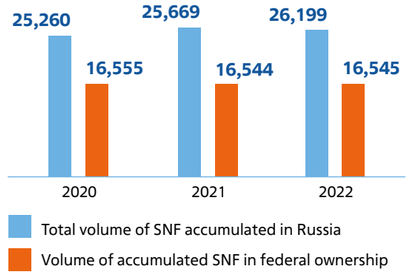
Reactor type	Number of SFAs	Description
RBMK-1000	7,488	Removal and placement in dry storage in FSUE Mining and Chemical Plant (MCP)
VVER-1000	82	Removal and placement in temporary storage for subsequent reprocessing in FSUE Mining and Chemical Plant
VVER-1000	164	Removal and transportation to FSUE Mayak Production Association for reprocessing
VVER-440	335	
BN-600	245	
BN-800	160	

SNF from the BN-800 reactor (Beloyarsk NPP) was reprocessed for the first time. Removal of SNF from the sites of research institutes and industrial reactor facilities continued. All SNF in the form of irradiated aluminium-clad dispersion fuel elements (ODAV) was removed from the sites JSC Pilot Production and Demonstration Centre for Decommissioning of Uranium-Graphite Nuclear Reactors and FSUE Mining and Chemical Plant.

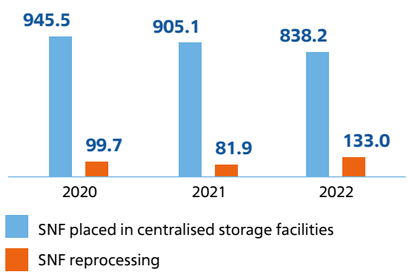
No new SNF reprocessing capacities were commissioned in 2022.

In the reporting year, the construction of the second start-up facility of the Pilot and Demonstration Centre (PDC) for SNF Reprocessing continued in FSUE Mining and Chemical Plant. The PDC is expected to become a leading-edge SNF reprocessing plant with a high level of environmental and economic performance.

SNF accumulation in Russia, tonnes



SNF placed in storage and reprocessed, tonnes



1. Tonnes of heavy metal.

5.3.4. Developing a system for the decommissioning of facilities posing nuclear and radiation hazards and addressing the 'nuclear legacy'

In 2022:

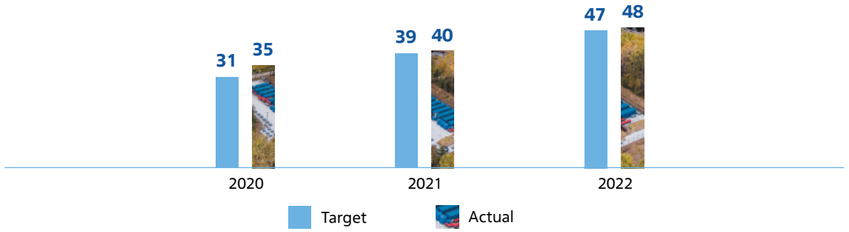
- Radiation and environmental monitoring of the Yenisei River floodplain was continued; by year-end 2022, no areas requiring rehabilitation had been identified;
- As part of a project to develop an industry-wide information system for decommissioning, the development of a site-level system continued based on a prototype developed earlier.

Work continued on a feasibility study for the launch of a project to develop a corporate information system for digital preparation for decommissioning scheduled for 2023. The project will involve developing cutting-edge tools for digital comprehensive engineering and radiation safety audit and digital development of design documentation for decommissioning, which will minimise the impact of human error on these processes.

5.3.5. Decommissioning and dismantling of facilities posing nuclear and radiation hazards

In 2022, eight facilities posing nuclear and radiation hazards were decommissioned.

Decommissioning and dismantling of facilities posing nuclear and radiation hazards (as a cumulative total since 2016)



5.3.6. Dismantling of nuclear submarines

The most important outcomes of work performed in 2022 included the following:

- The dismantling of two nuclear submarines and the floating hull unit of a nuclear maintenance ship (TNT-19) was completed; four storage packages from nuclear maintenance ships (TNT-49, PM-50) were prepared and placed into long-term storage; the floating hull unit of a Project 1941 large nuclear reconnaissance ship, *Ural*, was dismantled;
- The disposal of 3.4 tonnes of SNF from spent fuel assemblies (SFAs) from military nuclear power systems was completed;
- 1,937 SFAs were unloaded and transported for processing;

- The dismantling of the spent removable core from a dismantled Project 645 nuclear submarine was completed, and SNF was transported for disposal;
- 900 m^3 of solid radioactive waste accumulated during the past operation of nuclear submarines, surface ships with nuclear propulsion units and nuclear maintenance ships were conditioned;
- Environmental rehabilitation of sites near pier No. 4 and special sewerage systems of dismantled tanks No. 1 and 2 in Pavlovsky Bay (a former nuclear submarine base) in the Primorsky Territory was completed.

5.3.7. International technical assistance received in the reporting year

In 2022, delivery of equipment, tools and appliances to prepare storage facility 3A in Andreev Bay for SNF unloading was completed. The equipment will be used for work financed by ROSATOM and scheduled for the period from 2022 through 2024.

The supply of goods and the disbursement of funds have been suspended for an indefinite period.

Objectives and plans for 2023 and for the medium term

BIn 2023, ROSATOM will continue to implement the Federal Target Programme on Nuclear and Radiation Safety for the Period from 2016 through 2020 and until 2035, including:

- Transportation of accumulated SNF from NPP sites to long-term storage facilities;
- Rehabilitation of radiation-contaminated sites and decommissioning of facilities posing nuclear and radiation hazards.

In terms of the dismantling of nuclear submarines, surface ships with a nuclear propulsion unit and nuclear maintenance ships and the clean-up of facilities posing radiation hazards, in 2023, ROSATOM plans to:

- Complete the preparation of the reactor compartment of the dismantled nuclear submarine No. 394 and its placement into long-term onshore storage;
- Dismantle one nuclear maintenance ship (PM-50);
- Dismantle the fairwaters and missile tube covers from two nuclear submarines that are being dismantled;
- Unload two trainloads of irradiated SFAs from military nuclear power systems (accumulated as a result of Navy activities at the former coastal maintenance base in Andreev Bay) and transport them for disposal;
- Dispose of 1.534 tonnes of irradiated SFAs from military nuclear power systems;
- Condition 1,000 m^3 of solid radioactive waste accumulated during the past operation of nuclear submarines, surface ships with nuclear propulsion units and nuclear maintenance ships;
- Continue to implement projects expected to deliver the final outcomes in later periods.

5.4. ENVIRONMENTAL SAFETY

Key results in 2022:

- Expenditure on environmental protection totalled RUB 24.65 billion.
- Direct greenhouse gas emissions in the Corporation's organisations in Russia totalled 17,423,100 tonnes.
- Pollutant emissions into the atmosphere from nuclear organisations totalled 39,100 tonnes.

GRI 3-3

5.4.1. Environmental safety and environmental protection management

The environmental footprint of the nuclear power industry is smaller than that of carbon-based power generation using fossil fuels. Emissions of hazardous chemicals, including those that destroy the ozone layer or contribute to the greenhouse effect, from nuclear power plants are close to zero.

ROSATOM and its organisations attach great importance to environmental safety and operate responsibly in accordance with the following principles:

- Giving priority to preserving natural ecosystems;
- Making use of the latest scientific achievements and ensuring environmental safety as a mandatory requirement;
- Transparency and making information on environmental aspects of operations of organisations in the industry publicly available.

Ensuring environmental safety in the regions where ROSATOM operates is one of the priorities of its corporate strategy. Operational efficiency, responsible use of natural resources and timely environmental protection measures combined with a willingness to share unique knowledge in order to address the nation's environmental problems, including those related to handling hazardous waste and repairing historical environmental damage, reflect management focus on the environment and a strong environmental culture among ROSATOM's employees.

The Corporation's environmental priorities and values are reflected in the Uniform Industry-Wide Environmental Policy of ROSATOM and Its Organisations[1]. A number of tasks facing the industry require a comprehensive approach and cannot be accomplished within a single year. In 2022, ROSATOM continued to implement the three-year Comprehensive Plan for the Implementation of the Environmental Policy for the period from 2022 through 2024. It includes organisational, operational and technical measures to be implemented by the Corporation and its organisations in order to improve the environment and the standard of living. Successful environmental safety management requires team leadership, openness and speeding up decision-making. Accordingly, a list of environmentally relevant organisations is compiled in the industry on an annual basis (69 organisations in 2022). The Corporation's management gives special focus to their operations. Adhering to the principle of transparency, environmentally relevant organisations publish year-end annual reports on environmental safety on their websites and circulate them to stakeholders.

1. https://www.rosatom.ru/upload/iblock/74e/74eb9c650aa73e74d0b9b9aadea0c1f8.pdf

In order to prevent non-compliance with legislative and regulatory requirements for environmental protection, as part of the internal safety control system functioning in ROSATOM, inspection visits are carried out, including inspections of environmental protection at production facilities in the industry; the findings of these inspections provide a basis for the relevant managerial decisions aimed at improving environmental safety performance.

Organisations in the industry continue to develop and implement environmental, energy and quality management systems, as well as occupational health and safety management systems.

GRI 2-25

A five-year industry-wide action plan has been developed to minimise the negative environmental impact of the operations of ROSATOM's organisations until 2025. The plan is aimed at reducing the negative impact on the atmosphere and the climate impact, reducing emissions and the use of ozone-depleting substances, reducing the negative impact of waste on the environment, reducing the negative impact on water bodies, reducing the negative impact on biodiversity and its conservation, and reducing the negative impact on soil, land resources and subsoil; it also includes measures aimed at improving energy efficiency, controlling and monitoring the impact on various components of the environment. It also indicates expected environmental benefits from these activities.

In order to meet statutory requirements, a greenhouse gas emissions accounting system has been established in the nuclear industry, and steps are being taken for its further improvement. As part of Russia's commitment to comply with the requirements of the Stockholm Convention on Persistent Organic Pollutants, an inventory of equipment and waste containing polychlorinated biphenyls has been compiled in ROSATOM's organisations, and plans are being developed for the decommissioning of such equipment and the transfer of waste for decontamination/disposal.

Commissions under the General Inspectorate communicate with representatives of regional departments of federal executive authorities as part of inspections and preventive visits to the organisations. ROSATOM's Public Council as a collective expert body facilitates communication and cooperation between the Corporation's organisations and the public, non-profit organisations, regional and local governments in Russia and abroad.

In order to minimise environmental risks, in the reporting period, ROSATOM consistently implemented comprehensive preventive measures approved by the Corporation's Director General to prevent potential environmental damage from its operations:

1. Directive of ROSATOM on Approval of an Action Plan to Minimise the Negative Impact from ROSATOM on the Environment until 2025 (as amended in 2022). In 2022, performance of nuclear organisations against the targets set in the Action Plan stood at 130.4% (23 measures were planned; 30 measures were implemented, with seven measures implemented ahead of schedule).
2. Directive of ROSATOM on Approval of a Road Map for the Adaptation of ROSATOM and its Organisations to Climate Change Given the Introduction of State Regulation of Greenhouse Gas Emissions in the Russian Federation.
3. Order of ROSATOM on the Establishment of an Industry-Wide Working Group on the Planning of Measures for the Adaptation of the Industry to Climate Change and the Introduction of State Regulation of Greenhouse Gas Emissions.

For details on the assessment of progress in the implementation of the Environmental Policy, see the Annual Report of ROSATOM for 2021, pp. 401-402.

