



REPORT PROFILE

The Public Report of State Atomic Energy Corporation Rosatom for 2016 (the Report) is the eighth report published by the Corporation on a voluntary basis and intended for a broad range of stakeholders.

The Report focuses on ROSATOM's business strategy until 2030 and the contribution of the Corporation's performance in 2016 to the achievement of long-term strategic goals; this topic has been selected by the top management and representatives of key stakeholders.

STANDARDS AND REGULATORY REQUIREMENTS

The Report has been prepared in accordance with:

- The Public Reporting Policy and the Public Reporting Standard of ROSATOM and its organizations;
- The International Integrated Reporting Framework (International <IR> Framework);
- The Global Reporting Initiative (GRI) Sustainability Reporting Standards (GRI SRS, Core option);
- The AA1000 AccountAbility Principles Standard;
- The Recommendations of the Russian Union of Industrialists and Entrepreneurs (RSPP) for Use in Governance Practice and Corporate Non-Financial Reporting (basic performance indicators).

STAKEHOLDER ENGAGEMENT

To improve transparency and accountability and to determine the materiality of information to be disclosed, the Report was prepared in cooperation with stakeholders in accordance with international standards (AA1000SES, the GRI Standards and the International Framework). To identify material aspects to be disclosed in the Report, a poll was carried out and two dialogues with stakeholders were held, including public consultations on the draft Report. The Report incorporates key recommendations and requests voiced by stakeholder representatives during these dialogues.

[For details on the Report and the process of defining its content, see Appendix 1.](#)



PERFORMANCE OF STATE ATOMIC ENERGY CORPORATION ROSATOM IN 2016 PUBLIC ANNUAL REPORT

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2016 WAS A SUCCESSFUL YEAR FOR THE RUSSIAN NUCLEAR INDUSTRY. NUCLEAR POWER GENERATION REACHED A NEW RECORD HIGH. ROSATOM RECORDED AN INCREASE IN THE PORTFOLIO OF OVERSEAS ORDERS AND THE VOLUME OF ORDERS FOR NEW PRODUCTS

ABOUT ROSATOM

ROSATOM¹ 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, mechanical engineering, NPP design and construction, power generation, decommissioning of nuclear facilities, spent nuclear fuel and radioactive waste management.

The Corporation comprises over 300 enterprises and organizations, 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 abroad, uranium enrichment services, nuclear fuel fabrication, etc.) ROSATOM carries out numerous large-scale international projects abroad and generates substantial overseas revenue.

¹ ROSATOM's status, the goals of its establishment and operations, its functions and powers are determined by Federal Law No. 317-FZ on State Atomic Energy Corporation Rosatom dated December 1, 2007.

NO. 1

in the world in terms of the number of NPP power units in the portfolio of foreign projects (34 power units)

NO. 1

in the world in terms of uranium enrichment (36% of the global market)

NO. 2

in the world in terms of uranium reserves (517,900 tonnes in Russia and 220,800 tonnes abroad) and 13% of global production (7,920 tonnes)

18.3 %

share of electricity generation in Russia

329²

organizations and enterprises within the Corporation

² Within the scope of consolidation of ROSATOM as of Q4 2016.

THE WORLD'S ONLY NUCLEAR-POWERED ICEBREAKER FLEET

9.8

billion RUB
expenditure on corporate social programmes for employees in 2016

1.1

billion RUB
expenditure on charity programmes in ROSATOM's regions of operation in 2016

26.7

billion RUB
expenditure on environmental protection in 2016

250,000

employees

At present, ROSATOM is also developing new businesses outside its core production and process chain (electricity generation at large NPPs). These include projects in the sphere of nuclear medicine, wind power, composite materials, additive manufacturing, lasers, robotics, supercomputers, etc.

The Corporation's research activities are aimed at developing new solutions for the power industry and innovations that will improve the quality of people's lives.

ROSATOM's key innovative project in the sphere of nuclear power is the Proryv (Breakthrough) project, 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 secure a reliable long-term source of clean energy.

KEY RESULTS IN 2016

KEY PERFORMANCE INDICATORS SET BY THE SUPERVISORY BOARD

Indicator	2014	2015	2016	2016/2015
Adjusted free cash flow of ROSATOM ³ , RUB billion	202.1	245.4	263.6	+7.4 %
Increase in consolidated labour productivity vs 2011 (in current prices excluding the Nuclear Weapons Division), %	37.5	93.5	110.9	–
Unit semi-fixed costs (as a percentage of revenue), %	39.0	29.2	27.0	–
Power generation, billion kWh	180.5	195.2	196.4	+0.6 %
Implementation of JSC Rosenergoatom Concern's investment programme, %	96	100	99	–
10-year portfolio of overseas orders, USD billion	101.4	110.3	133.4	+20.9 %
10-year portfolio of orders for new products (within and outside the scope of the Corporation), RUB billion	318.0	583.5	1,018.8	+74.6 %
Revenue from new products within and outside the scope of the Corporation on a competitive basis, RUB billion	78.5	125.0	190.8	+52.6 %
Integrated innovation KPI ⁴ , %	–	128.9	111.7	
Fulfilment of government orders, %	100	100	100	
Number of events rated at level 2 or higher on the INES scale	0	0	0	

³ Calculated as net cash flow from day-to-day operations adjusted for proceeds from the disposal of non-core assets, dividends and interest before lease payments and reserve funds.

⁴ The calculation includes the number of foreign patents, revenue from sales of innovative products and the results of implementation of ROSATOM's new innovative development programme. The target for the reporting period was set at 100%.

KEY EVENTS IN 2016

- THE STATE DEFENCE ORDER WAS 100% FULFILLED.
- THE FIRST CRITICALITY PROGRAMME AND THE POWER START-UP OF POWER UNIT NO. 1 OF NOVOVORONEZH NPP-2 EQUIPPED WITH A GENERATION 3+ REACTOR WERE COMPLETED.
- THE INNOVATIVE POWER UNIT NO. 4 OF BELOYARSK NPP WITH A BN-800 FAST NEUTRON REACTOR STARTED FULL-SCALE OPERATION.
- ELECTRICITY OUTPUT AT 35 POWER UNITS OF 10 OPERATING NPPS TOTALLED 196.4 BILLION KWH, REACHING A NEW ALL-TIME HIGH IN THE HISTORY OF RUSSIAN NUCLEAR POWER GENERATION. THE SHARE OF NPPS IN RUSSIA'S ENERGY MIX TOTALLED 18.3%.
- 8 INTERGOVERNMENTAL AGREEMENTS AND 20 INTERDEPARTMENTAL AGREEMENTS WERE CONCLUDED. THESE INCLUDE 4 FRAMEWORK INTERGOVERNMENTAL AGREEMENTS WITH BOLIVIA, ZAMBIA, TUNISIA AND CUBA, WHICH PROVIDE THE FOUNDATION FOR BILATERAL COOPERATION WITH THESE COUNTRIES IN THE SPHERE OF NUCLEAR TECHNOLOGIES.

- AN OFFICIAL CEREMONY WAS HELD TO MARK THE START-UP OF POWER UNIT NO. 1 OF KUDANKULAM NPP IN INDIA AND THE CONNECTION OF POWER UNIT NO. 2 TO THE COUNTRY'S POWER SYSTEM.
- THE FIRST CONTRACT WAS SIGNED WITH A US NPP OPERATOR FOR THE PILOT USE OF RUSSIAN TVS-KVADRAT FUEL FOR FOREIGN-DESIGN REACTORS, AND A CONTRACT WAS CONCLUDED WITH VATTENFALL NUCLEAR FUEL AB (SWEDEN) FOR THE COMMERCIAL SUPPLY OF TVS-KVADRAT NUCLEAR FUEL TO RINGHALS NPP.
- INTERGOVERNMENTAL AGREEMENTS ON THE CONSTRUCTION OF NUCLEAR RESEARCH AND TECHNOLOGY CENTRES WERE SIGNED WITH BOLIVIA AND NIGERIA.
- THE DECISION WAS MADE TO ESTABLISH RUSATOM HEALTHCARE, WHICH WILL PROMOTE NUCLEAR MEDICINE TECHNOLOGY IN RUSSIA AND ABROAD.
- ROSATOM WON A COMPETITIVE SELECTION OF RENEWABLE ENERGY PROJECTS TO CONSTRUCT WIND POWER PLANTS IN RUSSIA WITH A TOTAL CAPACITY OF AT LEAST 610 MW.
- A PRIORITY SOCIAL AND ECONOMIC DEVELOPMENT AREA WAS ESTABLISHED IN KRASNOKAMENSK, ZABAYKALSKY TERRITORY (THE TOWN IS HOME TO PJSC PIMCU, THE KEY ENTERPRISE OF ROSATOM'S MINING DIVISION).
- THE WORLD'S MOST POWERFUL PROJECT 22220 NUCLEAR ICEBREAKER, ARKTIKA, WAS LAUNCHED.
- ROSATOM STARTED TO IMPLEMENT THE FEDERAL TARGET PROGRAMME ON NUCLEAR AND RADIATION SAFETY FOR THE PERIOD FROM 2016 THROUGH 2020 AND FOR THE PERIOD UNTIL 2030.

ADDRESS BY THE CHAIRMAN OF THE SUPERVISORY BOARD



SERGEY KIRIENKO
CHAIRMAN OF THE SUPERVISORY
BOARD OF ROSATOM



Dear colleagues,

I am happy to say that 2016 was a successful year for the Russian nuclear industry.

Key performance indicator targets for the reporting year set for ROSATOM by the Supervisory Board were met (performance against the targets stood at 106.5%). The state defence order was fulfilled in full. The Corporation saw a further increase in labour productivity and expansion of its portfolio of overseas orders and orders for new products. Electricity output at nuclear power plants reached a new all-time high. Thus, ROSATOM makes an important contribution to ensuring the energy security of Russia's regions. All this demonstrates the high level of professionalism and responsibility of Russian nuclear engineers.

In the reporting year, ROSATOM continued to implement five federal target programmes. The Federal Target Programme on Nuclear and Radiation Safety for the Period from 2016 through 2020 and for the Period until 2030 (FTP NRS 2) was launched. ROSATOM continued to implement the State Programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex'; in the reporting year, overall performance against the programme's targets was assessed at 101.45%.

In 2016, nuclear icebreakers escorted 400 vessels with a total gross tonnage of 5.3 million tonnes along the Northern Sea Route; this is 2.5 times more than in 2015. A large-scale upgrade of the icebreaker fleet is underway in the industry. The reporting year saw the launch of the world's most powerful nuclear icebreaker, Arktika.

ROSATOM is a technological leader both in Russia and abroad. In 2016, ROSATOM successfully launched a new Innovative Development and Technological Modernization Programme.

The Russian nuclear industry is characterized by high standards of employee health and safety. ROSATOM's performance in 2016 clearly demonstrates that the Corporation considers this aspect to be a priority: all nuclear facilities operated steadily and reliably, and there were no major incidents or violations.

In 2017, ROSATOM will continue to work towards achieving the objectives set by the government, and I am confident that Russia's nuclear engineers will succeed in this task!

ADDRESS BY THE CEO



ALEXEY LIKHACHEV
CEO OF ROSATOM



Dear colleagues and partners,

You are reading the public annual report of ROSATOM presenting the Corporation's operating results for 2016. The report has been prepared in cooperation with ROSATOM's key divisions and senior executives. The final version of the document incorporates proposals put forward by our partners, representatives of non-governmental organizations, the expert community and other stakeholders.

ROSATOM is a single team united by shared values and the governance system. We are not afraid to look into the future: we shape it, as is evidenced by the Long-Term Development Strategy until 2030, which is the focus of the 2016 report. Our strategic goals are as follows:

- To increase our share on international markets;
- To develop new products for the Russian and international markets;
- To reduce the cost of our products and the lead time.

The year was successful, and the results presented in the report confirm that in 2016, we took a major step towards achieving our strategic goals.

The state defence order was 100% fulfilled. One of the priorities of Russian nuclear engineers is to strengthen the country's nuclear shield, and we have once again successfully accomplished this objective.

Mass production of power units for nuclear power plants continued in Russia. The first criticality programme and the power start-up of power unit No. 1 were completed at Novovoronezh NPP-2. It is the first ever leading generation 3+ NPP power unit; it marks the next stage in the evolution of VVER designs and complies with all post-Fukushima safety requirements.

The innovative power unit No. 4 of Beloyarsk NPP with a BN-800 fast neutron reactor started full-scale operation. This power unit has become a research test facility for the development of 'fast' reactor technologies and new types of fuel. The BN-800 project has gained widespread recognition worldwide. *POWER*, a prestigious US energy magazine, named power unit No. 4 of Beloyarsk NPP the top power plant of the year.

In the reporting year, electricity output at 35 power units of 10 operating NPPs totalled 196.4 billion kWh, reaching a new all-time high in the history of Russian nuclear power generation (in 2015, electricity output totalled 195.2 billion kWh). Nuclear power generation accounted for 18.3% of the total electricity output in Russia.

In 2016, ROSATOM continued to expand its footprint on international markets. The 10-year portfolio of overseas orders increased to USD 133.4 billion (as against USD 110.3 billion in 2015). Revenue from overseas orders reached USD 5.58 billion. The Corporation is currently implementing projects in 42 countries around the world.

In 2016, units No. 1 and No. 2 of Kudankulam NPP in India were put into operation. The EPC contract for the construction of El Dabaa NPP in Egypt with four 1,200 MW power units was finalized.

The reporting year saw a breakthrough on the market for nuclear fuel for foreign-design PWR reactors (which make up more than half of the total number of reactors currently in operation worldwide). Our Fuel Division signed the first contract with a US NPP operator for the pilot use of Russian TVS-KVADRAT fuel and a contract with Vattenfall Nuclear Fuel AB (Sweden) for the commercial supply of TVS-KVADRAT nuclear fuel to Ringhals NPP.

One of our strategic priorities is to offer new products and services on the Russian and international markets. The Corporation's 10-year portfolio of orders for new products exceeded RUB 1 trillion (as against RUB 0.58 trillion

in 2015). Revenue from new products reached RUB 190.8 billion (as against RUB 125.0 billion in 2015).

ROSATOM seeks to become a global leader of the new zero-carbon economy and to develop technologies that will improve the quality of people's lives. 2016 was a landmark year for the Corporation's projects in renewable energy and nuclear medicine.

We won a tender for the construction of wind power plants (WPPs) in Russia with a total capacity of at least 610 MW to be commissioned in 2018–2020. Investments in the project will total about RUB 83 billion. The pilot wind farm will be built in the Republic of Adygea. ROSATOM signed a partnership agreement with a Dutch manufacturer of wind turbines, Lagerwey, providing for the transfer of 'critical technologies' to achieve a degree of production localization in Russia of no less than 65%.

The decision was made to establish Rusatom Healthcare, which will promote Russian nuclear medicine technology in Russia and abroad. In Obninsk, ROSATOM organized the production of microsources for brachytherapy using the iodine-125 isotope; the production capacity totals 50,000 sources per year. ROSATOM signed a long-term contract for the supply of the cobalt-60 isotope to the Canadian company Nordion. Highly radioactive cobalt is in demand on the global market and is used for cancer treatment and stereotactic surgery. Sales of molybdenum-99 (Mo-99), the most popular radioisotope for the diagnosis and treatment of cancer, increased by 68% year on year.

Enterprises in the Russian nuclear industry continue to improve the efficiency of their production and business processes and to reduce costs (including non-production costs).

We expect that these initiatives will enable the Corporation to increase labour productivity more than threefold between 2016 and 2030 and to make its products and services globally competitive.

Looking back on the past year, we should also highlight compliance with safety requirements.

Nuclear, radiation and environmental safety and protecting the lives and health of our employees are our top priority.

In 2016, ROSATOM provided safe working conditions for employees in the industry; there were no major deviations in the operation of nuclear facilities. More specifically, as in recent years, there were no events rated at level 2 or higher on the international INES scale (level 1 and 0 deviations do not pose a risk to employees operating the facilities, local residents or the environment).

I would like to thank all employees in the industry for their impressive performance. By working together, in 2017, we will reach new levels of success in our work!