5.4.2. Financing of environmental measures

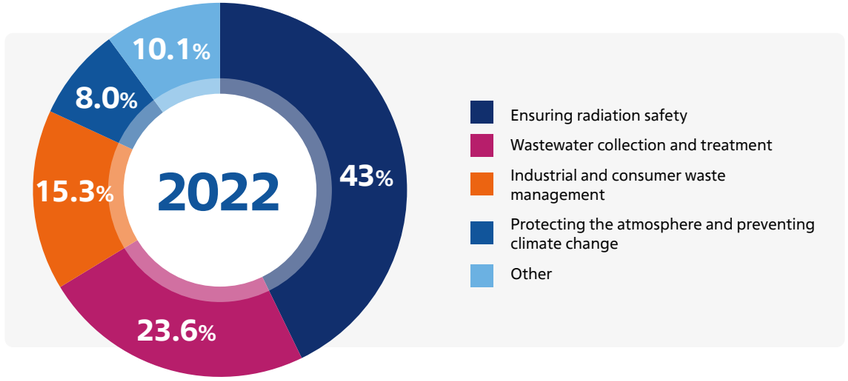
In 2022, expenditure on environmental protection in ROSATOM's organisations totalled RUB 24.65 billion, including expenditure on environmental activities of RUB 19.75 billion and fixed asset investment for environmental purposes of RUB 4.90 billion. Environmental costs increased by RUB 3.55 billion year on year. The increase was driven by an increase in investments in water recycling systems at Kursk NPP.

Environmental costs in ROSATOM, RUB billion

Indicator	2020	2021	2022
Expenditure on environmental measures	19.56	19.79	19.75
Fixed asset investment for environmental purposes	7.33	1.31	4.90
Total	**26.89**	**21.10**	**24.65**

The largest portion of expenditure on environmental measures was allocated for ensuring radiation safety (43.0%).

Environmental cost structure



A major part of fixed asset investment was allocated for the protection and sustainable use of water resources (81.8%) and the protection of the atmosphere (14.7%).

Branches of JSC Rosenergoatom account for 90.9% of the total fixed asset investment of ROSATOM's organisations aimed at environmental protection.

ROSATOM's organisations account for 1.6% of the total amount of environmental investment in the Russian Federation[1].

1. Based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2021.

GRI 2-27

5.4.3. Environmental charges and fines

In 2022, charges for the negative environmental impact totalled RUB 133.4 million, including charges for allowable emissions and discharges of pollutants, disposal of industrial and consumer waste totalling RUB 33.8 million (25.3%), and charges for excess emissions and discharges totalling RUB 99.6 million (74.7%).

In 2022, government supervision agencies in the field of natural resource management detected 31 violations in ROSATOM's organisations, for which they imposed administrative penalties in the form of fines.

Fines imposed on ROSATOM's organisations for non-compliance with environmental and natural resource management requirements totalled RUB 1.99 million; compared to 2021, the amount decreased by RUB 1.71 million, or by a factor of 1.86 (46.2%).

The violations detected by the government supervision agencies were local in scale and did not pose a significant threat to public health.

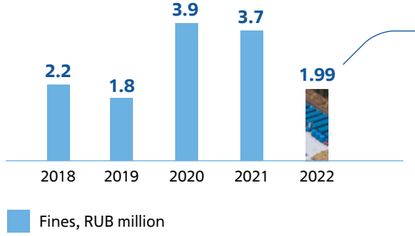
In 2022, LLC Atom Thermal Power Network paid RUB 2.72 million in compensation for environmental damage from wastewater discharges from treatment facilities into the Pinozero Reservoir in excess of the established permissible discharge limits.

Changes in the number of violations of environmental legislation by ROSATOM's organisations and the amounts of fines between 2018 and 2022 are shown in the figure below.

Prevention of environmental non-compliance

15
organisations in the industry have been inspected by government inspectors to assess environmental compliance

120
instances of environmental non-compliance have been detected, and action plans are being implemented to address them



-46.2%
In the reporting period, the total amount of fines for administrative violations decreased by a factor of 1.86

Charges for the negative environmental impact, RUB million

Indicator	2020	2021	2022
Charges for allowable emissions (discharges) of pollutants (disposal of industrial and consumer waste), total, including:	35.1	49.5	33.8
– into water bodies	3.1	4.1	3.1
– into the atmosphere	3.1	4.0	3.4
– for the disposal of industrial and consumer waste	28.9	41.4	27.3
Charges for excess emissions (discharges) of pollutants (disposal of industrial and consumer waste), total, including:	40.5	48.8	99.6
– into water bodies	15.2	3.5	31.2
– into the atmosphere	13.9	7.7	2.7
– for the disposal of industrial and consumer waste	11.4	37.6	65.7
Charges for allowable and excess emissions (discharges) of pollutants (disposal of industrial and consumer waste), total	75.6	98.3	133.4

5.4.4. Pollutant emissions into the atmosphere

In 2022, pollutant emissions into the atmosphere totalled 39,100 tonnes; the pollutant capture rate reached 89.6%. In 2022, ROSATOM's organisations accounted for 0.2% of the total emissions in the Russian Federation[1].

Pollutant emissions into the atmosphere, '000 tonnes

Emissions	2020	2021	2022
Total, including:	38.0	37.0	39.1
– Particulate emissions	14.2	13.5	11.7
– NO_x emissions	6.1	7.4	10.0
– SO_2 emissions	11.6	9.8	10.7
– CO emissions	3.3	3.8	4.3
– Hydrocarbon emissions, including:	2.2	2.1	2.0
– Methane emissions	0.8	0.7	0.7
– Volatile organic compounds	1.2	1.3	1.0
– Other gaseous and liquid compounds	0.6	0.4	0.4

Pollutant emissions into the atmosphere increased by 2,100 tonnes compared to 2021, as data on the branch of JSC RIR in Ozersk (included in the scope of organisations controlled by the Corporation since September 2021) were recorded for the full reporting year.

1. Based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2021.

Pollutant emissions from individual groups of pollution sources, '000 tonnes

Substance	From fuel combustion for electricity and heat generation	From production and other processes
Particulate matter	10.6	1.1
NO_x	9.0	1.0
SO_2	10.0	0.7
CO	3.1	1.2
Hydrocarbons, including volatile organic compounds (excluding methane)	0.01	1.2

Emissions of major ozone-depleting substances, tonnes of chlorofluorocarbon-11 equivalent[1]

Substance	2019	2020	2021	2022
Dichlorodifluoromethane (Freon 12)	72.24	72.24	72.24	14.05
Chlorodifluoromethane (Freon 22)	0.21	0.09	0.21	0.13
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.00	0.00	0.00	0.00
Chlorotrifluoromethane (Freon 13)	164.21	164.21	164.21	123.75
Tetrafluoromethane (Freon 14)	6.24	6.24	6.24	0.24
Total	**242.90**	**242.78**	**242.90**	**138.17**

Emissions of ozone-depleting substances decreased in 2022 as a result of the use of instrumental methods for measuring dichlorodifluoromethane (Freon 12) emissions and a reduction in the equipment operating time at JSC Chepetsk Mechanical Plant.

Initiatives to reduce harmful emissions into the air

Key measures implemented in 2022 included the following:

- The upgrade of air conditioning systems continued in the Rostov NPP branch of JSC Rosenergoatom. The project is expected to eliminate the use of 800 kg of ozone-depleting Freon R22 in autonomous air conditioners at power unit No. 1;
- An ammonia intake, storage and supply facility (room OVK-13) was upgraded in the Kola NPP branch of JSC Rosenergoatom, resulting in a 50% reduction in ammonia emissions into the atmosphere;
- In JSC Afrikantov OKBM, a GOU FVG-M-6,4-Sch scrubber was replaced with a more efficient wet gas scrubber, GM4-800-FVG-PP, in a workshop manufacturing electrical products and galvanic coatings;
- Protective casings were installed for flange joints of oil pressure lines of turbine unit No. 1 in the Seversk branch of JSC RIR;
- In JSC CDBMB, the welding area in building 251A was equipped with three cantilever-type fume extraction systems, ensuring the pollutant removal efficiency of up to 99.5%.

1. The data are presented taking into account the ozone depletion potential of substances under the Montreal Protocol on Substances that Deplete the Ozone Layer. The calculations have been made for those ozone-depleting substances that are reported in Form 2-TP (Air) as specific pollutants.

5.4.5. Greenhouse gas emissions

Federal Law No. 296-FZ of 2 July 2021 on Limiting Greenhouse Gas Emissions establishes a regulatory framework for greenhouse gas emission control in the Russian Federation.

In order to meet statutory requirements, a greenhouse gas emissions accounting system has been established in the nuclear industry, and steps are being taken for its further improvement. In 2022, a framework high-level document was updated: the Regulations on a System for Accounting for Greenhouse Gas Emissions Generated by the Operations of ROSATOM's Organisations in the Russian Federation. A list of organisations included in the industry-wide system for accounting for greenhouse gas emissions from organisations located in the Russian Federation and producing direct greenhouse gas emissions was compiled in accordance with the provisions of Federal Law No. 296-FZ of 2 July 2021. The threshold for the inclusion in the industry-wide system has been set at 20,000 tonnes or more of CO_2 equivalent per year (according to the Russian methodology), which is a more ambitious target compared to the regulatory threshold set at 150,000 tonnes of CO_2 equivalent per year.

The said list includes 32 organisations in the nuclear industry (legal entities and branches) that report on greenhouse gas emissions in the form approved by Decree No. 707 of the Government of the Russian Federation dated 20 April 2022. Work is underway to establish an industry-wide greenhouse gas emission management system and calculate greenhouse gas emissions in accordance with international methods (Scope 1 and Scope 2).

For details, see the section 'Sustainable Development Management'.

In 2022, direct greenhouse gas emissions from ROSATOM's organisations included in the industry-wide accounting system totalled 17,423,100 tonnes, or 17,503,400 tonnes of CO_2 equivalent, according to the Russian methodology.

Direct greenhouse gas emissions from ROSATOM's organisations in the Russian Federation, 000 tonnes[1]

Greenhouse gas	2022
Carbon dioxide	17,421.2
Methane	1.865
Nitrous oxide	0.002
Tetrafluoromethane	0.005
Total	**17,423.1**

5.4.6. Water use

GRI 3-3
GRI 303-1

The nuclear industry is a major water user. The systematic approach to water use management is underpinned by water accounting data covering all water resources used in the industry (surface water, groundwater, reused and recycled water). Furthermore, industrial facilities are designed and their locations are selected with due regard for uneven geographical distribution of natural water resources. Wastewater quality assurance approaches and methods used by the Corporation are based on scientific research and are aimed at preserving the natural water quality and minimising pollutant discharges into water bodies, thus ensuring the sustainability of water resources in the regions of operation.

1. Data on the Corporation's greenhouse gas emissions include PJSC Quadra – Power Generation, which was included in ROSATOM's scope of consolidation in 2022.

Water withdrawal and discharge for the needs of ROSATOM's organisations is regulated by water use agreements and fully complies with prescribed limits.

Sustainable use of water resources is achieved through:

- The use of water recycling and reuse systems;
- Wastewater treatment using mechanical, biological, and physical and chemical methods;
- Minimising freshwater consumption in regions with access to seawater;
- Continuous monitoring of wastewater quality and compliance with statutory limits;
- The implementation of investment projects focused on the construction and renovation of wastewater treatment facilities and water supply networks.

In 2022, water withdrawal from natural sources by ROSATOM's organisations made up 8.6%[1] of the total water withdrawal in the Russian Federation. The main water consumers among ROSATOM's organisations are Leningrad NPP and Kola NPP (74.7% of the total water withdrawal).

In the reporting year, water withdrawal by ROSATOM's organisations totalled 5,536.1 million m³, which is 556.9 million m³ more than in 2021. This was primarily caused by a rise in seawater intake at Leningrad NPP due to an increase in power generation and the fact that electricity is produced by RMBK-1000 units.

GRI 303-3

Total water withdrawal, million m³

Source	2020	2021	2022
Seawater	3,772.7	2,672.3	2,930.1
Fresh surface water, including rivers, marshes and lakes	2,191.2	2,204.5	2,505.0
– including regions with the scarcest water resources	-	-	59.6
Groundwater	77.5	82.1	81.5
– including regions with the scarcest water resources	-	-	4.5
Rainwater	2.4	2.4	2.3
Water from third-party organisations	15.4	17.9	17.23
Total	**6,059.2**	**4,979.2**	**5,536.1**
– including regions with the scarcest water resources	-	-	64.1

ROSATOM's regions of operation include regions with the smallest total amount of water resources, namely the Kursk and Kurgan Regions[2]. The volume of water used by the Corporation's organisations in water recycling and reuse systems totalled 37,623.7 million m³ in 2022.

1. Based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2021.
2. Based on data provided in the Government Report on the Status and Use of Water Resources of the Russian Federation in 2020.

Volume of recycled and reused water

Indicator	2020	2021	2022
Total volume of recycled and reused water, million m³	36,308.2	37,974.6	37,623.7
Water withdrawal, million m³ (% of recycled and reused water)	6,059.2 (16.7%)	4,979.2 (13.1%)	5,536.1 (14.7%)
Total, million m³	42,367.4	42,953.8	43,159.8
Share of recycled and reused water in water withdrawal, %	599.2	762.7	679.6

The volume of water used by ROSATOM's organisations for their own needs in 2022 totalled 5,434.2 million m³, which is 553 million m³ more than in 2021. This was mainly due to an increase in water consumption at Leningrad NPP.

Water consumption for own needs, million m³

Type of consumption	2020	2021	2022
Drinking and sanitary purposes	37.6	37.0	38.1
– including regions with the scarcest water resources	-	-	1.2
Operational needs	5,928.5	4,810.5	5,364.1
– including regions with the scarcest water resources	-	-	61.4
Other types	19.4	33.7	32.0
– including regions with the scarcest water resources	-	-	1.2
Total	5,985.5	4,881.2	5,434.2

Water discharge

GRI 303-4 ROSATOM manages all its negative impacts in compliance with the standards set in laws and regulations of the Russian Federation, which stipulate the necessary tools for identifying and controlling pollutant discharges.

All of ROSATOM's organisations discharge wastewater within the established limits and have the relevant permits. Pollutant content in wastewater is monitored by in-house laboratories as part of industrial environmental control; compliance with statutory limits is confirmed as part of monitoring and supervision by the Federal Service for Supervision of Natural Resources. In some cases, water from natural water sources does not meet quality standards, and an organisation withdraws water that has already been contaminated for its own needs. In these cases, water is also treated before discharge to ensure compliance with statutory limits, where possible.

In 2022, wastewater discharge by ROSATOM's organisations totalled 4,849.3 million m³ (including 5.6 million m³ in water-stressed regions), with clean water compliant with regulatory requirements accounting for 95.6% of the total volume, while the share of treated wastewater compliant with regulatory requirements and contaminated wastewater was 0.7% and 3.7% respectively.

In the structure of wastewater discharge, the main destinations are seas (59.2%), lakes (29.4%) and rivers (9.3%).

In 2022, wastewater discharge increased by 584.8 million m³ compared to 2021 due to an increase in discharges from Leningrad NPP into the Gulf of Finland in the Baltic Sea.

In 2022, discharge of treated wastewater compliant with regulatory requirements totalled 32.1 million m³, of which 10.4% was treated using the biological method, 3.8% was treated using the physical and chemical method, and 85.8% was treated using the mechanical method.

Contaminated wastewater discharge by ROSATOM's organisations accounted for 1.6% of the total volume of discharges in Russia in 2022[1].

Total wastewater discharge in 2022, million m³

Total wastewater discharge	**4,849.3**
Total discharge with a breakdown by destination, including:	4,849.3
– Surface water, including marshes, rivers and lakes	1,977.9
– Groundwater	0.2
– Seawater	2,871.2

Total wastewater discharge, million m³

Water category	2020	2021	2022
Clean water compliant with regulatory requirements	5,209.8	4,075.1	4,636.4
Treated wastewater compliant with regulatory requirements	35.4	40.1	32.1
Contaminated wastewater	144.2	149.3	180.8
Total	**5,389.4**	**4,264.5**	**4,849.3**

Pollutant content in wastewater in 2022, kg

Pollutant	2020	2021	2022
Chemical oxygen demand	18,522,404.434	13,833,926.355	5,720,214.386
Suspended matter	4,045,661.000	1,803,633.000	2,570,261.000
Phosphates (phosphorus contained)	25,540.000	32,902.000	35,795.000
Hexavalent chromium	41.558	64.595	102.118
Trivalent chromium	40.713	62.828	133.695
Manganese	776.084	633.565	640.469
Iron	33,573.719	23,198.916	35,296.603
Nickel	57.648	72.753	82.803
Copper	357.324	408.081	560.388
Zinc	782.583	577.472	695.118
Molybdenum	484.983	457.754	622.000
Cadmium	0.824	1.521	1.608
Lead	15.472	13.199	25.091

1. Based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2021.

Initiatives to reduce discharges of harmful substances into water bodies

GRI 303-2 Key measures implemented in 2022 included the following:

- PJSC PIMCU carried out comprehensive tests of process equipment and process lines of the mine water treatment plant at Mine No. 6 in the pre-commissioning and operating modes;
- Major repairs of secondary sedimentation tanks of packaged sewage treatment plants at Kola NPP were carried out to improve the quality of biological wastewater treatment;
- In the Atommash branch of JSC AEM-Technologies (Volgodonsk), pipelines, floatation units and tanks of industrial wastewater treatment facilities were flushed, which enabled a 5% increase in the efficiency of industrial wastewater treatment;
- FSUE Instrumentation Factory commissioned a plant-wide complex of wastewater and storm water treatment facilities, which will help to reduce the discharge of pollutants into the Yuryuzan River by 45%;
- JSC Chepetsk Mechanical Plant introduced the use of recycled water for equipment cooling in the granulation section of workshop No. 5, which reduced water consumption by 9,213 m³ per year;
- The North-West Centre for Radioactive Waste Management SevRAO (a branch of FSUE FEO) completed the upgrade of treatment facilities in its Saida-Guba and Guba Andreeva divisions, which will reduce the negative impact on water bodies.

5.4.7. Industrial and consumer waste management

In 2022, nuclear organisations produced 35.5 million tonnes of industrial and consumer waste, which is 1.7 million tonnes (5.0%) more than in 2021. Hazard class 4 and 5 waste (low-hazard and virtually non-hazardous waste) accounted for 99.98% of the generated waste.

An increase in the volume of waste generated in 2022 was due to an increase in the amount of loose overburden produced in PJSC PIMCU. Most of the waste is class 5, which is the least hazardous waste. Industrial and consumer waste generated in ROSATOM's organisations accounted for 0.4% of the total volume of waste generation in Russia in 2022[1].

85.7% of the total amount of waste generated and received by ROSATOM's organisations was recycled; 0.004% was treated. The weight of transferred waste totalled 226,100 tonnes, including 30,700 tonnes of solid household waste transferred to a regional operator.

Industrial and consumer waste management, '000 tonnes

Year	Amount at the beginning of the reporting year	Waste generated and received during the year	Recycling and treatment of generated and received waste		Transferred to third-party organisations	Storage in organisations	Amount at the end of the reporting year
			Amount	%			
2020	412,117.5	30,926.3	24,696.4	79.9	198.3	6,033.7	413,886.3
2021	444,378.2	33,811.0	27,663.0	81.8	224.4	5,529.1	445,078.6
2022	442,544.9	35,532.9	30,447.4	85.7	226.1	2,759.9	446,146.0

1. Based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2021.

In 2022, ROSATOM did not transport, import, export or process waste classified as 'hazardous' according to Annexes I, II, III, and VIII of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Industrial and consumer waste management by hazard class in 2022, '000 tonnes

Hazard class	Waste amount as at 1 January 2022	Waste generated and received during the year	Recycling		Treatment		Waste transfer to third-party organisations	Waste stored at the sites operated by ROSATOM during the year, '000 tonnes		Amount in organisations as at 31 December 2022
			'000 tonnes	%	'000 tonnes	%		Total	Including burial	
1	0.015	0.131	0.000	0.0	0.007	5.3	0.072	0.000	0.000	0.067
2	0.023	1.517	0.0002	0.9	1.323	87.2	0.136	0.002	0.000	0.081
3	1.568	6.833	0.016	1.1	0.000	0.0	6.814	0.001	0.000	1.572
4	4,444.354	96.223	0.389	0.01	0.011	0.01	88.434	7.260	5.467	4,446.275
5	438,098.950	35,428.173	30,445.634	85.9	0.000	0.0	130.662	2,752.674	1,252.795	441,698.033
Total	**442,544.9**	**35,532.877**	**30,446.0**	**85.7**	**1.3**	**0.004**	**226.118**	**2,759.9**	**1,258.3**	**446,146.0**

For details on ROSATOM's waste treatment projects, see the section 'Implementation of the Ecology National Project'.

5.4.8. Impact on local flora and fauna

The high quality of the natural environment is a vital prerequisite for the existence of life on our planet. Global environmental problems, such as the greenhouse effect and associated irreversible climate change, the depletion of the ozone layer and a rising level of toxic substances in the environment, ultimately lead to a reduction of biodiversity on the planet.

In terms of environmental performance, nuclear power is much more attractive than thermal power, since nuclear power plants consume no oxygen and emit no harmful chemicals into the atmosphere, which benefits living organisms, including humans. At the same time, the nuclear industry, primarily nuclear power plants, is subjected to close scrutiny by various environmental organisations, the general public and the media due to the potential radiation impact of nuclear power plants on the environment.

In the Russian Federation, there are currently no criteria for quantitative assessment of the radiation impact on flora and fauna, and in the vast majority of cases the assessment of such impacts is viewed as supplementary to the setting of hygienic standards.

Nuclear organisations operating nuclear facilities regularly monitor radionuclide content in local agricultural products, wild-growing foods (berries, mushrooms, etc.) and fodder growing in radiation control areas, as well as in fish and other aquatic organisms living in cooling ponds at NPPs. The specific activity of dose-

forming radionuclides is monitored in food products. Regional offices of the Russian Federal Medical and Biological Agency (FMBA) conduct independent radiation monitoring of the environment and locally produced food. Radiation monitoring of abiotic components of the environment is carried out by the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet).

The results of long-term radiation monitoring show that the content of radioactive substances in various types of crops corresponds to the background radiation level, that the species composition of flora and fauna is practically unchanged, with no hazards that can affect their existence, and that the growth rate of the amount of dead wood is within permissible limits.

GRI 304-2 In addition, the close proximity of NPPs to nature reserves also provides evidence of biodiversity conservation at their locations. The Lapland State Nature Reserve is located within a 30-kilometre radius of Kola NPP, and 16 nature monuments and 33 wildlife sanctuaries are located within a 30-kilometre radius of Kalinin NPP. This shows that the radiation impact of nuclear technologies and production facilities on the natural environment poses no danger to living organisms or their habitat and, accordingly, cannot be assessed as negative.

All organisations in the nuclear industry take measures to prevent the degradation of natural ecosystems as a result of their operation. Measures aimed at preserving the diversity of flora and fauna include the following:

- Equipping tailings ponds with bird deterrents to prevent birds from landing on the water surface;
- Equipping water intake facilities with fish screens in order to prevent young fish from swimming or getting drawn into them;
- Equipping transformer substations, their components and operating mechanisms with special devices (fences, casings, etc.) to prevent animals from entering the premises of the substation and getting into these units and mechanisms;
- Installing bird diverters on power lines;
- Maintaining fences along the perimeter of industrial sites in good condition, including in order to prevent animals from entering the premises of organisations;
- Ensuring that motor vehicles and special machinery travel on paved roads and providing special parking lots for them;
- Using machines and mechanisms that are in good condition, with adjusted fuel fittings preventing losses of fuel and lubricants and their spills onto the ground and vegetation;
- Measures to protect the atmosphere, which help to minimise the amount of pollutants inhaled by animals and humans, as well as the deposition of pollutants on vegetative parts of plants, further spread of harmful substances along the food chains and their accumulation in living organisms;
- Arranging waste accumulation sites compliant with technical and sanitary standards; removing waste and transporting it to designated locations in a timely manner;
- Fire prevention measures in order to ensure that industrial sites comply with fire safety requirements and to prevent the death of living organisms in fires;
- Measures to provide protection against noise exposure (using equipment that is less noisy; more effective soundproofing, etc.);
- Lighting of industrial sites at night.