ADDRESS BY A STAKEHOLDER REPRESENTATIVE



ELENA FEOKTISTOVA

MANAGING DIRECTOR FOR CORPORATE RESPONSIBILITY,
SUSTAINABLE DEVELOPMENT AND SOCIAL ENTREPRENEURSHIP
OF THE RUSSIAN UNION OF INDUSTRIALISTS
AND ENTREPRENEURS (RSPP)



Dear colleagues,

The economy, society and the environment are closely interconnected. Challenges arising in one of these spheres affect the other areas as well. This is now so clear that the international community has reached a consensus that comprehensive solutions need to be found to address global problems faced by all countries, taking into account the particular nature of these problems in each case. However, certain aspects are important in any society. These include the transparency and accountability of organizations; comprehensive risk management, including non-financial risks; responsibility for compliance with standards of business conduct not only in the organization itself but also among its contractors; stakeholder engagement and development of partnerships as a way to maintain a balance of interests, mitigate and prevent risks and create new opportunities.

The Sustainable Development Goals until 2030 formulated by the UN based on a common understanding reflect the need for an efficient response to current problems and the development of sustainable models that will help to implement long-term strategies to address these problems.

We are witnessing a transformation driven by new technologies, global economic and social processes and climate change, which is shaping the current and, in particular, the future strategies of entire regions of the world (the European Union, for instance), individual nations and businesses.

Sustainable development and corporate social responsibility increasingly form part of the agenda of large companies which understand corporate social responsibility to be, in accordance with the international definition of the term, the responsibility of an organization for its impact on society and the environment, including economic, social and environmental factors. All traditional aspects covered by this strategy remain relevant both in Russia and worldwide. These include labour relations, workplace health and safety, economic impacts, environmental protection, social investment and contribution to the development of operating regions, reporting processes, product quality, combating corruption, etc. At the same time, certain topics, such as responsibility in the supply chain, information

transparency, improvement of governance quality, compliance with the norms of ethical business conduct, attention to climate change issues, and stakeholder engagement as a way to maintain a balance of interests, mitigate and prevent risks, are becoming increasingly relevant.

Corporate social responsibility is defined as social innovation aimed at economic modernization and encouraging society and businesses to focus on sustainable development, whose principles and goals should be integrated into corporate strategy and linked with business performance, competitiveness and sustainability.

Major international initiatives, such as the Sustainable Development Goals adopted by the UN and the Paris Agreement on the Reduction of Greenhouse Gas Emissions, attract the attention of various stakeholders to economic, social and environmental impacts of organizations. These initiatives generate demand for information confirming that businesses, especially large ones, seek to maintain a balance between the economic, social and environmental components of sustainable development.

Large companies are expected to become responsible leaders of global sustainable growth. Today we can see that businesses, including in

Russia, are willing to accept this responsibility. The sustainable development agenda of each company may have specific features depending on the scale and nature of its operations and its products. It is determined by the needs of key stakeholders and the situation in the regions of operation. At the same time, a universal characteristic of a mature and effective sustainable development strategy is that it is incorporated in the overall business strategy of organizations.

ROSATOM's business spans an entire sector of Russian industry. Moreover, given the active promotion of its products and services on international markets and its footprint in many countries around the world, the Corporation represents Russian business in the international arena.

Nuclear power generation enables a transition to a green, low-carbon economy free from greenhouse gas emissions. ROSATOM's projects in related industries, such as nuclear medicine, reflect the Corporation's commitment to improving the quality of people's lives, which is undoubtedly an important contribution to sustainable development. ROSATOM's efforts to develop its personnel and the regions of its operation and the special importance that the Corporation attaches to nuclear, radiation and environmental safety demonstrate that the Corporation follows responsible business practices.

In 2016, ROSATOM ranked among leaders based on the Responsibility and Transparency and Sustainable Development Trajectory Indices of the RSPP. The RSPP Indices are the only Russian tool for independent assessment of companies that has been included in the international database of sustainability ratings and rankings. This helps to make information on Russian business leaders available to the international community.

On behalf of the Russian Union of Industrialists and Entrepreneurs, I applaud the impressive results achieved by ROSATOM and wish you all continued success in achieving your strategic goals and further contributing to the sustainable development of Russia and the world as a whole!

FINANCIAL AND ECONOMIC RESULTS⁵



NIKOLAY SOLOMON

FIRST DEPUTY CEO FOR CORPORATE FUNCTIONS,
CHIEF FINANCIAL OFFICER



— *What can you say about the financial performance of ROSATOM and its core divisions in 2016?*

— **In 2016, consolidated revenue increased by 5.3% year on year. Revenue growth was driven mainly by electricity sales (16.3%) as a result of both an increase in sales volumes and the price factor.**

I would like to point out that in 2015, we reported record power generation at our NPPs. However, in 2016, it reached a new all-time high of 196.4 billion kWh. In addition, revenue from NPP construction grew by 14.4%. At the same time, 2016 saw a reduction of revenue from sales of uranium products and enrichment services (down by 11.7%) and from sales of nuclear fuel (down by 5.8%) mainly as a result of lower prices on the nuclear fuel cycle markets.

Despite an increase in consolidated revenue, in 2016, ROSATOM's consolidated profit fell by 46.9% year on year. Changes in profit were driven primarily by a foreign exchange loss for 2016 as against a foreign exchange gain in the previous year. This is related to the volatility of the rouble exchange rate: as ROSATOM's foreign exchange

assets exceed foreign exchange liabilities, the strengthening of the rouble in 2016 resulted in the foreign exchange loss. This impact was partially offset by income from the affiliation of two uranium mining joint ventures in Kazakhstan.

Overall, our efforts enabled us to reduce our loan portfolio in 2016. As a result, by year-end 2016, the Debt/EBITDA ratio decreased to 2.1 as against 2.2 in 2015.

— *The reporting year saw a fall in profitability ratios compared to 2015. What caused this decline?*

— The decrease in return on sales (ROS) from 17.16% to 8.65%, in return on assets (ROA) from 4.46% to 2.26% and in return on equity (ROE) from 6.94% to 3.51% was caused primarily by the fact that profit fell by a factor of 1.5 compared to 2015. The decline in profit was to a large extent driven by the foreign exchange differences that I mentioned previously. In 2015, the USD/RUB exchange rate increased by RUB 16 and by year end reached RUB 73 per dollar; as a result, a foreign exchange gain was recorded in the 2015 financial statements. In 2016, the USD/RUB exchange rate fell to RUB 61 per dollar, while the EUR/USD cross rate decreased from 1.1 to 1.05. This resulted in a loss on foreign currency transactions totalling about 40% of the 2015 profit.

⁵ For more information on the financial and economic performance of the Corporation's Divisions, see the 2016 annual reports of JSC Atomenergoprom, JSC Atomredmetzoloto, JSC TVEL, JSC TENEX, JSC Atomenergomash, JSC ASE EC and JSC Rosenergoatom Concern.

— In 2016, intangible assets more than doubled. What contributed to this increase?

— The increase in intangible assets was related primarily to the receipt of mineral rights as part of the consolidation of two joint ventures in Kazakhstan: Joint Venture South Mining & Chemical Company LLP and Joint Venture Betpak-Dala LLP.

Due to a significant change in the terms of existing contracts, ROSATOM revised the terms of its participation in these joint ventures. As from January 1, 2016, control over both joint ventures was transferred to the Corporation. Accordingly, their financial and operating results have been included in the consolidated financial statements as financial and operating results of subsidiaries.

— One of the strategic objectives of ROSATOM is to reduce the cost of its products and the lead time. What were the key achievements in the reporting year (within your area of competence)?

— Overall, in 2016, we achieved a 9% increase in labour productivity across the industry, an 8% decrease in unit fixed costs and a 27% reduction in the inventory turnover period (in days).

Production cost and the lead time are reduced primarily through the implementation of ROS-ATOM's Production System (RPS). All enterprises involved in the system-wide roll-out of RPS reported an improvement in their business performance.

In addition, in 2016, we launched the PORA programme to reduce non-production costs. It enabled us to achieve cost savings totalling RUB 6 billion. ●

Changes in revenue (a 5.3% year-on-year increase) were driven mainly by the following factors:

- An increase in the revenue of the Electricity segment as a result of both an increase in electricity sales and the price factor;
- A reduction of revenue from sales of nuclear fuel, uranium products and enrichment services by the Sales and Trading, and Fuel operating segments, mainly as a result of lower prices on the nuclear fuel cycle markets;
- An increase in the revenue of the Mechanical Engineering segment due to an increase in the supply of reactor units for various types of vessels.

KEY FINANCIAL RESULTS

	2014	2015	2016	2016/2015
Revenue under IFRS, RUB billion	618.3	821.2	864.6	+5.3%
Assets under IFRS, RUB billion	2,637.7	3,160.4	3,316.9	+5.0%
Intangible assets under IFRS, RUB billion	48.0	55.9	117.6	+110.4%

PROFITABILITY RATIOS, %

	2014	2015	2016
Return on sales (ROS)	4.75	17.16	8.65
Return on assets (ROA)	1.11	4.46	2.26
Return on equity (ROE)	1.71	6.94	3.51

Profitability ratios decreased in 2016 primarily due to a year-on-year decrease in profit in the reporting period by a factor of 1.5.

ROSATOM HAS SET ITSELF THREE
LONG-TERM STRATEGIC GOALS
TO BE ACHIEVED BY 2030:

- TO INCREASE ITS INTERNATIONAL
MARKET SHARE;
- TO REDUCE PRODUCTION COSTS
AND THE LEAD TIME;
- TO DEVELOP NEW PRODUCTS
FOR THE RUSSIAN AND
INTERNATIONAL MARKETS



2.1. BUSINESS STRATEGY UNTIL 2030



SERGEY PETROV
DIRECTOR FOR STRATEGIC MANAGEMENT



— *In the reporting year, ROSATOM released a public version of its Business Strategy until 2030. It sets three strategic goals (to increase the Corporation's share on international markets, to develop new products for the Russian and international markets and to reduce the cost of products and the lead time). Why were those goals chosen as priorities?*

— ROSATOM is the only nuclear company in the world that operates in all segments of the value chain, from the extraction of natural uranium to the construction, operation and decommissioning of nuclear power plants. ROSATOM performs the functions of both the operator and the technology provider, which gives it a unique set of competences and the ability to offer 'turnkey' solutions, which are especially popular in countries that have only recently joined the nuclear club.

Our primary strategic objective is to promote the unique technologies of Russian-design reactors abroad while at the same time securing orders for the Mechanical Engineering, Fuel and other Divisions of ROSATOM.

The world offers numerous opportunities for growth and business expansion, and ROSATOM turns to those areas where it can maximize the benefits both for itself and for Russia as a whole.

The unique competences of ROSATOM enable the successful development of related, and sometimes non-nuclear, new businesses. Presence in different market segments and a well-balanced product portfolio enable ROSATOM to adapt faster to changes in the internal and external environment and to mitigate the risks associated with individual business areas. The development of new businesses makes it possible to achieve the objectives of ensuring production capacity utilization, employing a greater number of highly qualified specialists and increasing labour productivity and return on assets.

Today, ROSATOM is facing increased competition on all the markets where it operates. New competitors entering these markets, promoting their services and technologies, and often using dumping to squeeze out our products and services, pose a significant risk to ROSATOM's development. It has therefore become necessary to reduce the cost of production in order to survive amid tough international competition. The lead time is also extremely important, because any delays immediately result in a rise in costs, while being ahead of schedule provides an opportunity to lower costs.

— *What are the main tools for implementing ROSATOM's strategy? What resources does ROSATOM have to achieve its strategic goals?*

— Any company achieves its strategic goals by implementing projects. ROSATOM's pool of projects covers every possible area, from the construction of nuclear power plants abroad (leading to an increase in ROSATOM's share on the international market) and the PORA programme aimed at optimizing non-production costs (enabling a reduction in the cost of production and the lead time) to niche projects implemented by the industry's enterprises in order to launch new products.

The system of breaking down strategic goals and objectives to the level of industry enterprises makes it possible to identify the role of each enterprise in achieving common goals and to create the necessary incentives. By pursuing the objectives of individual enterprises, their leaders, with the support of the Corporation, are creating ROSATOM's future image from the ground up.

ROSATOM's principal resource is our people and their unique skills gained over many years. ROSATOM is the technological leader of the world's nuclear industry. It is our people and the support of the state that will enable us to implement even the most ambitious projects.

— *What do you see as the major risks (in the short and long term) with regard to strategy implementation?*

— The achievement of any company's long-term strategic targets can be affected by significant changes in both the external and internal environment. And ROSATOM is no exception.

I would like to touch on one very important aspect. The total number of power units in ROSATOM's portfolio of foreign projects as of the end of 2016 was 34, and we are continuing to develop cooperation with potential partners around the world. In 2016, our 10-year portfolio of overseas orders exceeded USD 133 billion. We are entering a new stage in overseas operations: the fulfilment of orders in the order portfolio. Accordingly, the main risk in the short and long term is the fulfilment of commitments that we have taken on. The main priority of ROSATOM's operations is shifting towards the performance of contracts at a profit, on time and on budget. Otherwise, we will face fines, and there will be a negative impact on both our reputation and the reputation of Russia as a whole. ●

2.1.1.

CONTEXT OF ROSATOM'S BUSINESS

Trends in the development of the nuclear industry

The nuclear industry is influenced by a number of factors, including⁶:

- Global population growth from 7 billion to 10 billion people in the next 50 years;
- Steady increase in global GDP by 2-3% per year;
- Growth of global electricity consumption. By 2030, global electricity consumption is expected to increase by 31% to 33 trillion kWh. China, India and developing countries in Southeast Asia will lead the growth, with electricity consumption increasing by 62% (from 8.7 trillion kWh to 14.1 trillion kWh). In Russia, electricity consumption is expected to grow by 1.3% per year until 2030;
- Increase in greenhouse gas accumulation. Global carbon dioxide emissions total about 32 billion tonnes per year and continue to grow. Carbon dioxide emissions are projected to exceed 34 billion tonnes per year by 2030. This creates the conditions for active development of carbon-neutral electricity generation, which includes the nuclear power industry.

These factors, as well as a reduction in fossil fuel reserves, contribute to the long-term demand for nuclear energy. Leading international analytical agencies predict a significant increase in installed capacity in the nuclear power industry by 2030. The International Energy Agency, UxC consulting company and the World Nuclear Association expect to see an increase in the capacity of operating NPPs to 520 GW, 501 GW and 495 GW respectively under the baseline scenario. The IAEA only predicts the floor and the cap for the global capacity of NPPs: 390 GW and 598 GW respectively.



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 with the highest possible safety level;**
- **Assistance in securing project funding (including under the B00 scheme) and building project infrastructure (legal framework, employee training, community relations, etc.).**

* LCOE stands for levelized cost of electricity over the NPP life cycle.

⁶ Data from the World Bank, the IEA World Energy Outlook 2016, EIU and a draft of the programme 'Development of the Russian Electricity Industry until 2035' have been used.

The global nuclear power industry will remain competitive in the long run compared to other energy sources. Thermal power generation will yield to nuclear energy primarily because of CO₂ emissions, which have a negative impact on the environment and drive up the cost of energy since many countries impose CO₂ emission fees. Unpredictable prices for raw hydrocarbons are yet another major disadvantage of thermal power generation.

Regarding renewable energy, even if energy generation becomes significantly cheaper, further traditional backup facilities or energy storage systems will need to be built to secure stable supplies of energy. This, in turn, will entail significantly higher capital expenditures for this type of generation.

ROSATOM’s competitive position⁷

The competitiveness of services provided by ROSATOM is based on unique facilities, technical capabilities and human resources, as well as the experience of coordinating R&D and design organizations. The Russian nuclear industry maintains global leadership in terms of research and development in reactor design, processing stages of the nuclear fuel cycle (NFC), NPP operation and the qualifications of NPP personnel. Russia has the most advanced enrichment technologies; nuclear power plants with water-cooled water-moderated power reactors (VVER) have proved their reliability over one thousand reactor-years of fail-free operation. The high quality of products and services is confirmed by the success in international tenders for the supply of nuclear fuel and construction of NPPs in other countries. Currently, ROSATOM is the largest global market player in terms of the number of confirmed NPP construction projects: its overseas order portfolio comprises 34 power units [\(for more details, see the section ‘International Business’\)](#).