In 2022, ROSATOM's organisations took the following steps to replenish aquatic wildlife:

- At Balakovo NPP, 78,795 juvenile grass carp, 78,795 juvenile silver carp, 158,914 juvenile common carp and 73,678 juvenile sterlets were released into the Saratov Reservoir;
- At Beloyarsk NPP, 269,997 juvenile bighead carp were released into the Beloyarsk Reservoir;
- At Kalinin NPP, Lake Pesvo and Lake Udomlya were stocked with black carp bred during the year weighing a total of 1,038 kg;
- At Novovoronezh NPP, 6 tonnes of juvenile silver carp were released into the cooling pond;
- At Rostov NPP, 418,807 juvenile grass carp, 856,128 juvenile common carp and 34,030 juvenile sterlets were released;
- At the FTNPP, 101,000 juvenile chum salmon were released into the Trezubets Stream (the Paratunka River basin) in the Kamchatka Territory;
- JSC Siberian Chemical Plant released 35 kg of juvenile fish into the Tom River;
- JSC Khiagda released 163,000 grayling fry into the Ina River in the Barguzinsky District of the Republic of Buryatia.

5.4.9. Rehabilitation of disturbed areas

At year-end 2022, the area of land disturbed by ROSATOM's organisations totalled 7,600 hectares.

Breakdown by type of operations that caused land disturbance in 2022, '000 hectares

Mining	0.15
Construction	0.14
Other operations	0.001
Total	**0.29**

GRI 304-3 In 2022, ROSATOM's organisations implemented a set of measures to restore the productivity and economic value of disturbed lands and improve the environment. In 2022, the area of rehabilitated (restored) land totalled 44.36 hectares.

Land rehabilitation in ROSATOM's organisations, hectares

Organisation	2020	2021	2022
JSC Lunnoye	0.00	0.00	41.05
PJSC ZIO-Podolsk	0.04	0.10	0.05
PJSC NCCP	0.00	0.00	2.45
JSC Siberian Chemical Plant	32.9	0.00	0.00
FSUE Integrated Plant Elektrokhimpribor	2.69	0.84	0.06
FSUE Mayak Production Association	0.12	0.47	0.08
Other	1.30	0.72	0.67
Total	**37.05**	**2.13**	**44.36**

In 2022, ROSATOM's organisations carried out reforestation activities, with the area of restored forests totalling 192.7 hectares.

Reforestation activities in ROSATOM's organisations, hectares

Organisation	2020	2021	2022
JSC Dalur	0.00	59.70	0.00
JSC Khiagda	0.00	0.00	173.20
Leningrad NPP branch of JSC Rosenergoatom	0.00	19.5	19.5
Total	**0.00**	**79.20**	**192.70**

5.4.10. Emissions and discharges of radionuclides

Emissions of radionuclides

In 2022, radiation burden on the environment was characterised by the total activity of radionuclides released into the atmosphere by ROSATOM's organisations, which amounted to $3.79 \cdot 10^{16}$ Bq.

Beta-emitting radionuclides accounted for 98.08% of the total activity ($3.72 \cdot 10^{16}$ Bq).

Actual and permitted emissions of radionuclides by nuclear organisations in 2022

Type of radionuclides	Permitted emission, Bq	Actual emission, Bq	Percentage of the permitted level
Alpha-emitting	$5.41 \cdot 10^{15}$	$7.26 \cdot 10^{14}$	13.41
Beta-emitting	$2.92 \cdot 10^{21}$	$3.72 \cdot 10^{16}$	0.0013

Discharges of radionuclides

ROSATOM's organisations discharged 48.24 million m^3 of wastewater with a total activity of $3.84 \cdot 10^{13}$ Bq into surface water bodies.

Compared to 2020, wastewater discharges decreased by 9.22%, while the total activity decreased by 30.57%.

Actual and permitted discharge of radionuclides by nuclear organisations in 2022

Type of radionuclides	Permitted discharge, Bq	Actual discharge, Bq	Percentage of the permitted level
Alpha-emitting	$1.17 \cdot 10^{13}$	$5.54 \cdot 10^{10}$	0.47
Beta-emitting	$5.31 \cdot 10^{15}$	$3.84 \cdot 10^{13}$	0.72

In 2022, radionuclide discharges did not exceed permitted levels.

Contaminated sites

At year-end 2022, there were radionuclide-contaminated sites in 17 nuclear organisations. The area of contaminated sites totalled 108.34 km^2, including:

- 24.17 km^2 at industrial sites;
- 83.66 km^2 in buffer areas;
- 0.51 km^2 in radiation control areas.

The area of contaminated sites decreased compared to 2021, as determined by radiation measurements performed at production sites of JSC Pilot Production and Demonstration Centre for Decommissioning of Uranium-Graphite Nuclear Reactors.

Radioactive contamination is caused mainly by caesium-137 and strontium-90 nuclides, as well as natural uranium and its decay products. Nearly 77% (82.92 km^2) of radionuclide-contaminated sites are located around FSUE Mayak Production Association (they were contaminated as a result of an accident in 1957).

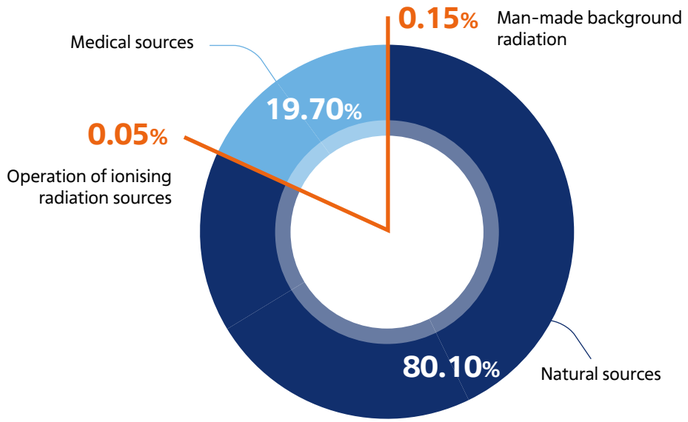
5.4.11. Radiation impact on the population and the environment

According to the findings of radiation and hygienic certification in the Russian Federation for 2021[1], average additional radiation exposure per person of the population at the locations of nuclear enterprises associated with their day-to-day operation did not exceed 1.8% of the basic dose limit for the population set in the NRB-99/2009 Standard (1 mSv on average for any consecutive five years). The highest level of radiation exposure among local residents was recorded in Ozersk in the Chelyabinsk Region (11% of the basic dose limit for the population; FSUE Mayak Production Association), which is consistent with previous years.

According to the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor)[2], the key factors behind radiation exposure of the population are natural and medical sources of ionising radiation. The average contribution of natural sources of ionising radiation to the total radiation exposure of local residents across Russia stands at 80.1%, while medical sources account for 19.7%. The contribution of enterprises using nuclear technology is estimated at a fraction of a percent (0.05%).

1. The findings of radiation and hygienic certification of organisations and areas were presented by the State Research Centre Burnasyan Federal Medical Biophysical Centre of the FMBA of Russia.
2. State Report on the Status of Sanitary and Epidemiological Well-Being of the Population in the Russian Federation in 2020. Moscow, Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, 2020. – 299 pages.

Breakdown of radiation exposure of the population, %



Contribution of NPPs to background radiation measured by ROSATOM

The gamma radiation dose rate is continuously monitored in buffer and radiation control areas around nuclear power plants.

The analysis of field data on the gamma radiation dose rate shows that gamma radiation doses in buffer and radiation control areas of all NPPs are within the limits of natural background radiation which was formed before the start-up of the nuclear power plants. This indicates that nuclear power plants produce no radioactive contamination in the monitored areas.

The findings of regular measurement of the content of radioactive substances in the natural environment in the locations of NPPs show that NPPs have no detectable impact on local residents or the environment.

The contribution of NPP operation to radiation exposure of the population living in the areas where NPPs are located does not exceed the minimum significant dose of 10 μSv/year; the level of radiation risk for local residents is entirely acceptable.

5.4.12. Forecast for the environmental impact of ROSATOM and its organisations; plans to reduce the impact and ensure environmental safety in 2023 and in the medium term

ROSATOM's organisations will continue to systematically reduce their negative environmental impact and take steps to prevent climate change as part of the Action Plan to Minimise the Negative Impact of ROSATOM on the Environment until 2025. In addition, the following steps will be taken:

- Maintaining fixed asset investment related to environmental protection at the current level;
- Continuing to pursue the policy of sustainable use of natural resources and implementing a number of measures to reduce the discharge of contaminated wastewater;
- Further reducing hazardous waste generation;
- Expanding and improving radiation and chemical monitoring systems in the areas where the Corporation's organisations are located;
- Implementing plans in ROSATOM's organisations for the decommissioning of PCB-containing equipment and the transfer of such equipment (including waste) for decontamination/disposal.

5.5. KEY PROJECTS IN THE FIELD OF NUCLEAR AND RADIATION SAFETY AND ENVIRONMENTAL PROTECTION

As part of its efforts to implement the Basic Principles of Government Policy on Nuclear and Radiation Safety in the Russian Federation until 2025 and beyond, ROSATOM has achieved the following results:

- Computer codes and operational documentation for the IRAW-OPTIMA software system have been developed as part of the project to create information support tools for optimising radiation protection of group A personnel in ROSATOM's organisations;
- Draft Regulations on the Industry-Wide System for the Assessment of Radiation Risks to Employee Health from Planned External Occupational Exposure to Radiation have been developed on the basis of the relevant IAEA Technical Document as part of the implementation of the Practical Arrangements between the IAEA and ROSATOM on cooperation in radiation safety;
- Documents on standardisation in the use of nuclear energy have been drafted, namely ROSATOM's Standards titled 'Instruments and Devices for Measuring or Detecting Ionising Radiation. Instruments for Measuring the Ambient and/or Directional Dose Equivalent (Rate) for Beta, X-ray and Gamma Radiation' in two parts.

One of ROSATOM's key priorities in the sphere of environmental protection is the implementation of the climate agenda. The Road Map for the Adaptation of ROSATOM and its Organisations to Climate Change Given the Introduction of State Regulation of Greenhouse Gas Emissions in the Russian Federation has been approved pursuant to a directive of the Director General. An industry-wide GHG emissions accounting system has been developed, and a list of ROSATOM's organisations included in the system has been compiled. JSC Rusatom Infrastructure Solutions has established a body responsible for the validation and verification of greenhouse gas emissions, which has been accredited with the National Accreditation System.

ROSATOM's organisations were implementing the Action Plan to Minimise the Negative Impact from ROSATOM on the Environment until 2025 in accordance with the approved schedule. The scope of the Action Plan was expanded in late 2022 to include additional measures, including an increase in the number of ROSATOM's organisations taking steps to minimise the negative impact on the environment.

The implementation of the Programme for the Development of the Industry-Wide Radiation Monitoring System (IRMS) for 2021–2030, which includes 58 initiatives, is an important focus area in terms of improving the quality and reliability of environmental monitoring.

INITIATIVES INCLUDED THE PROGRAMME FOR THE DEVELOPMENT OF THE INDUSTRY-WIDE RADIATION MONITORING SYSTEM UNTIL 2030

APPENDICES

APPENDIX 1. REPORT PROFILE

GRI 2-14 The Public Annual Report of State Atomic Energy Corporation Rosatom for 2022 (the Report) has been prepared on a voluntary basis and approved by ROSATOM's Director General; it is intended for a wide range of stakeholders.

The prioritised topic of the Report is 'ROSATOM's Contribution to the Technological Sovereignty of the Russian Federation'. The present Report has been prepared in an integrated format and provides a comprehensive picture of the following:

- The implementation of ROSATOM's strategy, including contribution to the sustainability of the Corporation's business, as well as short-, medium- and long-term plans;
- Significant financial, economic and operating results of the Corporation's core businesses;
- Results achieved in the sphere of nuclear and radiation safety, environmental protection, contribution to the development of nuclear towns and cities, implementation of the social policy and other aspects of sustainable development;
- The economic, environmental and social impact on the external and internal environment;
- ROSATOM's management approaches to various aspects of its business.

Given a large target audience, this Report has been prepared in a modular format and includes the following:

- Chapter 1. Strategic Report;
- Chapter 2. Business Development Report;
- Chapter 3. Social Report;
- Chapter 4. Report on the Development of Nuclear Towns and Cities;
- Chapter 5. Safety Report.

In addition to the Report, the following standalone reports have been prepared:

- The Sustainability Report;
- Reports of ROSATOM's Divisions.

Standards and regulatory requirements

The Report has been prepared in accordance with the following documents:

- The Sustainability Reporting Standards of the Global Reporting Initiative (GRI);
- The IIRC International Integrated Reporting Framework;
- The Uniform Industry-Wide Public Reporting Policy of ROSATOM;
- The Uniform Industry-Wide Methodological Guidelines (Standard) on Public Reporting of ROSATOM and Its Organisations;
- The AccountAbility AA1000 Standards;
- The Conceptual Framework for the Development of Public Non-Financial Reporting in Russia (as approved by the Government of the Russian Federation on 5 May 2017);
- The Recommendations of the Russian Union of Industrialists and Entrepreneurs for Use in Governance Practice and Corporate Non-Financial Reporting (basic performance indicators).

GRI 2-3 ROSATOM's internal regulations stipulate an annual reporting cycle. The Report covers the Corporation's operations during the period from 1 January 2022 through 31 December 2022. The reporting period for financial reporting coincides with the reporting period for the annual report. The publication date of the report is the third quarter of 2023.

GRI 2-2 Report boundaries

GRI 3-1 The Report contains information on the operations of ROSATOM and its organisations in Russia and abroad[1]. Given the nature of ROSATOM's business and the need to protect state secrets, the disclosure of information on the day-to-day operation of the Nuclear Weapons Division is restricted.

The Report covers several scopes of consolidation. Integrated performance indicators are disclosed for ROSATOM's organisations within the scope of budget consolidation as at 31 December 2022[2]. GRI disclosures that belong to the Social category are reported within the scope of budget consolidation; GRI disclosures that belong to the Environmental category are reported for all significant organisations within ROSATOM which provide information on their environmental performance using corporate reporting forms (266 organisations (legal entities and branches) in 2022). Financial and economic indicators in the section 'Financial and Economic Performance' are disclosed for the part of the scope of ROSATOM's consolidated IFRS financial statements for which information is publicly available.

Process for determining the Report content

The 2022 Report has been prepared in accordance with the GRI 2021 reporting standards and the International Integrated Reporting Framework (International <IR> Framework). Both standards require that material topics to be disclosed in the Report should be determined.

1. Except for information on engagement with ROSATOM's regions of operation abroad.
2. Hereinafter, not including State Atomic Energy Corporation Rosatom.

GRI 3-1 **The materiality of information has been determined through the following process:**

Objectives	Compiling a longlist of impacts	Calculating the Impact Index		Prioritising impacts for disclosure for the 2022 reporting year	Formulating material topics for disclosure in the Report
Actions	- Reviewing requests received during the 2022 public consultations; best integrated reporting practices; corporate reporting and transparency ranking criteria; requirements of the GRI SRS, UNCTAD, the International <IR> Framework and the TCFD; the business context and media coverage, as well as material topics for previous years	- The working group on reporting grouping / dividing impacts into actual and potential, positive and negative	- Questionnaire surveys among internal and external stakeholders; - Calculating the impact significance index	- Foresight dialogue involving experts and users of information	- Setting the cut-off threshold, formulating material topics and mapping them against GRI 2021 modules
Participants	Consultants, employees of the Communications Department (experts)	Employees of the Communications Department	Questionnaire surveys have been conducted among 43 stakeholder representatives and experts	Participants of the foresight dialogue have included 23 experts on impacts and users of information	Employees of the Communications Department
Outcome	Full list of 33 impacts	Longlist of impacts divided into four groups	Impact significance index, with assessment covering all impacts	List of impacts prioritised for disclosure for the 2022 reporting year (in accordance with the GRI Standard) and list of additional significant impacts for disclosure for the 2022 reporting year (outside the scope of the GRI Standard)	List of material topics for disclosure in the 2022 Report, which includes all prioritised impacts
Period	October/November	November – January		February	

GRI 3-2

List of material topics[1]

- Contribution to industrial development in the Russian Federation;
- The technological sovereignty of the Russian Federation;
- Nature conservation and ensuring environmental safety in the country;
- Promoting the well-being of our employees;
- Developing the regions of operation and improving the standard of living.

The list of material topics has been revised compared to the previous reporting period (see ROSATOM's Annual Report for 2021) due to changes in the methodology for identifying material topics set out in the GRI SRS standards (the 2021 version) and given the prioritisation of material topics for disclosure in the 2022 Report based on stakeholder engagement.

1. Material topics are disclosed in the Report in accordance with the GRI Standard.

List of significant topics[1]

- Contribution to the development of the national economy through timely tax payments to the budgets of all levels;
- Contribution of anti-corruption initiatives to improving governance quality and ethics;
- Impact of industrial waste generated by nuclear enterprises on the flora and fauna, water, air and land;
- Energy conservation;
- Impact on climate stability;
- Social impacts (including education) on local residents in the regions of operation other than employees of nuclear enterprises and their families;
- Impact of operations of ROSATOM's organisations on the flora and fauna, water, air and land.

Stakeholder engagement as part of the Report preparation process

To improve transparency and accountability and to determine the materiality of information to be disclosed, the Report has been prepared in cooperation with stakeholders in accordance with the AA1000AP AccountAbility Principles (2018) and the AA1000SES Standard (2015), the GRI Sustainability Reporting Standards and the International Integrated Reporting Framework (International <IR> Framework). Surveys have been conducted among stakeholders and experts to identify material impacts; a foresight dialogue has been held with experts and users of information in order to prioritise material impacts for disclosure in the 2022 Report; this included public consultations with ROSATOM's stakeholders on the draft 2022 Report (held online). The Report incorporates key recommendations and requests made by stakeholder representatives.

For more details on stakeholder engagement, see the section 'Strategic Communications'.

GRI 2-5

Verification of reporting information

Reporting information has been certified as accurate and reliable by:

- An independent auditor which certifies IFRS financial statements;
- An independent auditor which has confirmed the Report's compliance with the GRI Sustainability Reporting Standards and the International Integrated Reporting Framework (International <IR> Framework).

For details, see Appendix 5 'Independent Auditor's Report on the Non-Financial Statements of State Atomic Energy Corporation Rosatom'.

ROSATOM's Internal Audit Department has conducted an internal audit of the business process 'Public Reporting Procedure in ROSATOM'.

For details, see Appendix 4 'Report of the Internal Audit Department of State Atomic Energy Corporation Rosatom'.

Representatives of key stakeholders have provided public assurance of the Report in accordance with the AA1000SES Standard (2015), which has confirmed the materiality and completeness of information disclosed in the Report and the Corporation's responsiveness to stakeholders' requests when preparing the Report.

For details, see the section 'Statement of Public Assurance'.

1. A significant topic is a topic disclosed in the Report based on internal forms for information collection and disclosure (outside the scope of the GRI Standard).

Disclaimer

The Report contains information about ROSATOM's medium- and long-term objectives and initiatives. The objectives are forward-looking, and their actual achievement depends, among other things, on a number of economic, political and legal factors beyond ROSATOM's control (the global financial, economic and political environment; the pandemic and measures aimed at containing it; the situation on the key markets; amendments to the tax, customs and environmental legislation, etc.). Therefore, actual performance in the future years may differ from the forward-looking statements contained herein.

APPENDIX 2. GRI CONTENT INDEX

Statement of use	ROSATOM has reported in accordance with the GRI Standards for the period from 1 January through 31 December 2022.
GRI 1 used	GRI 1: Foundation 2021
Applicable GRI Sector Standard(s)	Not applicable

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
General disclosures					
GRI 2: General Disclosures 2021	2-1 Organisational details	Section 'About ROSATOM', p. 10 Section 2.2.1 'Promoting ROSATOM's Technologies on Foreign Markets', p. 204 Contact Details, p. 383 The Corporation is a legal entity established by the Russian Federation in the form of a state-owned corporation (in accordance with Federal Law No. 317-FZ of 1 December 2007).			
	2-2 Entities included in the organisation's sustainability reporting	Section 'Report Profile', p. 292 ROSATOM's Report covers all organisations included in JSC Atomenergoprom's annual report; in addition, the Report covers ROSATOM, security units and organisations forming part of the following Divisions: the Engineering Division, the Nuclear Weapons Division, the Northern Sea Route, Research and Innovations, Environmental Solutions, etc., which are outside the scope of JSC Atomenergoprom. See also the list of organisations: https://rosatom.ru/about/factories/ Environmental disclosures in accordance with GRI 303 and GRI 304 and data on occupational injuries in accordance with GRI 403 do not include PJSC Quadra – Power Generation.			

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 2: General Disclosures 2021	2-3 Reporting period, frequency and contact point	Appendix 1. Report Profile, p. 353 Contact Details, p. 383			
	2-4 Restatements of information	ROSATOM's financial results for 2021, as well as data on radiation exposure and individual radiation risks have been recalculated.			
	2-5 External assurance	Appendix 1. Report Profile, p. 355 Appendix 5. Independent Auditor's Report on the Non-Financial Statements of State Atomic Energy Corporation Rosatom, p. 372 The Corporation's policy with regard to seeking external assurance is set out in the Uniform Industry-Wide Methodological Guidelines on Public Reporting of ROSATOM and Its Organisations.			
	2-6 Activities, value chain and other business relationships	About ROSATOM, p. 10 Financial and Economic Performance, p. 20 Section 1.4. 'Markets Served by ROSATOM', p. 41 Section 1.12. 'Resource Management', p. 137 Section 2.1. 'Business Diversification', p. 195 Section 2.2 'International Business Development', p. 203			
	2-7 Employees	Section 3.1.2 'Key Personnel Characteristics', p. 228 Appendix 3. Number of Employees with a Breakdown by Type of Employment and Region (as at 31 December 2022), p. 368			
	2-8 Workers who are not employees	Section 3.1.2 'Key Personnel Characteristics', p. 228	Types of work performed by workers who are not employees	Lack of data on the types of work	

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 2: General Disclosures 2021	2-9 Governance structure and composition	Section 1.12.1 'Corporate Governance', pp. 131, 132			
	2-10 Nomination and selection of the highest governance body	Section 1.12.1 'Corporate Governance', p. 131			
	2-11 Chair of the highest governance body	Section 1.12.1 'Corporate Governance', pp. 131, 133			
	2-12 Role of the highest governance body in overseeing the management of impacts	Section 1.12.1 'Corporate Governance', pp. 131, 133			
	2-13 Delegation of responsibility for managing impacts	Section 1.2.4 'Fulfilment of Responsible Business Commitments. Sustainable Processes', p. 32 In accordance with Article 25 of Law No. 317-FZ, ROSATOM's Supervisory Board holds its meetings at least once every three months.			
	2-14 Role of the highest governance body in sustainability reporting	Appendix 1. Report Profile, p. 352 The Supervisory Board approves the annual report submitted by ROSATOM to the Government of the Russian Federation. The Supervisory Board does not approve ROSATOM's public reports.			
	2-15 Conflicts of interest	Section 1.2.1 'Corporate Governance', p. 131 Law No. 317-FZ does not provide for the involvement of the Supervisory Board in the prevention of conflicts of interest.			
	2-16 Communication of critical concerns	Section 1.2.1 'Corporate Governance', p. 132			