Plummeting oil prices had mixed effects but on the whole had a positive impact on ROSATOM’s competitive position. On the one hand, falling oil prices caused gas prices to decrease too, which, in turn, helped reduce the cost of thermal power generation and improved the competitiveness of the technology. On the other hand, the drop in oil prices caused a devaluation of the Russian rouble, and thus reduced the foreign currency cost of NPP construction projects in other countries and improved the Corporation’s competitiveness.

The current level of inflation in Russia has no significant impact on ROSATOM’s financial position. According to inflation projections (less than 10%), it should not have a significant impact on the Corporation’s solvency.

Low expected GDP growth rates in Russia (not exceeding 2%) constrain the growth of electricity consumption in the country and consequently limit the implementation of the Corporation’s new projects in the Russian Federation.

ROSATOM’s contribution to sustainable development

Nuclear generation holds a special place among power generation technologies that have a minimal impact on the environment. During one year of operation, one 1 GW nuclear power plant prevents emissions of 9 million tonnes of CO₂, which is equivalent to annual emissions from 2 million vehicles.

The 21st UN Climate Change Conference resulted in the signing of an agreement aimed at limiting the air temperature increase to no more than 1.5°C compared to the pre-industrial period (mid-18th century). In order to achieve this goal, greenhouse gas emissions will need to be reduced to zero by 2050. Thus, the signing of the agreement creates considerable opportunities for the development of the nuclear power industry, as it ensures base-load power generation, and a nuclear plant does not emit CO₂ during its operation.

Russia’s Energy Strategy involves maximizing the efficiency of the use of natural resources and the potential of the energy sector in the long term to enable sustainable economic growth, improve the quality of life of the country’s population and help to strengthen its position in the global economy.

In order to achieve the objectives of Russia’s Energy Strategy, the following tasks have been set:

- To improve energy efficiency and environmental performance and to reduce the energy intensity of the Russian nuclear power industry;
- To develop a new generation of the nuclear power industry with a closed fuel cycle;

ENVIRONMENTAL IMPACT OF NPP OPERATION

	during one year of operation	throughout the life cycle
Prevention of CO ₂ emissions	9 million tonnes	559 million tonnes
Equivalent of annual vehicle emissions	2 million vehicles	122 million vehicles

Calculated based on the data of the World Nuclear Association.

- To save valuable non-renewable fossil resources for non-energy use;
- To find a radical solution to the problem of greenhouse gas emissions;
- To develop distributed generation (including based on non-conventional energy resources) and smart energy systems, with improvements in electricity and heat markets; to promote electrification based on energy storage devices and fuel cells.

ROSATOM contributes to global sustainable development. In the course of its operations, the Corporation strives to ensure a high level of nuclear and radiation safety, minimize the impact on the environment and use resources more efficiently.

The Corporation uses environmental stewardship practices in uranium mining. New uranium deposits are developed by drillhole in-situ leaching

⁷ For information on ROSATOM's main competitors, see the section 'Markets Served by ROSATOM'.

with sulphuric acid, which completely eliminates the need for uranium ore mining and, accordingly, preparation and processing of uranium ores. When uranium is mined in this way, no dumps or uranium ore tailings are formed. Employees of the enterprises are not exposed to uranium ore. The ground surface remains unchanged, and its subsidence is prevented. The main source of radioactivity associated with the uranium decay product (radium-226) remains in the uranium ore deposit, because radium and sulphuric acid form a sulphate, a compound that is almost insoluble [\[for more details, see the report of JSC Atomredmetzoloto for 2016\]](#).

Between 2008 and 2016, important results were achieved in addressing the 'nuclear legacy' problems in Russia:

- The issue of spent nuclear fuel (SNF) storage was resolved, and the risks of NPP shutdown were eliminated. The filling level of storage facilities for SNF from RBMK reactors was reduced to 49%. Technologies for the processing of 'defective' SNF at Mayak Production Association were developed;
- 53 facilities posing nuclear and radiation hazards were decommissioned. Work was undertaken to dismantle vessels of the nuclear-powered fleet. Radioisotope thermoelectric reactors were removed from Antarctica, the Far Eastern sea routes and the Northern Sea Route;
- 2.7 million m² of radionuclide-contaminated territories were rehabilitated.

[For details, see the section 'RAW and SNF Management and Decommissioning of Facilities Posing Nuclear and Radiation Hazards'.](#)

In addition, ROSATOM is diversifying the use of nuclear technology and is transferring industry know-how to related areas. Technologies for the efficient use of energy are being developed, including superwire and high-temperature superconductor technologies. Electrical equipment and propulsion systems based on the superconductivity effect will improve the performance of rail and maritime transport, in the power industry, the oil and gas industry, manufacturing and other industries.

2.1.2. LONG-TERM STRATEGIC GOALS

ROSATOM's business strategy until 2030 was developed based on the goals set by the state for the civilian branch of the Russian nuclear industry and was approved by the Corporation's Supervisory Board on October 31, 2014.

The Corporation's development is based on the long-term technological policy, which involves mastering new generation nuclear 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 and nuclear fuel enrichment services, etc.).

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

- To increase its international market share. To assert its leadership on the global nuclear power market, ROSATOM is currently expanding its footprint in over 40 countries around the world, and the 10-year portfolio of overseas orders exceeds USD 133 billion. The Corporation plans to increase the share of foreign businesses from 47% in 2016 to more than 2/3 in 2030;

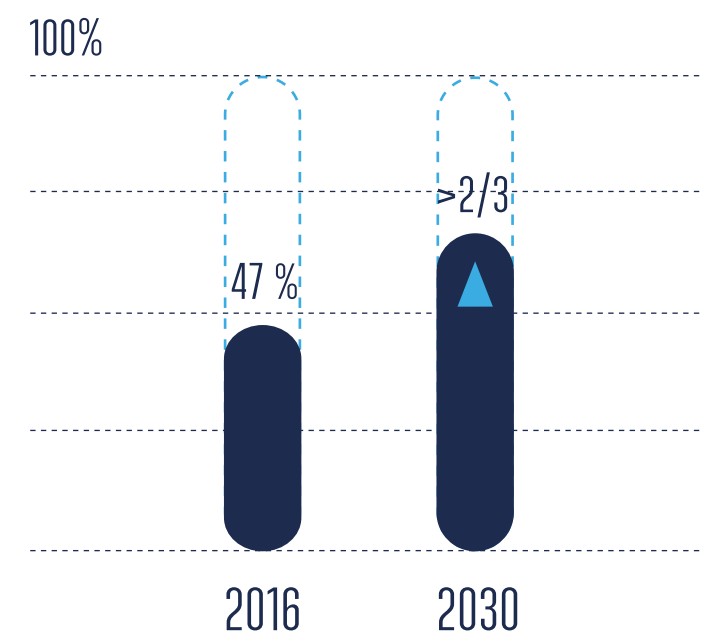
[For more details, see the sections 'International Business' and 'International Cooperation'.](#)

ROSATOM's mission is to provide the world with clean, safe, affordable energy and innovations based on nuclear technology.

10-YEAR PORTFOLIO OF OVERSEAS ORDERS, USD BILLION



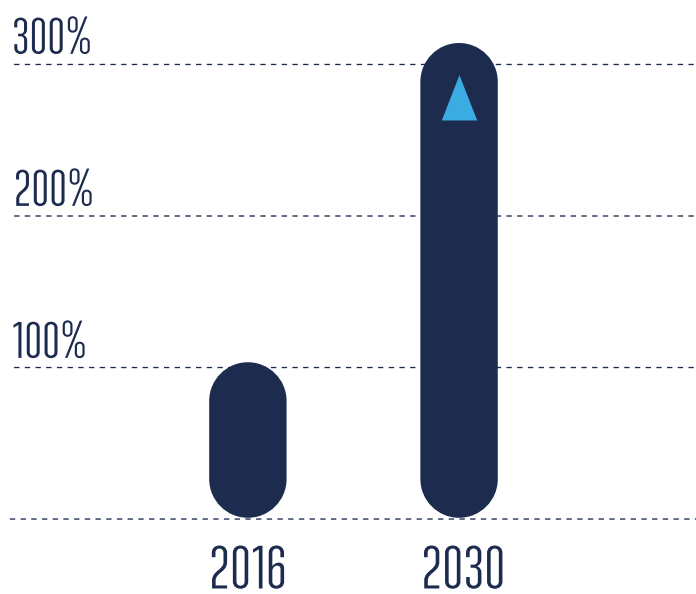
SHARE OF OVERSEAS BUSINESSES IN REVENUE



- To reduce production costs and the lead time. In order to develop the most competitive products, ROSATOM plans to boost labour productivity more than threefold by 2030 compared to 2016 and to reduce the duration of NPP construction and the levelized cost of electricity (LCOE⁸);

For details, see the section 'ROSATOM's Production System' and the sections on the performance of the Divisions.

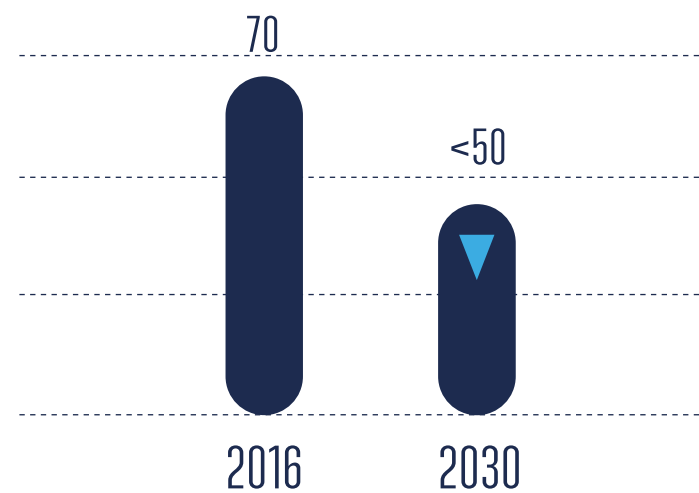
LABOUR PRODUCTIVITY



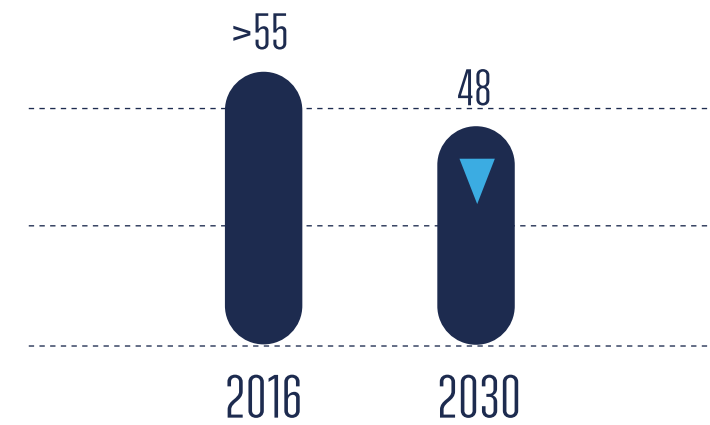
- To develop new products for the Russian and international markets. Given the accumulated knowledge and technologies of the 'nuclear project' in civilian sectors, the Corporation plans to increase the share of new businesses in revenue from 17% in 2016 to 30% in 2030.

For details, see the section 'Business Diversification' and the sections on the performance of the Divisions.

LCOE, USD PER KWH



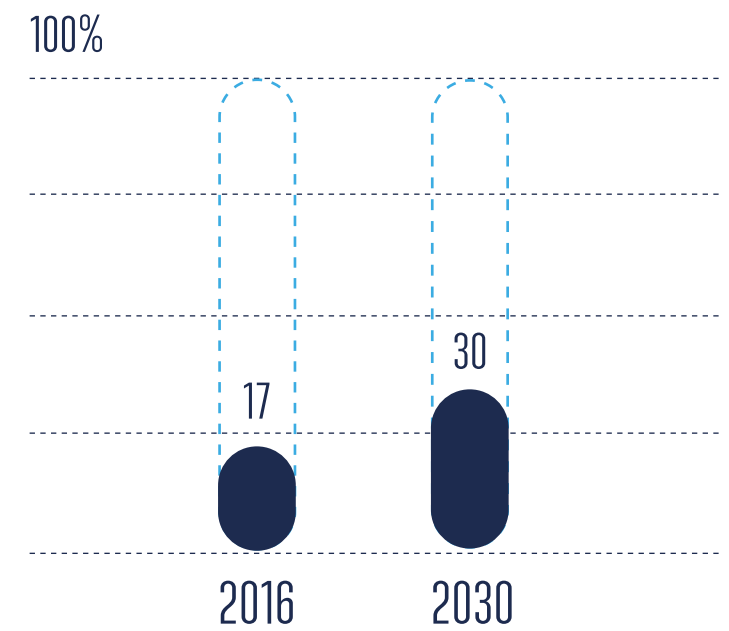
NPP CONSTRUCTION TIME, MONTHS



To achieve the strategic goals, the following objectives must be met:

- Ensuring safe use of nuclear energy;
- Non-proliferation of nuclear technologies and materials;
- Reducing the negative environmental impact to zero;
- Ensuring that the development of nuclear power is socially acceptable;
- Developing the Corporation's innovative potential;
- Shaping a corporate culture focused on results and performance improvement;

SHARE OF NEW BUSINESSES IN REVENUE, %



- Ensuring that the state defence order is fulfilled;
- Ensuring full compliance with Russian legislation, including the Law on State Secrets.

Key strategy implementation risks

Key risks that can influence the achievement of strategic objectives include:

- Nuclear and radiation risks;
- Financial risks (including currency, interest rate and credit risks, risk of financing shortfalls);

⁸LCOE stands for levelized cost of electricity over the NPP life cycle.

$$LCOE = \frac{\sum [(Capital_t + O\&M_t + Fuel_t + Carbon_t + D_t) \times (1+r)^{-t}]}{\sum MWh(1+r)^{-t}}$$

where:

Capital_t is the total cost of capital construction in year t; O&M_t is operating and maintenance costs in year t; Fuel_t is the cost of fuel in year t;

Carbon_t is carbon dioxide emission charges in year t; D_t is the cost of decommissioning and waste management in year t; MWh is the total electricity generation at the facility, MWh; (1+r)^{-t} is the discount rate in year t.

Source: Projected Costs of Generating Electricity/International Energy Agency & Nuclear Energy Agency, 2015.

- Commodity risks;
 - Operational risks;
 - Reputational risk;
 - Political risk;
 - Project risks;
 - Technological risk (risk of shortcomings in technology);
- Risk of incorrect assessment of market needs and trends when promoting the product offering on the strategic time horizon;
 - Risk of losing critical knowledge of existing and newly created products.
- For details, see the section 'Risk Management'.

2.1.3.

CONTRIBUTION OF THE 2016 RESULTS TO THE ACHIEVE-
MENT OF STRATEGIC GOALS AND PLANS FOR 2017

Strategic goal	Results and key events of 2016	Targets for 2017
Increase of the international market share	<p>The 10-year portfolio of overseas orders totalled USD 133.4 billion.</p> <p>Construction of the second stage of Bushehr NPP was launched in Iran.</p> <p>The contract for the construction of El Dabaa NPP, the first NPP in Egypt, was finalized.</p> <p>We entered the market of nuclear fuel for foreign-design PWR reactors (which make up more than half of the total number of reactors currently in operation worldwide): the Fuel Division signed the first contract with a US NPP operator for the pilot use of Russian TVS-KVADRAT fuel and a contract with Vattenfall Nuclear Fuel AB (Sweden) for the commercial supply of TVS-KVADRAT nuclear fuel to Ringhals NPP.</p>	<p>10-year portfolio of overseas orders totalling USD 137.3 billion</p>

Strategic goal	Results and key events of 2016	Targets for 2017
Increase of the international market share	<p>Four framework intergovernmental agreements were concluded with Bolivia, Zambia, Tunisia and Cuba, which provide the foundation for bilateral cooperation with these countries in the sphere of nuclear technologies.</p> <p>A legal framework was established at intergov- ernmental level for the construction of Nuclear Research and Technology Centres in Bolivia and Nigeria.</p>	
Reduction of the cost of products and the lead time	<p>Adjusted free cash flow totalled RUB 263.6 billion.</p> <p>Performance against the targets of the investment programme for the construction of nuclear pow- er plants in Russia (the investment programme of JSC Rosenergoatom Concern) totalled 99%.</p> <p>The increase in consolidated labour productivity (in current prices) compared to 2011 (excluding the Nuclear Weapons Division) totalled 110.9%.</p> <p>The cost of uranium production in Russian and for- eign enterprises was reduced.</p> <p>A new-generation gas centrifuge to be used for ura- nium enrichment was successfully tested: its intro- duction will reduce the cost per separative work unit and will have a significant economic impact.</p>	<p>Adjusted free cash flow totalling RUB 285 billion.</p> <p>Performance against the targets of the investment programme for the construction of nuclear power plants in Russia totalling 100%.</p> <p>Increase in consolidated labour productivity (in current prices) compared to 2011 (excluding the Nuclear Weapons Division) totalling 133.9%.</p>
New products for the Russian and international markets	<p>The 10-year portfolio of orders for new products (outside the scope of the Corporation) totalled RUB 692.9 billion.</p> <p>Revenue from new products (outside the scope of the Corporation) totalled RUB 149.0 billion.</p> <p>We won a tender for the construction of wind pow- er plants in Russia with a total capacity of 610 MW.</p>	<p>10-year portfolio of orders for new products (outside the scope of the Corporation) totalling RUB 714.2 billion.</p> <p>Revenue from new products (outside the scope of the Corporation) totalling RUB 161.8 billion.</p>

2.2. VALUE CREATION AND BUSINESS MODEL

ROSATOM SEEKS TO DEVELOP ITS BUSINESS SUSTAINABLY, INCLUDING BY INCREASING ITS TOTAL VALUE FOR THE CORPORATION, A WIDE RANGE OF STAKEHOLDERS AND THE RESIDENTS OF ITS REGIONS OF OPERATION

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 the nuclear industry. Realizing 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, a wide range of stakeholders and the residents of its regions of operation.

The term 'value' refers not only to products created, services rendered and financial results achieved by ROSATOM, but also to the economic, social and environmental impact of ROSATOM on its stakeholders and the environment.

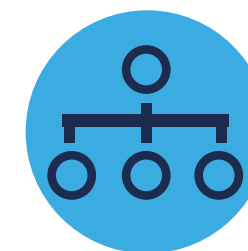
ROSATOM defines the business model as a system that enables value creation in the short, medium and long term and is aimed at achieving strategic goals.

VALUE CREATION PROCESS

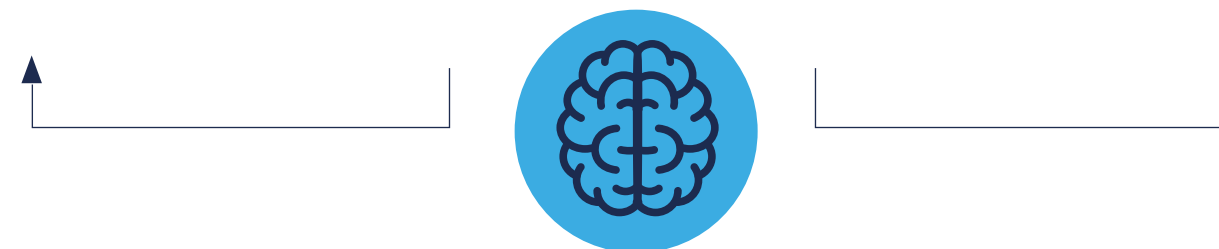
CAPITALS AVAILABLE AS
OF DECEMBER 31, 2015



BUSINESS MODEL
AND ITS RESULTS



CAPITALS AVAILABLE AS
OF DECEMBER 31, 2016



GOVERNANCE SYSTEM

The business model is based on ROSATOM's long-term 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 capitals (see the section 'Efficient Management');
- Operating results and their contribution to the long-term increase in 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 scheme 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 capitals 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, etc.), 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 are owned jointly with other stakeholders (e.g. natural resources or public infrastructure). 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.

VALUE CREATION RESULTS

Capital	Indicator	2015	2016	2016/2015
Financial	Adjusted free cash flow, RUB billion	245.4	263.6	+7.4 %
	Assets under IFRS, RUB billion	3,160.4	3,316.9	+5.0 %
Manufactured	Number of power units in operation, pcs.	35 ⁹	35	—
	Capacity factor of Russian NPPs, %	86.0	83.1 ¹⁰	▼
Intellectual	Intangible assets under IFRS, RUB billion	55.9	117.6	+110.4 %
	Share of innovative products in revenue, %	12.4	13.6	▲
Human ¹¹	Average number of employees, thousand people	256.6	249.9	-2.3 %
	Employee engagement rate, %	78	77	▼
	Share of specialists aged under 35, %	32.5	31.9	▼
Social and relationship	Level of support for the nuclear industry in Russia, %	75.5	71.0	▼
	Number of countries in which foreign projects are being implemented	41	42	▲
Natural	Uranium resources (Russian assets), kt	521.2	517.9	-0.6 %
	Uranium resources (foreign assets), kt	213.1	220.8	+3.4 %

⁹ Including power unit No. 4 of Beloyarsk NPP, which was being tested.

¹⁰ The decrease in the NPP capacity factor compared to 2015 was due to an increase in the duration of scheduled repairs, including the restoration of long-term performance of RBMK reactors.

¹¹ For more information about the results of working with human capital, see the section 'Personnel Management'.

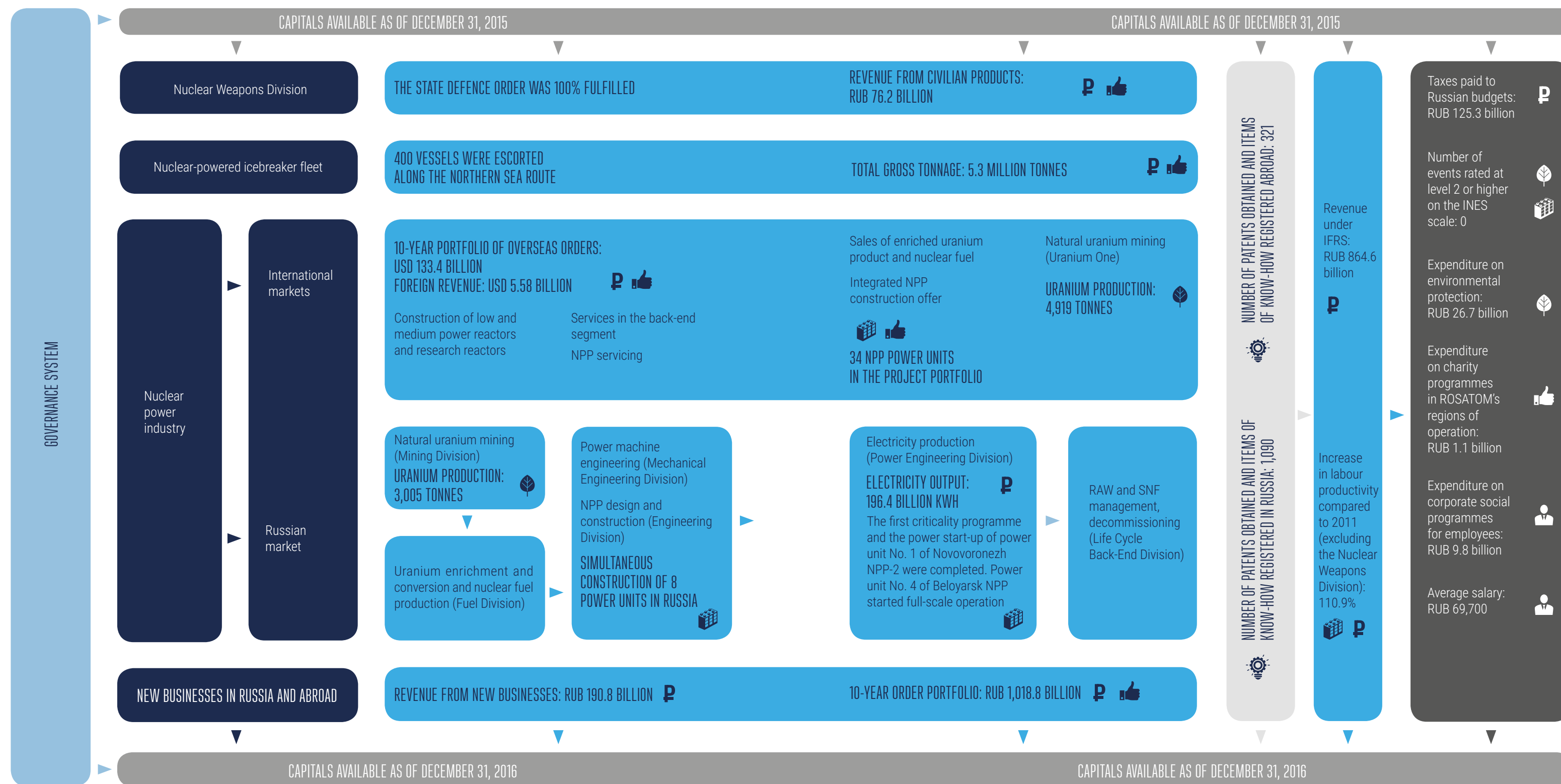
ROSATOM'S BUSINESS MODEL*

● Areas of business

● Operating results

● Development of innovations

● External environment



*The diagram presents results for 2016 broken down by type of capital:



manufactured



human



social and relationship



financial



intellectual



natural

3.1. MARKETS SERVED BY ROSATOM	058
3.2. INTERNATIONAL BUSINESS	070
3.3. INTERNATIONAL COOPERATION	088

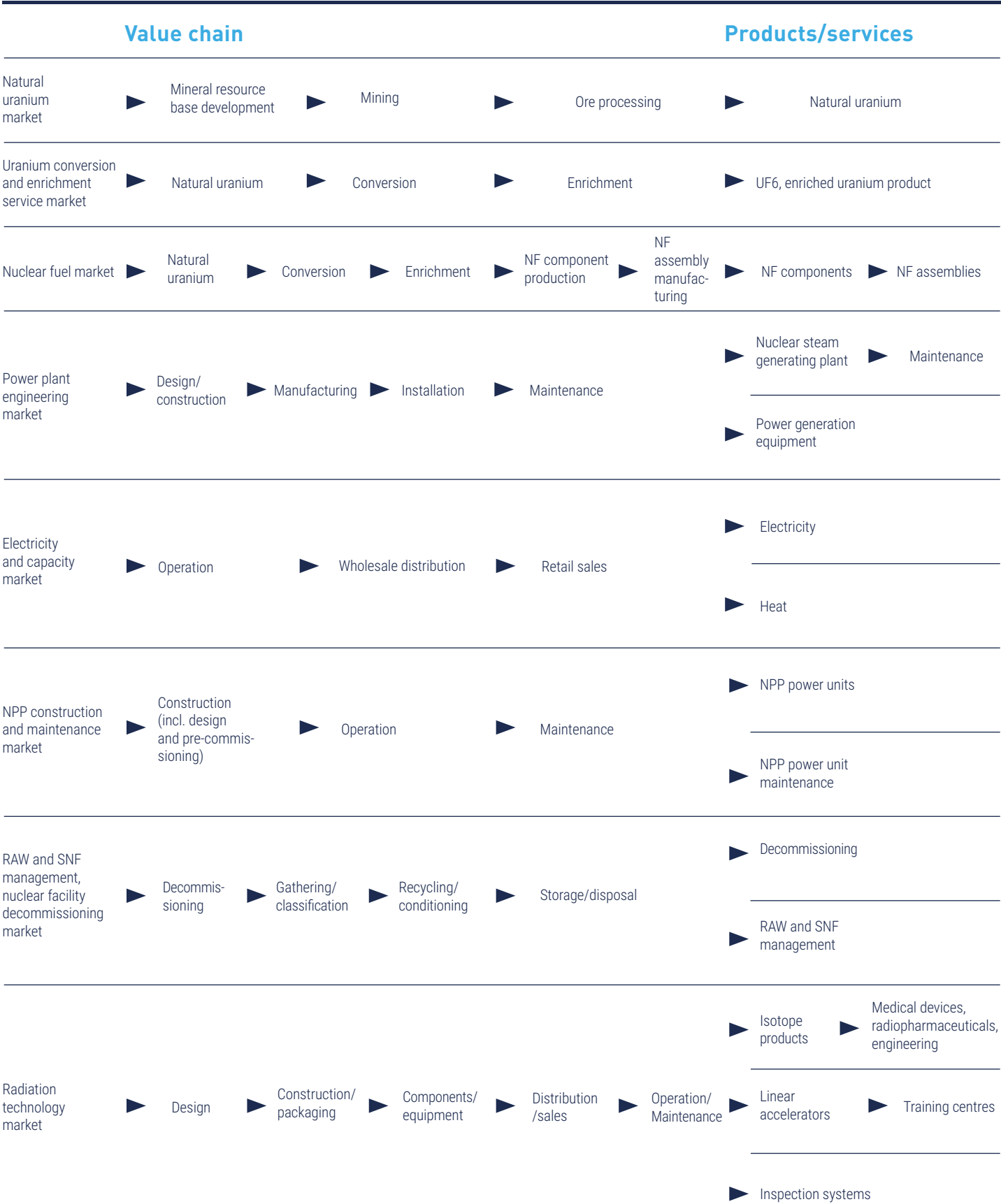
ROSATOM IS A GLOBAL
TECHNOLOGICAL LEADER IN THE
NUCLEAR INDUSTRY AND RELATED
SECTORS. THE CORPORATION IS
CURRENTLY IMPLEMENTING A WIDE
RANGE OF PROJECTS IN DOZENS OF
COUNTRIES WORLDWIDE



3.1.
MARKETS
SERVED
BY ROSATOM

- IN 2016, ROSATOM:
- RANKED FIRST IN THE WORLD IN TERMS OF THE NUMBER OF NPP POWER UNITS IN THE PORTFOLIO OF FOREIGN PROJECTS (34 POWER UNITS);
 - RANKED FIRST IN THE WORLD IN TERMS OF URANIUM ENRICHMENT (36% OF THE MARKET);
 - HELD 17% OF THE GLOBAL NUCLEAR FUEL MARKET;
 - ACCOUNTED FOR 13% OF THE WORLD’S URANIUM PRODUCTION.

MARKETS SERVED BY ROSATOM



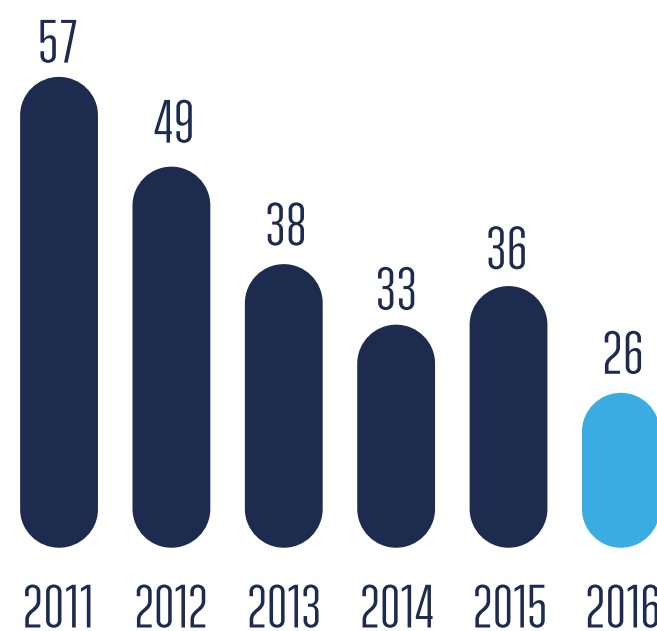
3.1.1.