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 2: General Disclosures 2021	2-17 Collective knowledge of the highest governance body	Section 1.2.4 'Fulfilment of Responsible Business Commitments. Sustainable Processes', p. 31			
	2-18 Evaluation of the performance of the highest governance body	No formalised performance evaluation of the Supervisory Board is carried out. Pursuant to Law No. 317-FZ, the scope of responsibilities of the Supervisory Board does not include self-assessment.			
	2-19 Remuneration policies	Section 1.12.1 'Corporate Governance', p. 134 Section 3.1.3 'Personnel Costs and Remuneration System', p. 231			
	2-20 Process to determine remuneration	Section 1.12 'Resource Management', p. 134 Consultants have not been involved in determining remuneration.			
	2-21 Annual total compensation ratio	The indicator has not been disclosed.	Ratio of the annual total compensation for the organisation's highest-paid individual to the median annual total compensation for all employees	The information is not available	Detailed data on employees of the Corporation's subsidiaries are not available. No methodology for calculating the indicator has been approved. In 2023/2024, the Corporation plans to examine the possibility of data consolidation for the calculation of the indicator.
	2-22 Statement on sustainable development strategy	Statement of the Director General, p. 16			
	2-23 Policy commitments	Section 1.2.4 'Fulfilment of Responsible Business Commitments. Sustainable Processes', p. 30 Section 3.2 'Human Rights', p. 248			

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 2: General Disclosures 2021	2-24 Embedding policy commitments	Section 1.2.4 'Fulfilment of Responsible Business Commitments. Sustainable Processes', pp. 30, 32 Additional information on the use of the precautionary principle is provided in the Unified Industry Policy on Sustainable Development of ROSATOM.			
	2-25 Processes to remediate negative impacts	Section 5.1. 'Occupational Health and Safety', p. 301 Section 5.4.1 'Environmental Safety and Environmental Protection Management', p. 333			
	2-26 Mechanisms for seeking advice and raising concerns	Section 1.2.4 'Fulfilment of Responsible Business Commitments. Sustainable Processes', p. 31 Section 3.2 'Human Rights', p. 250 Contact Details, p. 383			
	2-27 Compliance with laws and regulations	Section 5.4.8 'Environmental Charges and Fines', p. 335 There were no significant instances of non-compliance with laws and regulations, i.e. instances that resulted in administrative suspension of ROSATOM's operations, in 2022.	Information on fines (other than fines for environmental non-compliance)	The information is not available	Government and corporate statistical reports prepared by ROSATOM provide no statistics on this topic.
	2-28 Membership associations	Section 2.2.1 'Promoting ROSATOM's Technologies on Foreign Markets', p. 205			
	2-29 Approach to stakeholder engagement	Section 1.12.8 'Strategic Communications', p. 177 Section 4.5 'Work of ROSATOM's Public Council and Community Relations', p. 287			
	2-30 Collective bargaining agreements	Section 3.3.4 'Social Partnership in the Nuclear Industry', p. 255			

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 3: Material Topics 2021	3-1 Process to determine material topics	Appendix 1. Report Profile, pp. 353, 354			
	3-2 List of material topics	Appendix 1. Report Profile, p. 354			
Contribution to industrial development in the Russian Federation					
GRI 3: Material Topics	3-3 Management of material topics	Section 2.1 ‘Business Diversification’, p. 195 Section 4.2 ‘Contribution to the Implementation of National Projects’, p. 271			
Technological sovereignty					
GRI 3: Material Topics	3-3 Management of material topics	Section 1.6.1 ‘Performance of the Nuclear Weapons Division’, p. 63 Section 1.7.7 ‘New Areas of Activity’, p. 79 Specific examples of projects promoting technological sovereignty are provided in the reports of ROSATOM’s Divisions.			
Nature conservation and ensuring environmental safety in the country					
GRI 3: Material Topics	3-3 Management of material topics	Section 5.2. ‘Nuclear and Radiation Safety’, p. 308 Section 5.3 ‘RAW and SNF Management and Decommissioning of Facilities Posing Nuclear and Radiation Hazards’, p. 327 Section 5.4. ‘Environmental Safety’, pp. 332, 338			
GRI 304: Biodiversity 2016	304-2 Significant impacts of activities, products, and services on biodiversity	Section 5.4.8 ‘Impact on Local Flora and Fauna’, p. 344			
	304-3 Habitats protected or restored	Section 5.4.9 ‘Rehabilitation of Disturbed Areas’, p. 345			

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 303: Water and Effluents 2018	303-1 Interactions with water as a shared resource	Section 5.4.6 ‘Water Use’, p. 338			
	303-2 Management of water discharge-related impacts	Section 5.4.6 ‘Water Use’, p. 342			
	303-3 Water withdrawal	Section 5.4.6 ‘Water Use’, p. 339 The Corporation does not draw formation water or other types of water produced as a result of extraction, processing or use of any raw materials.	In terms of breakdown into freshwater and other water	The information is not available	The information is not provided in statistical reports.
	303-4 Water discharge	Section 5.4.6 ‘Water Use’, p. 340	In terms of breakdown into freshwater and other water	The information is not available	The information is not provided in statistical reports.
	303-5 Water consumption	Water consumption calculated in accordance with the methodology described in the GRI Standards (total water withdrawal minus water discharge) totals 686.8 million m^3, including 58.5 million m^3 in water-stressed areas.			
Promoting the well-being of our employees					
GRI 3: Material Topics	3-3 Management of material topics	Section 3.1.1 ‘HR Policy Approaches and Principles’, p. 228			
GRI 401: Employment 2016	401-1 New employee hires and employee turnover	Section 3.1.2 ‘Key Personel Characteristics’, p. 230	In terms of breakdown by age group, gender and region	The information is not available	The indicator has been disclosed in part, with no breakdown by age group, gender and region, due to the lack of the relevant records. The Corporation plans to provide the required breakdown in the 2023 report.

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 404: Training and Education 2016	404-1 Average hours of training per year per employee	Section 3.1.7 ‘Employee Training’, p. 235			
	404-2 Programmes for upgrading employee skills and transition assistance programmes	Section 3.1.4 ‘Executive Succession Pool’, p. 233 Section 3.1.6 ‘Career Counselling’, p. 233 Section 3.1.7 ‘Employee Training’, pp. 237, 238, 239, 240			
GRI 403: Occupational Health and Safety 2018	403-1 Occupational health and safety management system	Section 5.1. ‘Occupational Health and Safety’, pp. 299, 300			
	403-2 Hazard identification, risk assessment, and incident investigation	Section 5.1. ‘Occupational Health and Safety’, p. 300 Section 5.2.8 ‘Radiation Exposure of Employees’, p. 317 In accordance with the Labour Code of the Russian Federation (Articles 216 and 379), the Corporation’s employees have the right to refuse to perform work if there is a hazard to their life and health due to non-compliance with occupational safety requirements until the hazard has been eliminated, except as otherwise provided in federal laws.			
	403-3 Occupational health services	Section 5.1. ‘Occupational Health and Safety’, pp. 299, 300			
	403-4 Worker participation, consultation, and communication on occupational health and safety	Section 5.1. ‘Occupational Health and Safety’, p. 302 The operation of occupational health and safety committees (commissions) is governed by section 6.3. ‘Occupational Safety and Health Committee (Commission)’ of the Uniform Industry-Wide Guidelines for Developing and Improving an Occupational Health and Safety Management System in ROSATOM’s Organisations.			

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 403: Occupational Health and Safety 2018	403-5 Worker training on occupational health and safety	Section 5.1. ‘Occupational Health and Safety’, p. 302			
	403-6 Promotion of worker health	Section 3.3.2 ‘Social Programmes’, p. 252			
	403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	The requirements of the occupational health and safety management system (OHSMS) are binding on suppliers and contractors operating at ROSATOM’s facilities. Contractors also undertake to comply with occupational safety and health legislation and to ensure compliance by their subcontractors. The Corporation does not impose any other occupational safety and health requirements on suppliers and contractors.			
	403-8 Workers covered by an occupational health and safety management system	Section 5.1. ‘Occupational Health and Safety’, p. 300	Data on workers who are not employees but whose work and/or workplace is controlled by the organisation	The information is not available	No occupational safety and health records are kept for this type of workers
	403-9 Work-related injuries	Section 5.1. ‘Occupational Health and Safety’, pp. 302, 303, 306 The number of persons injured in accidents includes employees at the sites of ROSATOM’s organisations, including abroad, provided that the employee works for an organisation within the scope of consolidation of ROSATOM, is employed under Russian law, and the accident has been investigated under Russian law.	Injury rates for workers who are not employees but whose work and/or workplace is controlled by the organisation; micro-injuries (microtrauma) suffered by employees and requiring medical assistance beyond first aid	The information is not available	No records of hours worked by contractors are kept. No records of micro-injuries (microtrauma) with a breakdown by type of required medical assistance are kept.

GRI Standard	Disclosure	Section	Disclosure		
			Requirements omitted	Reason	Comments
GRI 403: Occupational Health and Safety 2018	403-10 Work-related ill health	Section 5.1.1 'Occupational Health and Safety', p. 305	Information on work-related ill health for workers who are not employees but whose work and/or workplace is controlled by the organisation; information on fatalities as a result of work-related ill health	The information is not available	No occupational safety and health records are kept for these groups of employees.
Developing the regions of operation and improving the standard of living					
GRI 3: Material Topics	3-3 Management of material topics	Section 4.1 'Development Priorities', p. 270			
GRI 203: Indirect Economic Impacts 2016	203-2 Significant indirect economic impacts	Statement of the Head of Department for Liaison with Regions, p. 269 Section 4.3. 'Contribution to the Economy', pp. 278, 279 Section 4.4 'Social Development', p. 286			
GRI 413: Local Communities 2016	413-1 Operations with local community engagement, impact assessments, and development programmes	Section 4.5 'Work of ROSATOM's Public Council and Community Relations', p. 292 ROSATOM's organisations participate in the implementation of agreements concluded by ROSATOM with constituent entities of the Russian Federation.			