NATURAL URANIUM MARKET

Forecast for changes in uranium demand by 2030

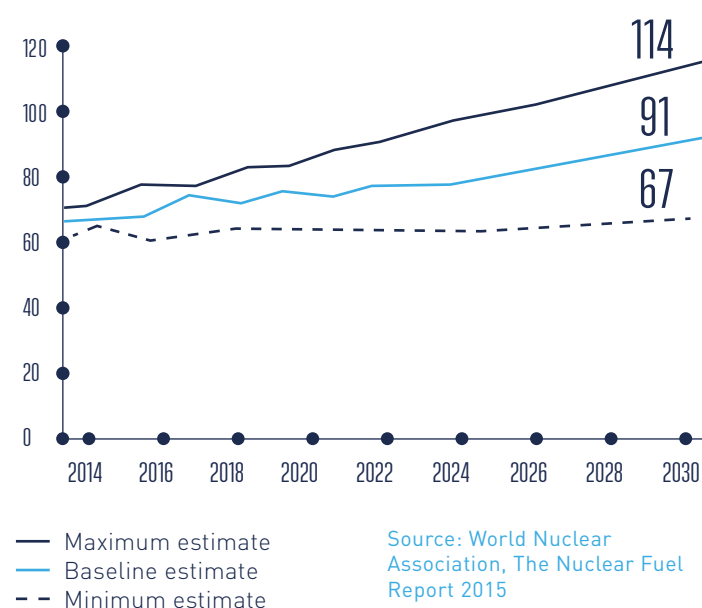
The Fukushima accident in Japan in 2011 led to a significant drop in prices on the nuclear fuel cycle front-end markets, including a decline in quotations for natural uranium.

AVERAGE ANNUAL SPOT MARKET QUOTATIONS FOR NATURAL URANIUM, USD/LB OF U3O8



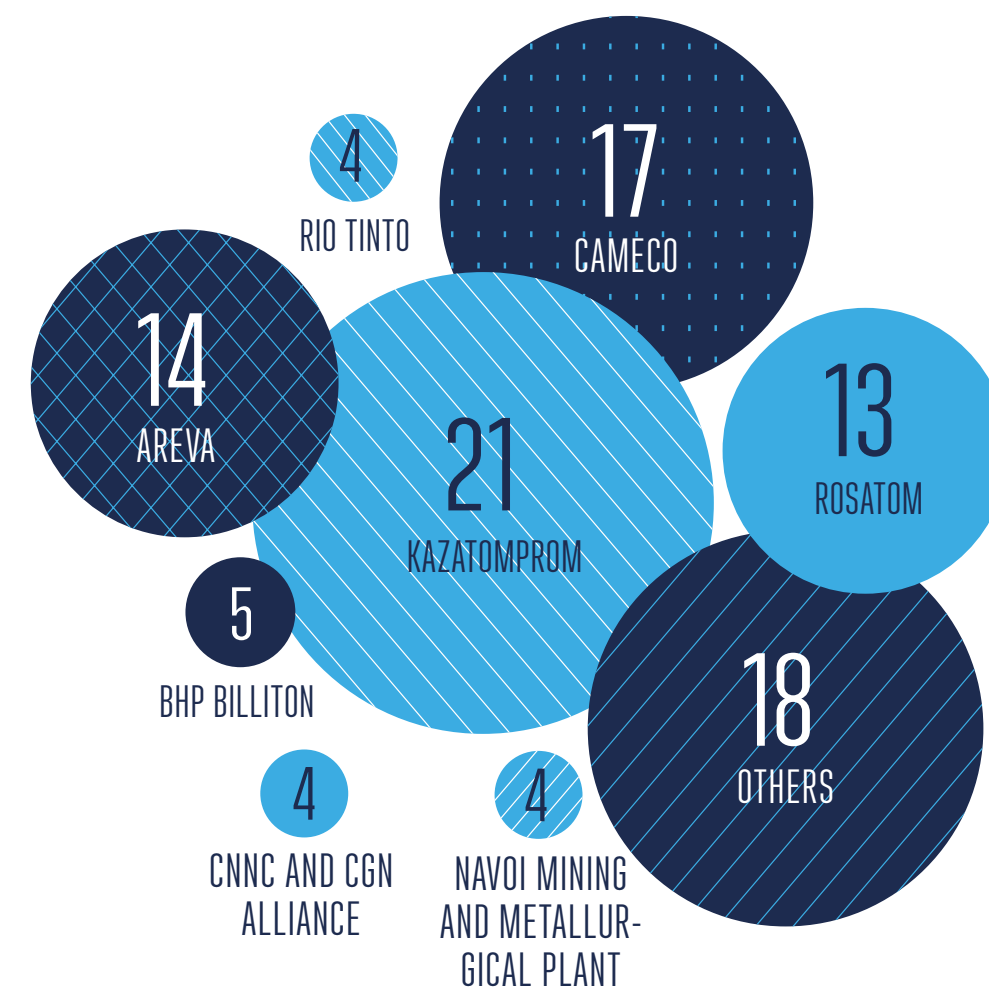
However, the accident did not affect the fundamental drivers of demand for uranium, and natural uranium prices are expected to recover in the medium and long term.

FORECAST OF CHANGES IN URANIUM DEMAND, KT



Global demand for uranium for reactors totalled 65,000 tonnes in 2016, according to the baseline scenario of the World Nuclear Association (WNA). At the same time, the world demand, taking into account commercial and strategic stockpiling not intended for current consumption, is estimated at 71,000 to 74,000 tonnes. Under this scenario, global demand for uranium will increase to 91,000 tonnes by 2030.

LARGEST PLAYERS ON THE NATURAL URANIUM MARKET, %



Natural uranium market overview

In 2016, global production of natural uranium remained virtually unchanged compared to 2015 and totalled 62,000 tonnes. Supplies from secondary sources (inventories of energy companies and some states, reparation of depleted uranium hexafluoride, reprocessed uranium, etc.) are estimated at 18,000 tonnes of uranium equivalent.

Natural uranium production is expected to increase by 2030 in line with the growing demand for it. In 2030, supply from secondary sources will total about 11,000 tonnes of uranium equivalent.

A settled group of leaders has now formed on the natural uranium market. At year-end 2016, the group comprised ROSATOM (13% of the global output), NAC Kazatomprom (Kazakhstan, 21%), Cameco (Canada, 17%), AREVA (France, 14%), BHP Billiton (Australia-United Kingdom, 5%),

Rio Tinto (Australia-United Kingdom, 4%), an alliance of CNNC and CGN (China, 4%), and Navoi Mining and Metallurgical Plant (Uzbekistan, 4%). The eight largest players account for about 82% of the total uranium output.

In 2016, the pace of development of most existing projects remained low. The Cigar Lake mine in Canada (the main owners are Cameco and AREVA) was an exception, as uranium production at this mine grew by a factor of 1.5 compared to 2015, to 6,700 tonnes. At the end of the year, pilot operation started at the Husab mine in Namibia controlled by the Chinese CGN (its commencement had been repeatedly postponed).

As the market environment remained unfavourable, key uranium producers continued to optimize costs and investments in the development of existing enterprises and review plans for prospective projects. In April 2016, Cameco announced the mothballing of the Eagle Point mine in Canada (uranium production ceased in August) and the suspension of drilling at underground leaching plants in the United States. NAC Kazatomprom, Rio Tinto, Paladin Energy and other companies announced additional measures to improve asset performance.

Junior companies focused on optimizing key projects (in Canada, the US, Australia and some other countries) with a view to commissioning them in the long term. Progress on most of these projects remained slow due to difficulties with raising funds and confirming sales.

See also the section 'International Business' and the report of JSC Atomredmetzoloto for 2016.

3.1.2. URANIUM CONVERSION AND ENRICHMENT MARKET

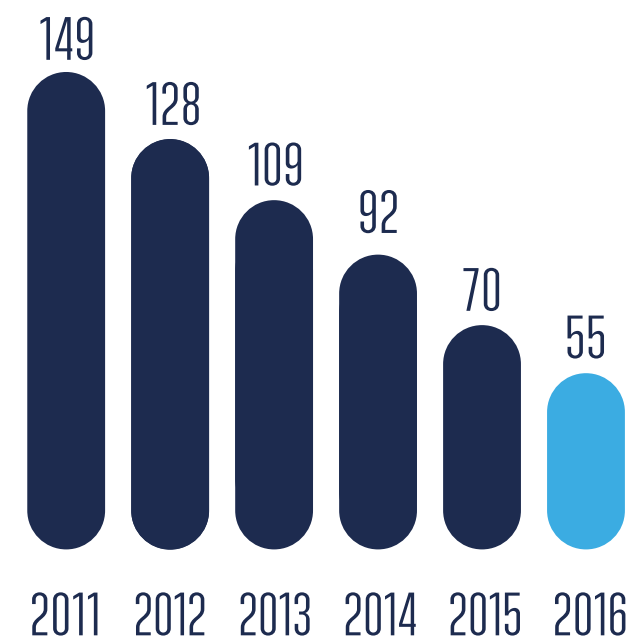
Uranium enrichment is one of the main stages of the front end of the nuclear fuel cycle (NFC). Products sold on the market include enriched uranium product (EUP) and the uranium enrichment service measured in separative work units (SWU).

Forecast for changes in the demand for uranium enrichment services by 2030

According to the World Nuclear Association's baseline scenario, the world demand for enrichment in 2016 totalled 50 million SWU. Given the current significant oversupply on the uranium enrichment market, spot market quotations declined by 21% in 2016. Moreover, since the Fukushima nuclear power plant accident in 2011, spot market quotations for enrichment have dropped by 63%.

The development of the nuclear industry until 2030 will have a positive impact on the market for natural uranium enrichment services. Global demand for enrichment will grow to 57 million SWU and 71 million SWU by 2020 and 2030 respectively, according to the baseline scenario of the WNA. Given the expected growth of demand in the future, the market is likely to become more balanced.

AVERAGE ANNUAL SPOT MARKET QUOTATIONS FOR ENRICHMENT, USD/SWU

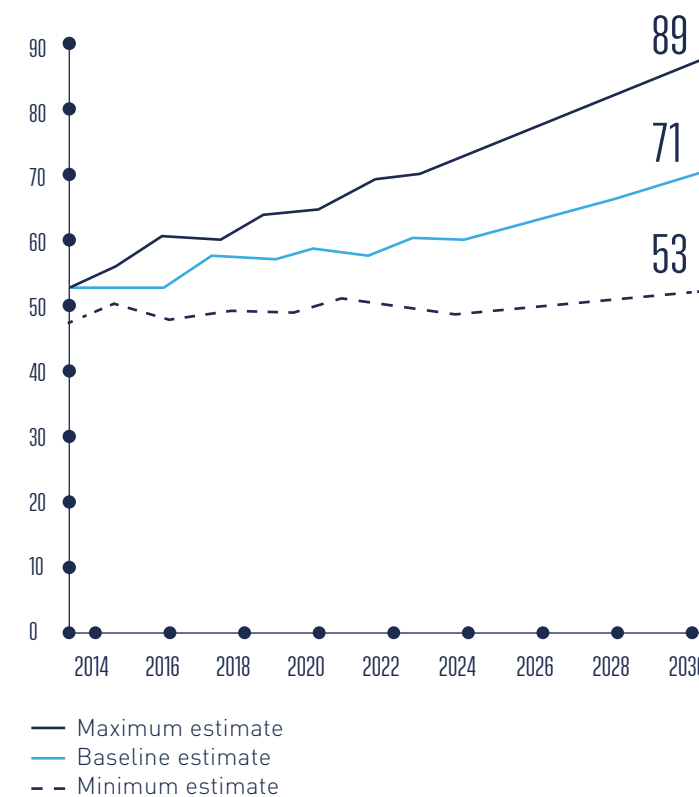


Uranium conversion and enrichment market overview

The main players on the global market for uranium enrichment services include ROSATOM (36% of the global enrichment market), URENCO (UK, Germany, Netherlands; 28%), AREVA (France; 11%) and Chinese companies (8%). Together, they control over 80% of the market. At present, all players use modern gas centrifuge technology for uranium enrichment.

Although the market for uranium enrichment services is depressed, in 2016, URENCO in the United States and AREVA in France continued to expand the capacity of new gas centrifuge plants, albeit at a slower pace than before.

FORECAST FOR CHANGES IN DEMAND FOR URANIUM ENRICHMENT, MILLION SWU



Source: World Nuclear Association, The Nuclear Fuel Report 2015

In the reporting year, a laser uranium enrichment project was given renewed impetus as an agreement on enrichment of tailings was signed by the US Department of Energy and Global Laser Enrichment. However, this event will not affect the uranium enrichment market because of the small amount of reprocessing.

See also the section 'International Business' and the reports of JSC TVEL and JSC TENEX for 2016.

3.1.3.

NUCLEAR FUEL FABRICATION MARKET

According to ROSATOM, in 2016, the global market capacity for nuclear fuel fabrication totalled about 12,000 tonnes of heavy metal (tHM). This includes:

- fuel requiring uranium enrichment accounting for 8,000 tHM (including over 1,000 tHM of fuel for VVER reactors);
- fuel for heavy-water reactors accounting for 4,000 tHM.

As the reactor fleet will be expanding, the demand for fabrication services may increase to 14,000 tonnes by 2030.

Global suppliers on the fabrication market are Westinghouse/Toshiba, AREVA, Global Nuclear Fuel and ROSATOM.

Westinghouse Electric Company fabricates nuclear fuel for nearly all types of light-water reactors (LWR). Its major markets are the US and Western European countries. Moreover, Westinghouse is actively seeking to enter the market for fuel for VVER reactors and gain a foothold there. The company is the largest player holding 32% of the market.

AREVA produces fuel for PWR and BWR reactors and holds 28% of the global fabrication market, with Western Europe being its main sales market.

Global Nuclear Fuel (GNF) is a joint venture of GE, Hitachi and Toshiba. GNF consists of two divisions: GNF-J operating in Japan and GNF-A operating on other markets. The company only produces fuel for BWR reactors and holds 11% of the market.

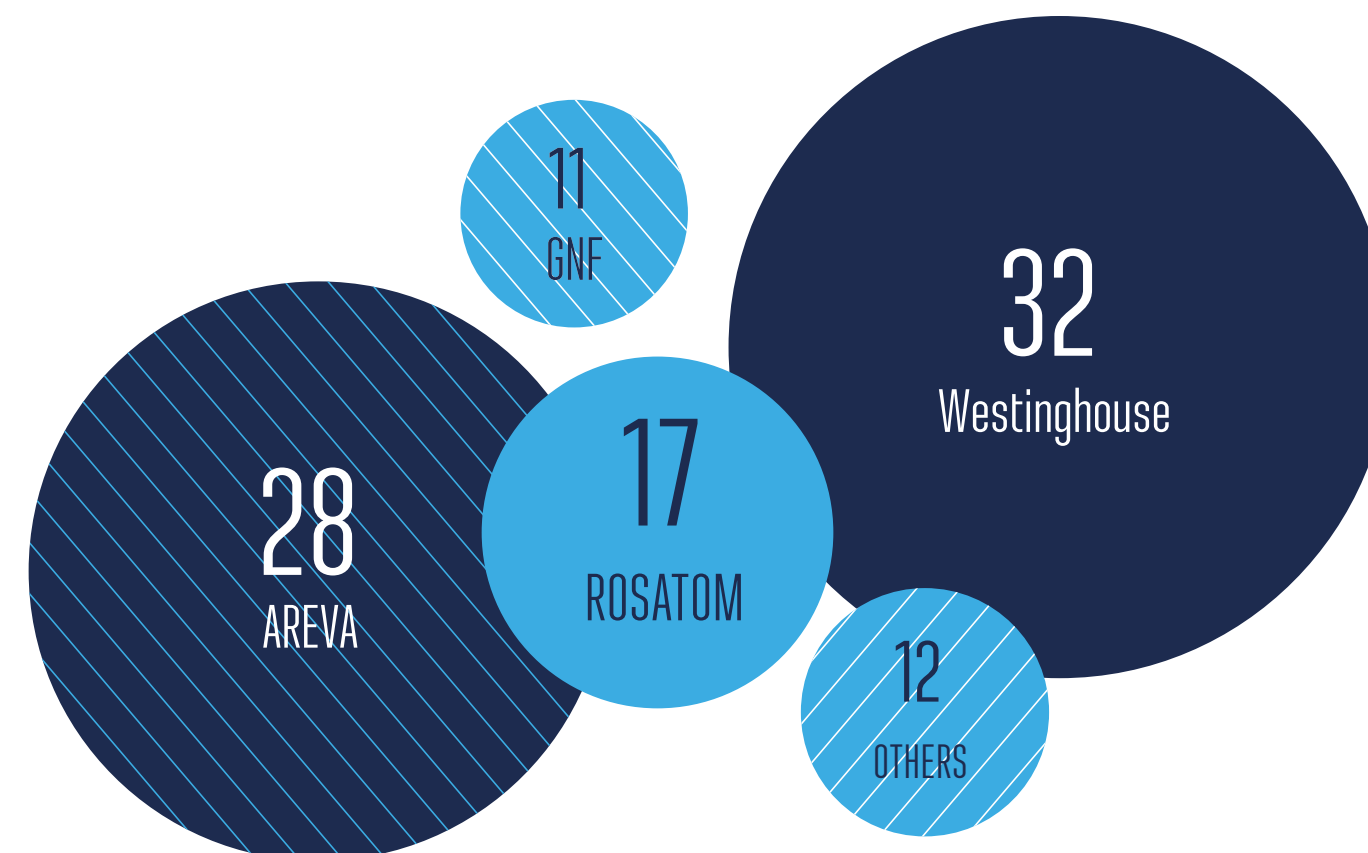
In 2016, Russian nuclear fuel fully met the demand of Russia, Iran, the Czech Republic, Slovakia, Hungary, Bulgaria and Armenia for reactor fuel. ROSATOM also partially met the demand of Ukraine (85%), Finland (36%), India (31%) and China (3%) for reactor fuel. The Corporation, in cooperation with AREVA, also supplies fuel and components to Western European nuclear power plants. In the reporting year, the Corporation's share on the nuclear fuel fabrication market totalled 17%.

Entering new nuclear fuel markets

In the reporting year, a number of important events occurred in the area of fabrication of TVS-KVADRAT fuel for foreign-design light-water reactors. In July, a contract was signed with a US NPP operator for the pilot use of TVS-KVADRAT. In December, a contract with the Swedish company Vattenfall Nuclear Fuel AB for the commercial supply of TVS-KVADRAT to Ringhals NPP came into force.



SHARES OF PLAYERS ON THE NUCLEAR FUEL FABRICATION MARKET, %



In addition, in 2016, contracts were signed for the supply of nuclear fuel for research reactors in the Czech Republic and for the supply of uranium components of nuclear fuel for research reactors in Argentina.

In the future, the development of a new technological platform for the nuclear power industry based on fast-neutron reactors will result in the formation of a market for MOX fuel used in reactors of this type. Only two high-capacity fast-neutron power reactors are currently in operation in the entire world, both of which are located in Russia: BN-600 and BN-800. The former runs

on uranium fuel, while the latter will use only MOX fuel. In 2016, a programme was approved to switch over to fully loading the reactor core with MOX fuel, and the first batch of MOX fuel pellets was manufactured.

See also the sections 'International Business' and 'Research and Innovations' and the report of JSC TVEL for 2016.

3.1.4. POWER MACHINE ENGINEERING MARKET

In 2016, the global power machine engineering market showed little growth and totalled ~USD 110 billion. The structure of the market remained virtually unchanged, and most investments in equipment were made in the thermal power sector (about 60%). Equipment for the gas and petrochemical industry accounted for about 25%, while nuclear power generation equipment accounted for 15%. Until 2030, no radical change is expected in the structure of investment in power machine engineering, and equipment for thermal power generation will continue to dominate.

The situation on the Russian market for power machine engineering is largely consistent with global trends, with equipment in the thermal power industry accounting for 60% of the total investment, equipment in the gas and petrochemical industry for 29% and equipment in the nuclear power industry for 11%. At present, the Russian power machine engineering market is estimated at RUB 350 billion per year. The three largest players on the Russian power machine engineering market account for 68% of the market, with the Mechanical Engineering Division of ROSATOM holding 27%. In the future, until 2030, the average annual growth rate on the domestic market will range between 1% and 2%, and the main trends will include growing competition among manufacturers and a reduction in the import of power generation equipment and its components.

See also the section 'Mechanical Engineering Division' and the report of JSC Atomenergomash for 2016.

3.1.5. NPP CONSTRUCTION AND OPERATION MARKET

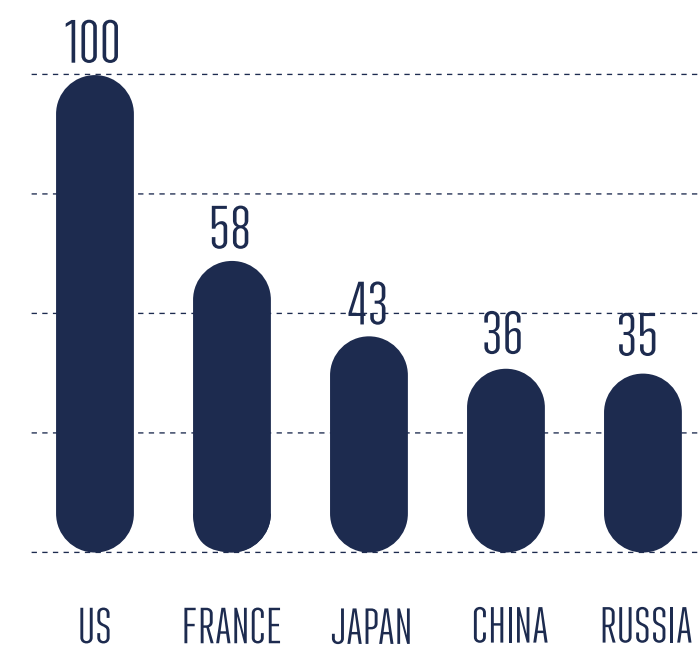
In 2016, the nuclear power industry accounted for about 11% of the global electricity supply. The share of nuclear generation in the energy mix of many countries remains high. According to the IAEA, in 13 states, more than a quarter of the electricity demand is met by nuclear power generation. Countries with the largest share of NPPs in electricity generation include France (76.3%), Slovakia (55.9%), Hungary (52.7%), Ukraine (56.5%) and Belgium (37.5%).

According to the IAEA, as of December 31, 2016, 450 power reactors were in operation with a total capacity of 392 GW (including the suspended Japanese reactors). Another 61 reactors were under construction. ROSATOM ranked second among global generating companies in terms of installed NPP capacity (27.13¹² GW), surpassed only by the French EDF (73 GW).

For details, see the 2016 annual reports of JSC Rosenergoatom Concern and JSC ASE EC.

Light-water reactors (VVER, PWR, BWR, LWGR) are the main type of operating reactors used around the globe; they account for 85% of the global market, while PHWR (CANDU) heavy-water reactors account for 11%.

LEADING COUNTRIES BY THE NUMBER OF OPERATING NPP POWER UNITS



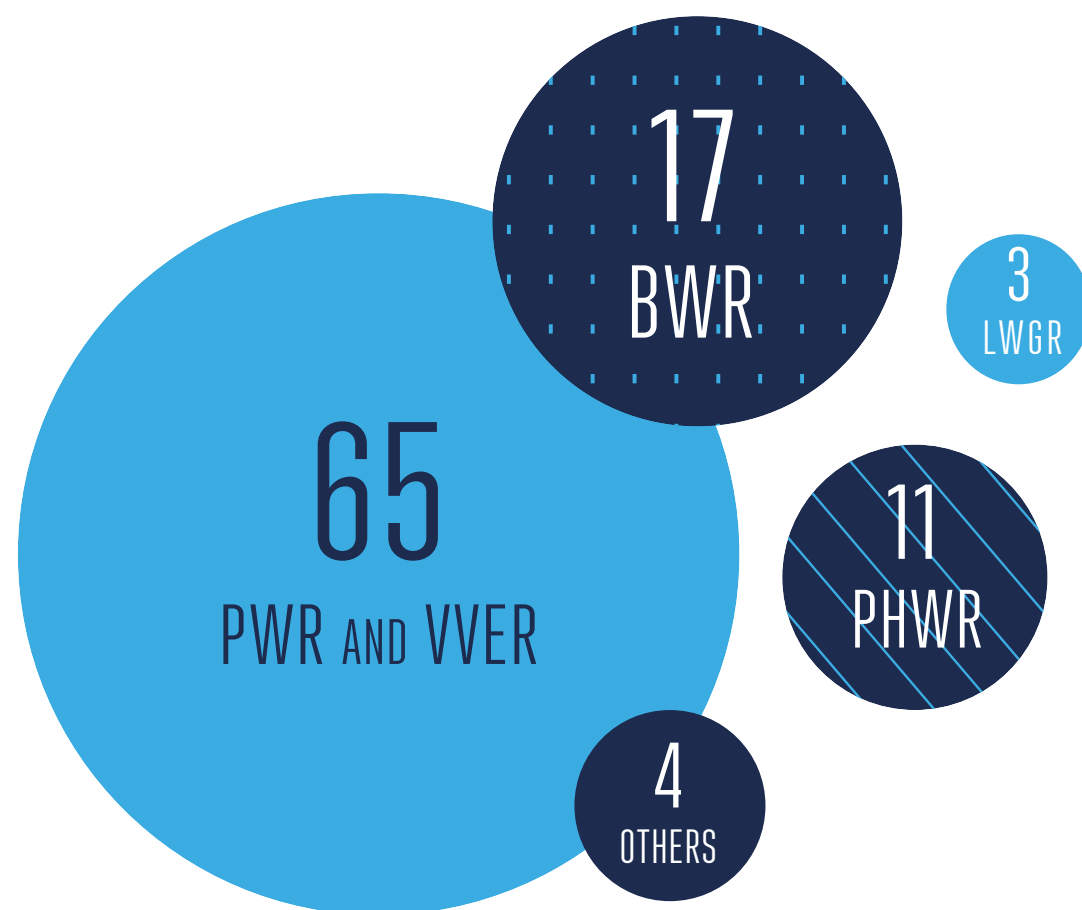
Currently, demand for NPP construction comes primarily from Asian countries, which is due to rapidly growing demand for electricity in this region. ROSATOM is actively expanding its global footprint: it is currently the largest global player in terms of the number of NPP construction projects in its portfolio of overseas orders. AREVA will remain the Corporation's main competitor on the foreign NPP construction and operation markets until 2030, with more intense competition coming from Chinese and South Korean companies.

For details, see the section 'International Business'.

¹² Excluding power unit No. 1 of Novovoronezh NPP-2, which was at the stage of pilot operation as of December 31, 2016.



OPERATING REACTORS IN THE WORLD (% OF THE TOTAL NUMBER OF OPERATING POWER UNITS)



3.1.6.

MARKET FOR RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL MANAGEMENT AND DECOMMISSIONING OF NUCLEAR FACILITIES (BACK END)

Market for RAW and SNF management, processing and disposal

According to ROSATOM's estimates, in 2016, the market for radioactive waste (RAW) management, processing and disposal totalled USD 8.3 billion. Its volume will gradually grow in the coming years due to the decommissioning of a large number of nuclear facilities and will range from USD 11 billion to USD 13 billion after 2023. Major market players include ROSATOM, AREVA, Energy Solutions, URS, Studsvik, Onet Technologies, Steag, Westinghouse and EWN.

The market for spent nuclear fuel (SNF) management, processing and disposal is expected to be the most dynamic segment of the nuclear fuel cycle back end market with an average annual growth rate of ~5.9% until 2030. In 2016, this market was estimated at USD 4.4 billion by ROSATOM. The market will reach USD 5.9 billion in 2020 and USD 9.9 billion by 2030. Major players

include ROSATOM, Areva, SKB, Holtec, GNS and Skoda.

Market for decommissioning of facilities posing nuclear and radiation hazards

According to ROSATOM's estimates, in 2016, the global market for the decommissioning of facilities posing nuclear and radiation hazards totalled ~USD 7.2 billion. The market will grow gradually, since a large number of reactors will be decommissioned in the coming years. In 2019, the market will reach a maximum of USD 8.7 billion. In the future, until 2030, the market volume will range between USD 7.5 billion and USD 8.5 billion. Major players include ROSATOM, AREVA, Energy Solutions, URS, Westinghouse, Bechtel, EWN, Cavendish Nuclear, Nuvia UK, Siempelkamp and Ch2M Hill.

See also the section 'International Business'.

3.2. INTERNATIONAL BUSINESS



KIRILL KOMAROV

FIRST DEPUTY CEO FOR CORPORATE DEVELOPMENT
AND INTERNATIONAL BUSINESS



KEY RESULTS IN 2016:

- THE 10-YEAR PORTFOLIO OF OVERSEAS ORDERS TOTALLED USD 133.4 BILLION, UP BY 20.9% COMPARED TO 2015;
- 34 POWER UNITS IN THE PORTFOLIO OF OVERSEAS PROJECTS;
- REVENUE FROM OVERSEAS ORDERS TOTALLED USD 5.58 BILLION;
- INTERNATIONAL PROJECTS IN 42 COUNTRIES.

— *What were the most important achievements in 2016 in international business and the development of new products? Was the year successful in terms of accomplishing the stated goals and objectives?*

— We continued to build up the portfolio of overseas orders, which increased by 20.9% and reached USD 133.4 billion. This is undoubtedly an achievement.

One of the most important outcomes of the year is the commercial contract for the supply of TVS-KVADRAT fuel to a Swedish operator. Over the years, the Fuel Division has been making efforts to enter the market for Western-design fuel, and they have finally borne fruit. I am referring not only to the commercial supply of fuel to the Swedish Ringhals NPP, but also to the conclusion of a contract for the pilot use of TVS-KVADRAT in the United States.

I would like to particularly highlight the settlement with the Bulgarian party. Bulgaria's National Electricity Company (NEK) fully repaid the debt owed to ROSATOM for the construction of Belene NPP totalling EUR 601.6 million. This precedent is also very important to us from a reputational perspective.

Other major achievements on foreign markets include the following: the first two units of Kudankulam NPP were delivered to the Indian customer; the concrete foundation for power units No. 3 and 4 was laid; the foundation stone was laid at power units No. 2 and 3 of Bushehr NPP-2 in Iran; the contract with Egypt was finalized.

The Corporation finalized the rationale for the extension of the life of power unit No. 5 at Kozloduy NPP (Bulgaria). A contract was signed for the provision of a rationale for the extension of the life of power unit No. 6.

In 2016, the Vietnamese government decided to postpone the construction of nuclear power

plants, abandoning both the Russian and Japanese projects. Nevertheless, the Vietnamese continue to negotiate with us on the construction of the Nuclear Science and Technology Centre, so we believe that the establishment of a national nuclear industry remains on their agenda, as does the maintenance of the strategic partnership with Russia.

In 2016, we showed strong performance in terms of new products. In the reporting year, revenue from new products¹³ totalled RUB 190.8 billion, including revenue from new products on foreign markets; it increased by 53% compared to 2015. The 10-year order portfolio¹⁴ reached RUB 1,018.8 billion.

According to ROSATOM's strategic goal, by 2030 the revenue from new products should make up at least 30% of the total revenue. When we consider developing a product line, we immediately determine whether in the long run we will be able to take the product to the international market and be competitive there. When implementing a project, we build the entire production chain to later be able to present an integrated offer to our foreign partners.

— *How do you assess ROSATOM's competitiveness on the international market, and how does the Corporation plan to sustain it in the long run (as part of the strategy until 2030)? What challenges and trends do you have to consider?*

— ROSATOM is an undisputed leader of the world's nuclear industry. Last year, we took the lead in terms of the number of overseas orders for the construction of new nuclear power plants, with 34 power units at different stages of construction

all over the world, including Europe, the Middle East, Southeast Asia and North Africa. ROSATOM remains number one in the world in terms of uranium enrichment; it ranks in the top three uranium producers and exporters and accounts for 17% of the global market for nuclear fuel.

Today, ROSATOM itself sets global trends to a large extent: its current development projects not only meet all the needs of customers but are often ahead of the market, be it the start-up of the world's first power unit with a generation 3+ reactor at Novovoronezh NPP-2 or the start-up of a BN-800 fast neutron reactor at Beloyarsk NPP. But what is important is that we offer our partners those projects that have already been implemented in Russia. They are 'tangible' in the literal sense of the word.

The use of reference technologies is our important advantage giving us the edge over our competitors. At the same time, we are closely following the market situation and learning from the experience of other players. It is no coincidence that one of ROSATOM's strategic goals is to reduce the cost of its products and the lead time. Continuous optimization of production is a key prerequisite for efficiency. And to compete effectively, we need to continue to reduce the LCOE¹⁵ of our power units. The task is very ambitious, but it is clear what needs to be done: the time spent on NPP construction needs to be reduced and costs need to be lower throughout the value chain.