Other significant topics for disclosure in the Report	
Name	**Section**
ROSATOM's contribution to the development of the national economy through timely tax payments to the budgets of all levels	Chapter 1 'Strategic Report', p. 14 Section 4.3 'Contribution to the Economy', p. 276
Contribution of anti-corruption initiatives to improving governance quality and ethics	Chapter 1 'Strategic Report', p. 14
Impact of industrial waste generated by nuclear enterprises on the flora and fauna, water, air and land	Section 5.3.7 'International Technical Assistance Received in the Reporting Year', p. 331
Energy conservation	Section 2.3.1 'Energy Efficiency Management System. Implementation of Energy Efficiency Management and Energy Management Systems', p. 210
ROSATOM's impact on climate stability	Section 1.2. 'Sustainable Development Management', p. 28 Section 5.4. 'Environmental Safety', p. 332
Social impacts (including education) on local residents in the regions of operation other than employees of nuclear enterprises and their families	Section 4.4 'Social Development', p. 283
Impact of operations of ROSATOM's organisations on the flora and fauna, water, air and land	Section 5.3 'RAW and SNF Management and Decommissioning of Facilities Posing Nuclear and Radiation Hazards', p. 327 Section 5.4. 'Environmental Safety', p. 332

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APPENDIX 3. NUMBER OF EMPLOYEES WITH A BREAKDOWN BY TYPE OF EMPLOYMENT AND REGION (AS AT 31 DECEMBER 2022)[1]

Number of employees with a breakdown by gender and type of employment (as at 31 December 2022), persons[2]

Indicator	Women	Men	Total
Number of employees	113,968	223,399	337,367
Number of permanent employees	107,545	192,820	300,365
Number of temporary employees	6,423	30,579	37,002
Number of full-time employees	109,589	221,406	330,995
Number of part-time employees	4,379	1,993	6,372

Number of employees with a breakdown by type of employment and region (as at 31 December 2022)

Indicator	Number of employees	Number of permanent employees	Number of temporary employees	Number of full-time employees	Number of part-time employees
Altai Territory	52	52	0	52	0
Amur Region	88	87	1	88	0
Arkhangelsk Region	101	101	0	101	0
Astrakhan Region	182	174	8	178	4
Belgorod Region	1,881	1,880	1	1,873	8
Vladimir Region	1,411	1,395	16	1,358	53
Volgograd Region	383	375	8	376	7
Voronezh Region	10,451	9,994	457	10,257	194
Zabaykalsky Territory	7,164	6,895	269	7,109	55
Irkutsk Region	1,579	1,519	60	1,567	12
Kaliningrad Region	370	346	24	369	1
Kaluga Region	2,990	2,673	317	2,908	82
Kirov Region	161	158	3	161	0
Krasnodar Territory	2,071	2,053	18	2,061	10
Krasnoyarsk Territory	9,476	9,324	152	9,214	262

1. The Corporation has no non-guaranteed hours employees.
2. A significant increase in the headcount compared to 2021 was driven by the development of new businesses: PJSC Quadra – Power Generation (11,000 people), LLC MC Delo (8,500 people), expansion of the Digitisation Unit by 5,200 people, and expansion of TITAN2 IC in the Power Engineering Division to 6,900 people.

Indicator	Number of employees	Number of permanent employees	Number of temporary employees	Number of full-time employees	Number of part-time employees
Kurgan Region	1,023	851	172	1,014	9
Kursk Region	23,277	14,707	8,570	23,041	236
Leningrad Region	11,372	11,197	175	11,164	208
Lipetsk Region	2,146	2,036	110	2,145	1
Moscow	49,045	46,734	2,311	46,861	2,184
Moscow Region	14,017	13,609	408	13,699	318
Murmansk Region	6,547	6,357	190	6,489	58
Nizhny Novgorod Region	34,048	33,210	838	33,474	574
Novosibirsk Region	3,609	3,516	93	3,570	39
Omsk Region	291	221	70	291	0
Oryol Region	647	647	0	647	0
Penza Region	5,371	5,370	1	5,370	1
Perm Territory	75	68	7	72	3
Primorsky Territory	1,714	1,586	128	1,698	16
Republic of Adygea	56	56	0	56	0
Republic of Bashkortostan	98	92	6	97	1
Republic of Buryatia	687	499	188	677	10
Republic of Karelia	1,429	1,367	62	1,366	63
Republic of Mordovia	224	221	3	218	6
Sakha Republic	117	115	2	115	2
Republic of Tatarstan	660	653	7	656	4
Republic of Khakassia	259	259	0	252	7
Rostov Region	9,613	9,338	275	9,313	300
Ryazan Region	220	220	0	220	0
Samara Region	117	113	4	115	2
Saint Petersburg	14,239	13,818	421	13,783	456
Saratov Region	6,877	6,723	154	6,787	90
Sakhalin Region	591	590	1	591	0
Sverdlovsk Region	22,501	22,063	438	22,227	274

Indicator	Number of employees	Number of permanent employees	Number of temporary employees	Number of full-time employees	Number of part-time employees
Smolensk Region	6,285	6,233	52	6,231	54
Stavropol Territory	234	232	2	234	0
Tambov Region	614	604	10	614	0
Tver Region	5,695	5,519	176	5,533	162
Tomsk Region	6,283	5,750	533	6,193	90
Tula Region	778	778	0	778	0
Udmurt Republic	5,453	5,295	158	5,368	85
Ulyanovsk Region	4,090	3,951	139	4,042	48
Khabarovsk Territory	159	157	2	159	0
Chelyabinsk Region	30,409	30,062	347	30,159	250
Chukotka Autonomous District	1,236	1,211	25	1,226	10
Yaroslavl Region	245	244	1	238	7
Other	205	194	11	198	7
Total	**310,916**	**293,492**	**17,424**	**304,653**	**6,263**

Number of employees in ROSATOM's overseas branches and organisations with a breakdown by type of employment (as at 31 December 2022)[1]

Indicator	Number of employees	Number of permanent employees	Number of temporary employees	Number of full-time employees	Number of part-time employees
Bangladesh	15,758	252	15,506	15,739	19
Turkey	3,738	3,663	75	3,733	5
Egypt	2,922	175	2,747	2,918	4
Belarus	1,370	673	697	1,323	47
Kazakhstan	1,298	1,294	4	1,298	0
Hungary	580	343	237	554	26
Czech Republic	193	193	0	193	0
Germany	120	119	1	119	1
Other	472	161	311	465	7
Total	**26,451**	**6,873**	**19,578**	**26,342**	**109**

1. There are no non-guaranteed hours employees.

APPENDIX 4. REPORT OF THE INTERNAL AUDIT DEPARTMENT OF STATE ATOMIC ENERGY CORPORATION ROSATOM

REPORT

of the Internal Audit Department of State Atomic Energy Corporation Rosatom
on the findings of internal audit of the business process
'Public Reporting Procedure in ROSATOM'

Internal audit of the business process 'Public Reporting Procedure in ROSATOM' has been performed pursuant to the Consolidated Monitoring Plan of Specialised Internal Control Bodies of ROSATOM for the Second Half of 2023 signed off by the Director General of ROSATOM and approved by the Chairman of the Supervisory Board of ROSATOM.

The audit has involved:

- An assessment of efficiency of internal controls in the public reporting process;
- An assessment of compliance of the public reporting procedure with applicable legislation, international standards and internal regulatory requirements for public reporting;
- Producing recommendations for improving internal controls in public reporting and enhancing the efficiency of this process.

The findings of the audit suggest that the business process 'Public Reporting Procedure in ROSATOM' complies with applicable legislation, international standards and internal regulatory requirements governing the public reporting process. At the same time, the auditors would like to highlight the need for more detailed disclosure of information as required by individual provisions of international standards and internal regulations. The shortcomings revealed during the audit did not have a significant impact on the reliability and quality of the public annual report.

Head of the audit team — Ya. A. Razykova

Member of the audit team — Yu. S. Bakhvalova

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APPENDIX 5. INDEPENDENT AUDITOR'S REPORT ON THE NON-FINANCIAL STATEMENTS OF STATE ATOMIC ENERGY CORPORATION ROSATOM

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INDEPENDENT PRACTITIONER'S LIMITED ASSURANCE REPORT [TRANSLATION FROM RUSSIAN ORIGINAL]

To the management of State Atomic Energy Corporation Rosatom

We have undertaken a limited assurance engagement of the accompanying Public Annual Report of State Atomic Energy Corporation Rosatom for 2022[1] (hereinafter referred to as the Report).

Responsibility of State Atomic Energy Corporation Rosatom

State Atomic Energy Corporation Rosatom (hereinafter referred to as ROSATOM) is responsible for preparation of the Report in accordance with the applicable criteria:

- GRI Sustainability Reporting Standards, as specified in the GRI Content Index included in the Report,
- requirements of the International Integrated Reporting Framework

(hereinafter jointly referred to as Applicable criteria).

This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation of the Report that is free from material misstatement, whether due to fraud or error.

Our Independence and Quality Management

We have complied with the independence and ethical requirements of the Rules of Independence of the Auditors and Audit Organizations and The Code of Professional Ethics of the Auditors, as well as of The International Code of Ethics for Professional Accountants (including International Independence Standards) issued by the International Ethics Standards Board for Accountants, which are founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

Our firm applies International Standard on Quality Management 1, which requires our firm to design, implement and operate a system of quality management, which is supported by policy or procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Our Responsibility

Our responsibility is to express a limited assurance conclusion on compliance of the Report with the Applicable criteria based on the procedures we have performed and the evidence we have obtained.

We conducted our limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised), Assurance Engagements Other than Audits or Reviews of Historical Financial Information. This standard requires that we plan and perform this engagement to obtain limited assurance about whether the Report is free from material misstatement.

A limited assurance engagement undertaken in accordance with this standard involves assessing the suitability in the circumstances of ROSATOM use of applicable criteria as the basis for the preparation of the Report, assessing the risks of material misstatement of the Report whether due to fraud or error, responding to assessed risks as necessary in the circumstances, and evaluating the overall presentation of the Report.

[1] PERFORMANCE OF STATE ATOMIC ENERGY CORPORATION ROSATOM IN 2022

TRANSLATION NOTE: Our report has been prepared in Russian and in English. In all matters of interpretation of information, views or opinions, the Russian version of our report takes precedence over the English version.

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A limited assurance engagement is substantially less in scope than a reasonable assurance engagement in relation to both the risk assessment procedures, including an understanding of internal control, and the procedures performed in response to the assessed risks.

The procedures we performed were based on our professional judgment and included inquiries, inspections of documents, analytical procedures, evaluating the appropriateness of quantification methods and reporting policies, and agreeing or reconciling with underlying records.

Given the circumstances of the engagement, in performing the procedures listed above we have undertaken the following activities:

- Interviewing the management and employees of ROSATOM and obtaining documentary evidence.
- Study of information available on the website of ROSATOM related to its activities in the context of sustainable development.
- Study of public statements of third parties concerning economic, environmental and social aspects of ROSATOM activities, in order to check the validity of the declarations made in the Report.
- Analysis of non-financial reports of comparable companies for benchmarking purposes.
- Study of the existing processes of collection, processing, documenting, verification, analysis and selection of data to be included into the Report.
- Participation in stakeholder engagement activities carried out by ROSATOM and some of the organizations included in the Report boundary including participation in dialogues with stakeholders and public consultations on the Report, study of the relevant minutes.
- Analysis of the current system of internal audit of public annual reporting in ROSATOM
- Selective review of documents and data on the performance of the economic, environmental and social impact management systems in ROSATOM.
- Assessment of conformity of the reported information which is referenced in the GRI Content Index included in the Report and disclosure of which is necessary to comply with the requirements of the GRI Sustainability Reporting Standards as well as information reported in accordance with the requirements of the International Integrated Reporting Framework to the documents provided to us, including external and internal reporting documents.
- Analysis of information in the Report for compliance with the Applicable criteria.

The procedures were undertaken exclusively in relation to data for the year ended 31 December 2022.

The procedures were not performed in relation to forward-looking statements; statements expressing the opinions, beliefs and intentions of ROSATOM to take any action related to the future; as well as statements based on expert opinion.

The procedures were performed in relation to the Russian version of the Report approved by the General Director of ROSATOM as well as subject to be sent to Global Reporting Initiative in order to notify it of the use of the GRI Sustainability Reporting Standards in the Report preparation.

The procedures were performed in relation to the version of the Report subject to be published in digital form by the date specified in the GRI 2-3 Disclosure.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had we performed a reasonable assurance engagement. Accordingly, we do not express a reasonable assurance opinion about compliance of the Report, in all material respects, with the Applicable criteria.

TRANSLATION NOTE: Our report has been prepared in Russian and in English. In all matters of interpretation of information, views or opinions, the Russian version of our report takes precedence over the English version.

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Limited Assurance Conclusion

Based on the procedures we have performed and the evidence we have obtained nothing has come to our attention that causes us to believe that the Report is not prepared, in all material respects, in accordance with the Applicable criteria.