However, as a business corporation we realize that market opportunities will not be endless and the regions in which we currently operate have certain limits. The world is changing rapidly, and so are the priorities and needs of our customers. The nuclear industry is undoubtedly one of the key components of the world's green energy mix of the future, and ROSATOM sees itself as the global leader in the field of nuclear power and other green technologies. For instance, being aware of the enormous potential of renewable energy sources in regions with special climatic conditions, ROSATOM has decided to expand the energy portfolio by including wind power generation. Under the direction of the management of JSC ITPC, which is involved in the development of renewable generation at ROSATOM, VetroOGK won the tender for the construction of a wind farm with a total capacity of 610 MW in southern Russia. This confirms that we are moving in the right direction. We are currently developing this

strategic project in order to further expand our business on the international market.

But at the same time, we also bear in mind that during the history of the Russian nuclear industry, which spans more than 70 years, our research institutions have accumulated vast and unique non-energy capabilities. Technologies for water desalination and purification, nuclear medicine, radiation technologies for agriculture, composite materials and 3D printing technologies are only a fraction of ROSATOM's capabilities that are currently in demand on the market. We have set ourselves the objective of earning at least 30% of revenue from new businesses by 2030, and, in the light of the above, this objective is quite realistic. Measures aimed at reducing production costs, entering new markets and promoting new products will enable ROSATOM not only to maintain its positions on the current markets, but also to open new horizons on new markets. ●

¹³ Including intra-group turnover.

¹⁴ Including intra-group turnover.

¹⁵ Levelized cost of electricity over the NPP life cycle.

3.2.1. GLOBAL TECHNOLOGICAL LEADERSHIP OF ROSATOM

ROSATOM achieves technological leadership on international markets for nuclear technology and services by providing a unique integrated offer: a set of products and services from Russian nuclear power organizations which provides full support to the national nuclear programme of the customer country at all stages and provides the customer with access to the entire range of products and services from one supplier throughout the NPP life.

Today, the Corporation is actively promoting Russian nuclear power technologies both in countries that are beginning to develop nuclear power and in countries with a well-developed national nuclear power industry (including those based on Russian technology).

Regional centres

A foreign regional network managed by Private Institution Rusatom International Network has been established in order to increase international sales and promote the products of the Russian nuclear power industry. As of December 31, 2016, the foreign regional network comprised 11 regional centres that operated in more than 60 countries around the world.

The Corporation's Regional Centre in Western Europe coordinated two meetings of ROSATOM's International Advisory Council established in order to examine international best practices and develop practical recommendations for the development of the Russian nuclear industry.



The 8th International Forum ATOMEXPO 2016 (Moscow) has become a major event for the international nuclear business community. The Forum focused on the role of the nuclear power industry in the low-carbon energy balance of the future. The event was attended by over 5,000 people from 55 countries and about 100 companies. The total value of the documents signed at ATOMEXPO 2016 totalled about USD 10 billion.

In 2016, 15 targeted workshops and round-table conferences were conducted, involving the demonstration of the entire range of ROSATOM's products. The events were attended by about 2,200 foreign participants. With the support of the regional centres, Russian nuclear enterprises

participated in 13 large foreign exhibitions, including the 2nd World Nuclear Exhibition (Paris), the 41st Annual World Nuclear Association Symposium (London) and the 60th session of the IAEA General Conference (Vienna).

RUSATOM INTERNATIONAL NETWORK (RIN)

MANAGES THE NETWORK OF ROSATOM'S FOREIGN REGIONAL OFFICES AND PERFORMS A NUMBER OF FUNCTIONS FOR THE BENEFIT OF ALL ORGANIZATIONS IN THE INDUSTRY ON A TARGETED BASIS:



Marketing

- Industry-wide market reviews
- Timely provision of information
- Marketing research and support



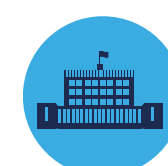
Foreign communications

- Mass communications
- Promotion of products and services of subsidiaries
- Web communications
- Brand management



Business development

- Search for and provision of information on new business opportunities
- Assistance in establishing and developing contacts with potential customers and partners



Government relations

- Analysis of key stakeholders, identification of 'decision-makers'
- Building a working relationship with key stakeholders



Search for investors

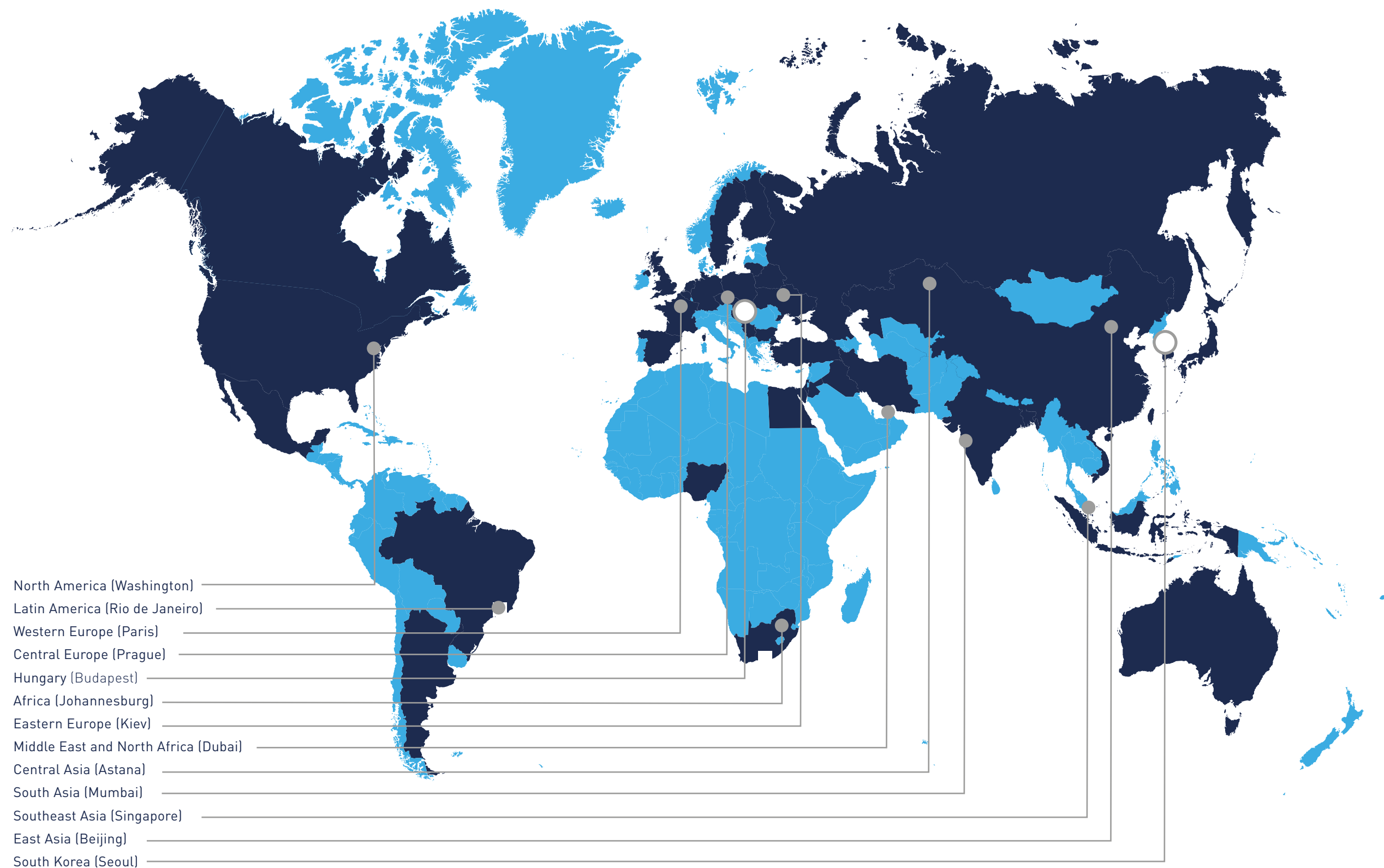
- Infrastructure support to find funding for ROSATOM's foreign projects



Coordination of activities

- Industry-wide coordination of operations of the Divisions on overseas markets at ROSATOM's request

GLOBAL FOOTPRINT OF ROSATOM (INCLUDING REGIONAL CENTRES)



● Countries where ROSATOM is implementing its projects ○ Country offices ● Regional offices

GEOLOGICAL EXPLORATION
AND URANIUM MINING

NO. 2 IN THE WORLD

13 % OF GLOBAL PRODUCTION

NPP CONSTRUCTION

34 POWER UNITS IN THE OVERSEAS
PROJECT PORTFOLIO

POWER GENERATION

NO. 2 IN THE WORLD AMONG
NUCLEAR COMPANIES
IN TERMS OF INSTALLED
CAPACITY (27.1 GW)

URANIUM ENRICHMENT SERVICES

NO. 1 IN THE WORLD

36 % OF THE MARKET

NUCLEAR FUEL SUPPLIES

17 % OF THE MARKET

NEW BUSINESSES

- NPP servicing and modernization
- Construction of research reactors
- Nuclear fuel cycle back-end
- Products and services based on radiation technologies

3.2.2.

CHANGES IN THE PORTFOLIO OF OVERSEAS ORDERS AND REVENUE FROM OVERSEAS ORDERS

In the reporting year, ROSATOM continued to build up its portfolio of overseas orders, which reached USD 133.4 billion (USD 110.3 billion in 2015).

CHANGES IN THE PORTFOLIO OF OVERSEAS ORDERS, USD BILLION			
	2014	2015	2016
10-year portfolio of overseas orders, including:	101.4	110.3	133.4
Construction of NPPs abroad	66.0	75.9	97.6
Uranium products	21.8	21.1	19.9
Nuclear fuel assemblies and other activities	13.6	13.3	15.9

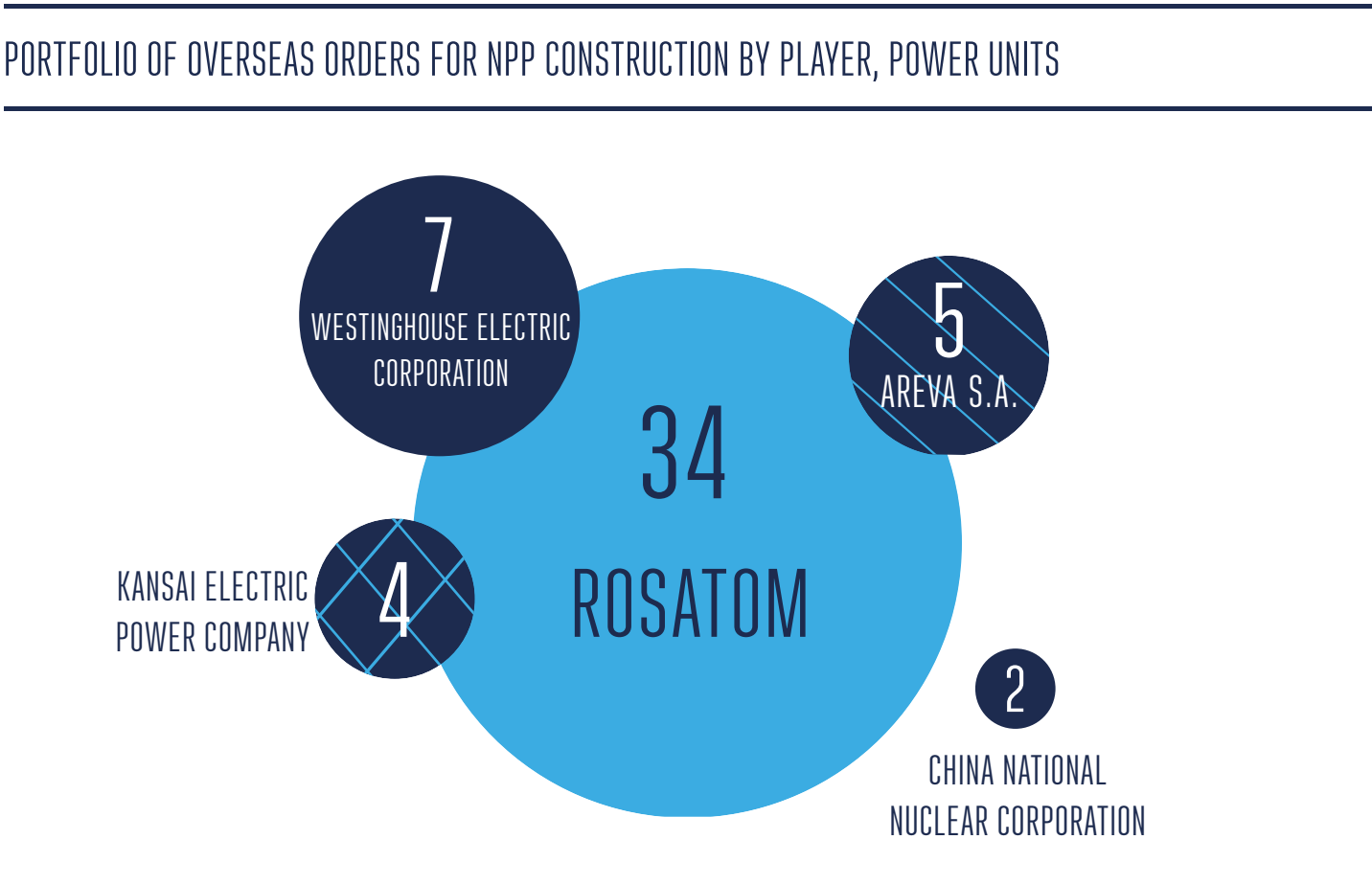
At year end, revenue from overseas orders totalled USD 5.58 billion (USD 6.26 billion in 2015). The decline was caused by unfavourable conditions on the nuclear fuel cycle front-end markets.

CHANGES IN OVERSEAS REVENUE, USD MILLION			
	2014	2015	2016
Revenue from overseas orders, including:	5,202	6,259	5,576
Construction of NPPs abroad	948	1,565	1,554
Uranium products	2,227	2,667	2,046
Nuclear fuel assemblies and other activities	2,027	2,026	1,976

3.2.3.