FBK, LLC

V.Y.Skobarev
(registration number 21606080523)

Practitioner
Partner
acting under Power of Attorney No. 130/21 of September 09, 2021

The Russian Federation, Moscow
September 18, 2023

TRANSLATION NOTE: Our report has been prepared in Russian and in English. In all matters of interpretation of information, views or opinions, the Russian version of our report takes precedence over the English version.

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Glossary and abbreviations

AA1000 Stakeholder Engagement Standard (AA1000SES)	A regulatory framework for designing, implementing, evaluating, communicating and assuring the quality of stakeholder engagement, including as part of reporting and accountability processes of organisations
Becquerel (Bq)	A unit of nuclide activity in a radiation source equal to nuclide activity where one nucleus decays per second
BOO (Build – Own – Operate) contract	A contract imposing obligations related to the construction, ownership and operation of a facility
Capacity factor	The ratio of actual electricity output of a reactor unit during its operation to electricity output that would have been produced during its operation at full nameplate capacity without shutdowns
Closed nuclear fuel cycle	A nuclear fuel cycle in which spent nuclear fuel is processed in order to extract uranium and plutonium for nuclear fuel refabrication
Corporate business model	A model comprising key business processes used by an organisation to create and maintain its value in the short, medium and long term
Corporate social responsibility	A concept whereby an organisation takes into account stakeholder needs. It is a set of obligations voluntarily assumed by the organisation's executives taking into account the interests of employees, shareholders, local communities in the organisation's regions of operation, government bodies and municipal governments and other stakeholders. These obligations are funded mainly from the organisation's own funds and are aimed at implementing significant internal and external social (in a broad sense) programmes whose outcomes help develop the organisation, improve its reputation and image, and enable constructive stakeholder engagement
Depleted uranium	Uranium with a lower content of the U-235 isotope than natural uranium (e.g. uranium in spent fuel from reactors fuelled with natural uranium)
Dialogue with stakeholders (as part of reporting processes)	An event held in accordance with the international AA1000 Series of Standards to facilitate communication between the organisation and representatives of key stakeholders when preparing and promoting its public reports
Digitisation	A systematic approach to the use of digital resources in order to improve labour productivity, gain a competitive advantage and promote overall economic development
Enrichment (isotopic)	a) The amount of atoms of a specific isotope in a mixture of isotopes of the same element if it exceeds the share of this isotope in a naturally occurring mixture (expressed as a percentage); b) a process resulting in an increase in the content of a specific isotope in a mixture of isotopes
EPC (Engineering – Procurement – Construction) contract	A contract imposing obligations related to the turnkey construction of a facility, i.e. obligations related to engineering, procurement and construction of the facility. Unlike a BOO contract, it does not provide for ownership of the facility to be built
EPCM (Engineering – Procurement – Construction – Management) contract	A contract imposing obligations related to the turnkey construction (engineering, procurement and construction) and management of a facility. Unlike a BOO contract, it does not provide for ownership of the facility to be built
ESG principles	Principles governing an organisation's operations and taking into account environmental (E), social (S) and governance (G) factors. The term 'ESG' is widely used by the investment community; the ESG principles are essentially similar to sustainability principles
Fast neutrons	Neutrons whose kinetic energy exceeds a certain limit. This limit varies within a broad range and depends on the application (reactor physics, protection or radiation monitoring). In reactor physics, this limit is usually set at 0.1 MeV

First criticality	A stage in the commissioning of an NPP which involves loading nuclear fuel into the reactor, achieving criticality and performing required physical experiments at a power level at which heat is removed from the reactor through natural heat losses
Fuel assembly	A set of fuel elements (rods, bars, plates, etc.) held together with spacer grids and other structural elements that are transported and irradiated in the reactor in one piece. Fuel assemblies are loaded into the reactor core
Global Reporting Initiative (GRI)	An international system for reporting on economic, environmental and social performance based on the Sustainability Reporting Standards
Global Reporting Initiative (GRI) Sustainability Reporting Standards	Standards that outline the principles for defining report content and ensuring the appropriate quality of reporting information; disclosures comprising performance indicators related to an organisation's economic, environmental and social impacts, approaches to managing these impacts and other characteristics
Industry-wide emergency prevention and response system (IEPRS)	A functional subsystem for emergency prevention and response in organisations under the jurisdiction and within the scope of operations of ROSATOM
Integrated report	A report consolidating all material data on the organisation's strategy, corporate governance, performance indicators and prospects to present a comprehensive picture of its economic, social and environmental status. The report gives a clear idea of value creation in the organisation at present and in the future
Natural background radiation	Ionising radiation including cosmic radiation and ionising radiation from naturally distributed natural radionuclides (on the surface of the Earth, in the air, food, water, the human body, etc.)
Non-financial reporting	Reports provided by an organisation on its performance beyond its core operational and financial activities (and on the management of this performance). Examples of non-financial reports include sustainability reports, corporate social responsibility reports, environmental reports, reports on philanthropy, etc.
NPP safety	The ability of an NPP to ensure radiation safety for personnel, the general public and the environment within required limits during normal operation and in the event of an accident
Nuclear fuel	Material containing fissionable nuclides which, after being placed in a nuclear reactor, enables a nuclear chain reaction
Nuclear fuel cycle (NFC)	A sequence of manufacturing processes supporting the operation of nuclear reactors, ranging from uranium production to radioactive waste disposal
Nuclear power	A branch of power engineering that uses nuclear energy for electricity and heat generation
Nuclear safety	The ability of a reactor unit to prevent nuclear accidents and radioactive leaks
Operator	An organisation that has obtained a permit from a regulator for the operation of an NPP or another nuclear facility
Pilot operation	A stage in the commissioning of a nuclear power plant from the power start-up to acceptance of the power plant for commercial operation
Power start-up	A stage in the commissioning of an NPP at which the NPP starts to generate energy, and the operation of the NPP is tested at various power levels, up to the level specified for commercial operation
Radiation burden	A sum of individual doses of radiation received or planned in the course of operation, maintenance, repairs, replacement or dismantling of equipment at a nuclear facility
Radiation monitoring	Measures for obtaining information on radiation levels in the organisation and in the environment and on human exposure to radiation (including dosimetry and radiometric monitoring)

Radiation safety	Protection of the current and future generations of people and the environment against the harmful impact of ionising radiation
Radioactive discharge	Controlled release of radionuclides into industrial reservoirs as a result of the operation of a nuclear facility
Radioactive release	Controlled atmospheric emission of radionuclides by a nuclear facility
Radioactive waste	Materials and substances unsuitable for further use, as well as equipment and products with radionuclide content above prescribed levels
Radioactive waste disposal	Safe placement of radioactive waste in repositories or any places that rules out waste withdrawal or a possibility of radioactive leaks into the environment
Radioactive waste processing and conditioning	Process operations aimed at ensuring that the physical form and condition of radioactive waste are appropriate for its disposal
Recommendations of the Russian Union of Industrialists and Entrepreneurs (RSPP) for Use in Governance Practice and Corporate Non-Financial Reporting (basic performance indicators)	A system of economic, social and environmental performance indicators for non-financial reports developed by the RSPP in order to facilitate the adoption of responsible business principles. It is based on a number of framework documents developed by UN organisations (including the UN Global Compact) and the Global Reporting Initiative, as well as methodological and procedural guidelines of the Federal State Statistics Service of the Russian Federation and guidelines developed by the RSPP (the Social Charter of Russian Business, Recommendations on the Preparation of Non-Financial Reports 'Five Steps Towards Social Sustainability of Companies', etc.)
Research reactor	A nuclear reactor designed for use as an object of research to obtain data on reactor physics and technology required in order to design and develop similar reactors or components thereof
Separative work unit (SWU)	A measure of efforts expended on the separation of a given amount of material with a specific isotopic composition into two fractions with different isotopic compositions; separative work is measured in kilograms, and enrichment and energy costs are calculated per kilogram of separative work performed
Spent nuclear fuel reprocessing	A set of chemical engineering processes for removing fission products from spent nuclear fuel and for regeneration of fissionable material for reuse
Stakeholder assurance of the report	A procedure organised in accordance with the AA1000SES (2015) international standard whereby representatives of principal stakeholders provide assurance for the report by confirming the materiality and completeness of information disclosed in the report, and whereby the organisation responds to requests and proposals from stakeholders. The outcome of stakeholder assurance is a Statement of Public Assurance signed by representatives of principal stakeholders and included in the report
Stakeholders	Individuals and/or legal entities and groups of individuals or entities whose interests are affected or could be affected by the organisation. An organisation may have different stakeholders (national and international regulatory (supervisory) authorities, shareholders, consumers of goods and services, business partners, suppliers and contractors, civil society organisations, local communities, trade unions, etc.) with differing and conflicting interests
Sustainable development	A process of economic and social change whereby the exploitation of natural resources, allocation of investments, the focus of scientific and technical development, personal development and institutional changes are aligned with each other and strengthen the present and future potential for meeting human needs and aspirations
Sustainable Development Goals	17 interdependent Goals set in the 2030 Agenda for Sustainable Development adopted by 193 countries at the session of the UN General Assembly in 2015. The goals include eradicating poverty in all its forms, reducing inequality and addressing climate change

Uranium conversion	A chemical engineering process involving the transformation of uranium-containing materials into uranium hexafluoride
Uranium hexafluoride	A chemical compound of uranium and fluorine (UF_6), which is the only highly volatile uranium compound (when heated to 56.4°C at atmospheric pressure, uranium hexafluoride changes directly from the solid state into the gaseous state); it is used as feedstock for the separation of uranium-238 and uranium-235 isotopes using gaseous diffusion or the gas centrifuge method and for production of enriched uranium
Uranium ore enrichment	A combination of processes for primary treatment of uranium-containing mineral resources in order to separate uranium from other minerals contained in the ore
Water-cooled water-moderated power reactor (VVER)	A power reactor in which water is used as both a coolant and a moderator. This type of reactors is the most widely used at Russian NPPs; it has the following versions: VVER-440, VVER-1000 and VVER-1200

List of Abbreviations and Acronyms

APCS	Automated process control system
ARMS	Automated radiation monitoring system
CATF	Closed administrative and territorial formation
CHPP	Combined heat and power plant
DUHF	Depleted uranium hexafluoride
ESG	Environmental, social and corporate governance
ESP	Executive succession pool
FAIR	Facility for Antiproton and Ion Research
FMBA of Russia	Federal Medical and Biological Agency
FS	Feasibility study
FTP	Federal target programme
GRI	Global Reporting Initiative (an organisation developing sustainability reporting standards)
HLW	High-level waste
IAEA	International Atomic Energy Agency
IARMS	Industry-Wide Automated Radiation Monitoring System
IGA	Intergovernmental agreement
ILW	Intermediate-level waste
IP	intellectual property
IRAW	Individual risk assessment workstation
ITER	International Thermonuclear Experimental Reactor
KPI	Key performance indicator
LLW	Low-level waste
LNG	Liquefied natural gas
LTIFR	Lost Time Injury Frequency Rate
MIC	Military–industrial complex
NEIC	Nuclear Energy Information Centre
NFA	Nuclear fuel assembly
NFC	Nuclear fuel cycle
NFE	Nuclear fuel element

NPP	Nuclear power plant
NPU	Nuclear propulsion unit
NRS	Nuclear and radiation safety
NRTC	Nuclear Research and Technology Centre
NSR	Northern Sea Route
NWD	Nuclear Weapons Division
ODAV	Irradiated aluminium-clad dispersion fuel element
OECD NEA	Nuclear Energy Agency of the Organisation for Economic Cooperation and Development
PDA	Priority development area
PDEF	Pilot and Demonstration Energy Facility
R&D	Research and development
RAW	Radioactive waste
RBMK	High-power channel-type reactor
RMS	Risk management system
RPS	ROSATOM Production System
SNF	Spent nuclear fuel
tHM	Tonne of heavy metal
TPP	Thermal power plant
VVER	Water-cooled water-moderated power reactor
WANO	World Association of Nuclear Operators
WPP	Wind power plant

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