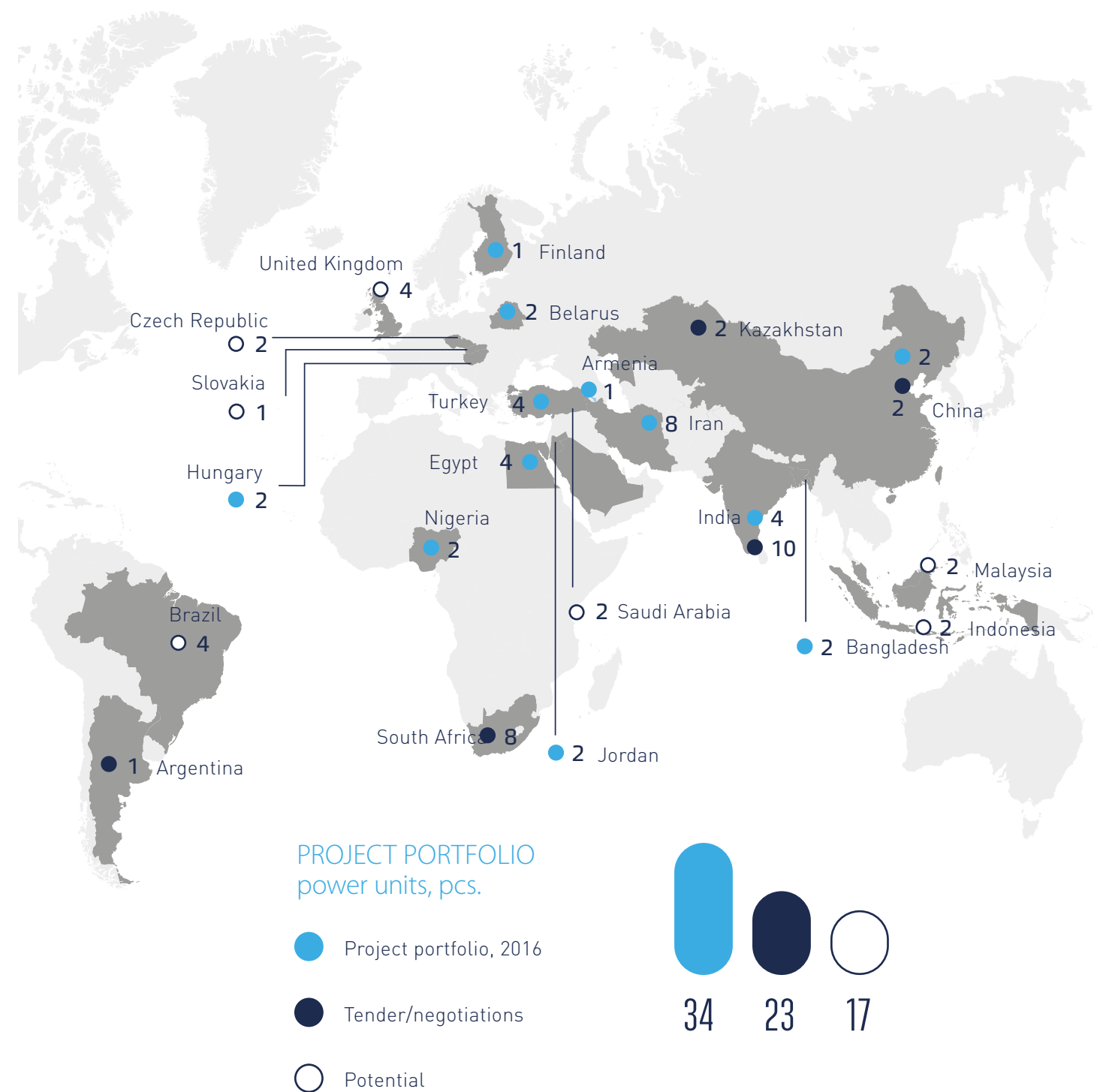
CONSTRUCTION OF NPPS ABROAD

ROSATOM’s NPP construction project portfolio includes 34 NPP power units around the world (projects are implemented in 12 countries).



Sources: World Nuclear Association, International Atomic Energy Agency, analysis by ROSATOM

ROSATOM'S POSITIONS ON THE INTERNATIONAL MARKET FOR NPP CONSTRUCTION, NUMBER OF POWER UNITS



RESULTS OF NPP CONSTRUCTION PROJECTS IN 2016

NPP, country	Results
Asia	
Rooppur NPP, Bangladesh	All conditions were met for the master contract for NPP construction to come into force. The parties completed the process of negotiating and signing all appendices to the master contract. A licence for the site was received
Kudankulam NPP, India	An official ceremony was held to mark the start-up of power unit No. 1 of the NPP and the connection of power unit No. 2 to India's power system. The concrete foundation of power units No. 3 and 4 started to be laid. The Master Framework Agreement and a package of documents for power units No. 5 and 6 were prepared
Bushehr NPP, Iran	The construction of the second stage of Bushehr NPP was launched; the foundation stone was laid at power units No. 2 and 3
Tianwan NPP, China	Preparations were made for the start-up of power unit No. 3 (completion of the main power installation work at the reactor unit, flushing of the open reactor to prepare it for the hydraulic testing phase and the circulation cleaning of the primary circuit)
Akkuyu NPP, Turkey	Preparatory work continued at the NPP site. A report on the site parameters was submitted for approval to the Turkish Atomic Energy Authority (TAEK, a regulatory authority of the Republic of Turkey)
Europe	
Ostrovets NPP, Belarus	Full-scale construction and installation work was carried out at 102 sites and structures of power units No. 1 and 2 and offsite facilities
Hanhikivi NPP, Finland	Extensive infrastructural work was launched on the NPP site. A ceremony was held to mark the start of preparation of the NPP foundation pit. Following an international tender, Alstom Power Systems was selected as the equipment supplier for the NPP turbine hall. In accordance with the agreed schedule, the first documentation packages for the construction licence were developed and handed over to the customer, Fennovoima
Africa	
El Dabaa NPP, Egypt	The EPC contract for the construction of the NPP with four 1,200 MW power units was finalized

In December 2016, the National Electricity Company of Bulgaria fully repaid its debt under the Belene NPP project totalling EUR 601.6 million to JSC Atomstroyexport (an organization of ROSATOM) in accordance with the ruling made by the Court of Arbitration under the International Chamber of Commerce in Geneva in June¹⁶.

3.2.4.

CONSTRUCTION OF RESEARCH CENTRES

In 2016, agreements were signed with Bolivia and Zambia on the establishment of nuclear research centres.

LLC UIC (an organization of ROSATOM) and the Indian Agricultural Association signed a Memorandum of Cooperation in the development of a network of irradiation centres. The use of irradiation technologies will help to improve the performance of India's agricultural industry by extending the shelf life of food products.

3.2.5.

INTEGRATED SERVICING OF RUSSIAN-DESIGN NPPS

In 2016, ROSATOM serviced 32 power units of Russian-design NPPs abroad.

A comprehensive inspection of power unit No. 2 of the Armenian NPP was completed as part of a project to extend its life.

The Corporation finalized the rationale for the extension of the life of power unit No. 5 at Kozloduy NPP (Bulgaria). A contract was signed for the provision of a rationale for the extension of the life of power unit No. 6.

A contract was signed for technical support for the installation of the primary circuit systems and pre-commissioning works during the construction of power units No. 3 and 4 at Mochovce NPP.

A protocol was signed for the delivery of spare parts to Bushehr NPP (Iran) between 2017 and 2020.

Contracts for the maintenance of Tianwan NPP (China) were concluded.

A platform for remote technical support for foreign nuclear power plants (Nuclear Assistant) was developed, and an agreement on pilot testing was reached with the first potential customers.

As part of the development of the Nuclear Research and Technology Centre in Bolivia, a contract for the assessment of the condition of the Bolivian national nuclear infrastructure was signed and successfully carried out.

3.2.6.

URANIUM MINING ABROAD

In 2016, Uranium One (a subsidiary of the Corporation that mines uranium abroad) implemented the annual production programme in full as it produced 4,919 tonnes of uranium (taking into account mining as part of the pilot development of deposits).

The uranium mining enterprises of Uranium One retained the leading position in terms of production costs on the global market for natural uranium. The company managed to lower the production cost by 5% to USD 11 per pound and make a profit in 2016, unlike its main competitors.

The estimated mineral resource base of the Uranium One enterprises under international reporting standards totalled 220,800 tonnes of natural uranium.

URANIUM MINING BY URANIUM ONE ENTERPRISES, T*

	2014	2015	2016
Uranium production including:	4,857	4,794	4,919
Kazakhstan	4,640	4,749	4,896
US	217	45	23

MINERAL RESOURCE BASE OF URANIUM ONE ENTERPRISES, KT*

	2014	2015	2016
	224.1	213.1	220.8

* Including the 100% share in Mantra Resources Pty Limited.

¹⁶ In 2006, JSC Atomstroyexport (ASE) won a tender for the construction of two power units at the Belene NPP site. As a result, in November 2006, an agreement was concluded between JSC ASE and the Bulgarian company NEK EAD for engineering design, manufacture of long-lead equipment, etc. In 2012, the Council of Ministers of Bulgaria decided to abandon the Belene NPP construction project. In order to recover the amount payable for the performed and accepted work from the customer (NEK EAD), JSC ASE filed a lawsuit in the ICC International Court of Arbitration.

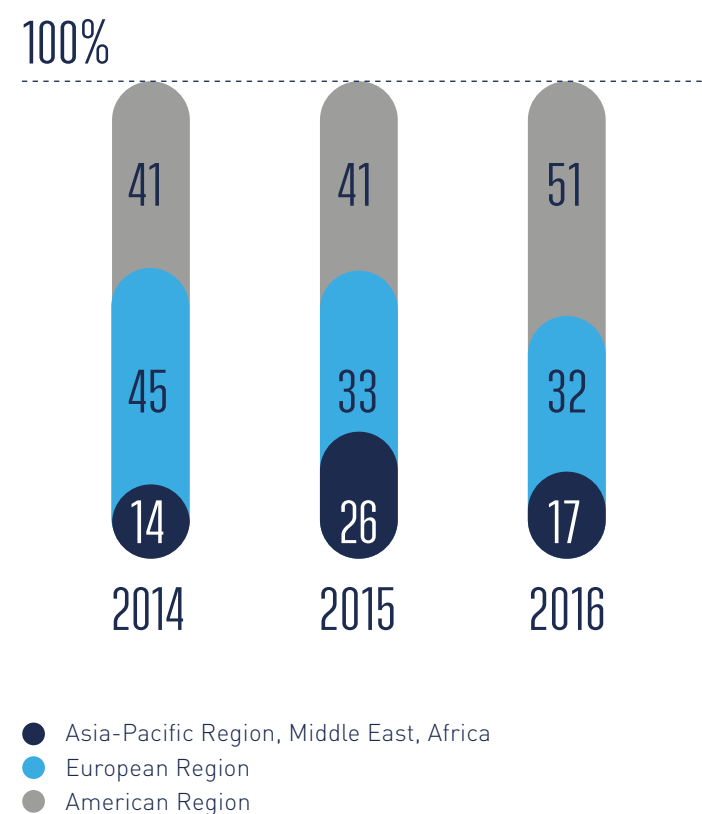
3.2.7.

EXPORT OF URANIUM PRODUCTS AND NATURAL URANIUM ENRICHMENT SERVICES

In the reporting year, JSC TENEX (an organization of ROSATOM) concluded 17 agreements on the export of uranium products and natural uranium enrichment services, including supplements to the existing contracts increasing the delivery volume. The 10-year portfolio of overseas orders totalled about USD 20 billion¹⁷, while sales totalled about USD 2.1 billion.

[See also the report of JSC TENEX for 2016.](#)

CHANGES IN THE SALES STRUCTURE OF JSC TENEX
BY REGION, %



3.2.8.

EXPORT OF NUCLEAR FUEL

In the reporting year, the Fuel Division's 10-year portfolio of overseas orders totalled about USD 10.1 billion, while export revenue reached USD 1.4 billion.

2016 saw a breakthrough on the market for nuclear fuel for foreign-design PWR reactors (which make up more than half of the total number of reactors currently in operation worldwide). The Fuel Division signed the first

contract with a US NPP operator for the pilot use of Russian TVS-KVADRAT fuel and a contract with Vattenfall Nuclear Fuel AB (Sweden) for the commercial supply of TVS-KVADRAT nuclear fuel to Ringhals NPP.

Contracts were signed with AREVA NP for the supply of additional nuclear fuel components for the Sizewell B NPP in the United Kingdom.

A contract was signed and fuel was delivered to a Czech research reactor.

A contract was signed with the China Institute of Atomic Energy for the production and supply of fuel for the China Experimental Fast Reactor (CEFR).

A number of contracts were signed for the supply of uranium components of nuclear fuel for research reactors in Argentina.

[See also the section 'Fuel Division' and the report of JSC TVEL for 2016.](#)

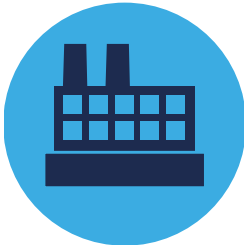
3.2.9.

FOREIGN OPERATIONS IN THE NUCLEAR FUEL CYCLE BACK-END

The most important achievement of 2016 was winning the tender for the construction of a radioactive waste storage facility and for the development of a project to dismantle power units No. 1-4 at Kozloduy NPP.

ROSATOM continued to implement projects under existing contracts at Ignalina NPP in Lithuania and at the nuclear power plants under construction (Ostrovets NPP in Belarus, Paks NPP in Hungary).

¹⁷ Excluding the portfolio of JSC Atomenergopromsbyt (managed by the Company as from 2016) totalling USD 2.6 billion.



CONSTRUCTION OF NPPS ABROAD IN 2017

NPP, country	Planned work
Asia	
Rooppur NPP, Bangladesh	Start of concreting of the foundation slab of the reactor building at power unit No. 1. Signing of contracts for the NPP life cycle
Kudankulam NPP, India	Handover to the customer of the documentation necessary for obtaining the permit from the Indian regulator to lay the first concrete at power unit No. 3. Signing of contract documents for power units No. 5 and 6
Bushehr NPP, Iran	Development of detailed designs and their transfer to the customer. Infrastructure development for the foundation pit for the main buildings of power unit No. 2
Tianwan NPP,China	First criticality at power unit No. 3
Akkuyu NPP, Turkey	Obtaining approval from the Turkish Atomic Energy Authority for the Report on the Site Parameters. Submission of an application for the Licence for the Construction of Power Unit No. 1 to the Turkish Atomic Energy Authority. Filing of an application for the main licence for electricity generation
Europe	
Ostrovets NPP, Belarus	Start of installation of main equipment at power unit No. 1 (the reactor vessel, steam generators, the turbine generator set)
Hanhikivi NPP, Finland	Continuation of infrastructural work on the site. Finalization of documentation packages for the construction licence and their handover to the customer of the NPP, as well as preparation of documentation for the design and start of the manufacture of long-lead equipment. Signing of further contracts for the supply of equipment for nuclear power plants
Paks-2 NPP, Hungary	Obtaining permission from the Hungarian regulatory authority for the NPP site after obtaining permission from the European Commission. Development and submission of a preliminary safety analysis report to the customer
Africa	
El Dabaa NPP, Egypt	Signature and entry into force of the EPC contract. Conclusion of contracts for the NPP life cycle

3.2.10.
PLANS FOR 2017

Given that ROSATOM is expanding the scope of its operations on the international market, in 2017, the consistent performance of the contracts for NPP construction concluded by the Corporation will become a major priority.

Research centres

ROSATOM plans to conclude contracts for the construction of at least three nuclear research and technology centres abroad.

NPP servicing

ROSATOM plans to expand its footprint and step up its operations in Belarus, Bangladesh, Egypt, Bolivia and Zambia.

Uranium mining abroad

- To develop the commercial infrastructure and increase the share on the global market for natural uranium;
- To maintain the cost leadership and improve operational efficiency;
- To optimize the loan portfolio of Uranium One.

Supply of uranium products and nuclear fuel

Given that the market environment is expected to remain unfavourable, the focus of contract management on the uranium market will be on the use of new marketing tools mitigating the impact of negative factors. ROSATOM plans to develop a project to form a global transportation and logistics service provider in the nuclear fuel cycle based on preliminary agreements with a foreign partner reached in 2016.

Plans for 2017 as part of the efforts to enter the market for nuclear fuel for Western-design reactors are as follows:

- To expand JSC TVEL’s footprint on the foreign markets for NFC products by promoting fuel components produced using Russian and foreign technologies;
- To strengthen cooperation with companies and organizations interested in promoting the TVS-KVADRAT project on the target markets;
- To develop cooperation with foreign partners on fuel and components for foreign-design research reactors.

3.3. INTERNATIONAL COOPERATION

ON A GLOBAL SCALE, ROSATOM AIMS TO SET FAVOURABLE INTERNATIONAL LEGAL AND POLITICAL CONDITIONS TO PROMOTE RUSSIAN TECHNOLOGIES ACROSS THE GLOBAL NUCLEAR MARKET, STRENGTHEN THE NUCLEAR SAFETY AND NON-PROLIFERATION REGIMES AND ACTIVELY COOPERATE WITH INTERNATIONAL ORGANIZATIONS AND FORUMS.

KEY RESULTS IN 2016:

- 8 INTERGOVERNMENTAL AGREEMENTS AND 20 INTERDEPARTMENTAL AGREEMENTS WERE CONCLUDED. THESE INCLUDE 4 FRAMEWORK INTERGOVERNMENTAL AGREEMENTS WITH BOLIVIA, ZAMBIA, TUNISIA AND CUBA, WHICH PROVIDE THE FOUNDATION FOR BILATERAL COOPERATION BETWEEN RUSSIA AND THESE COUNTRIES IN THE SPHERE OF NUCLEAR TECHNOLOGIES;
- A LEGAL FRAMEWORK WAS ESTABLISHED AT INTERGOVERNMENTAL LEVEL FOR THE CONSTRUCTION OF NUCLEAR RESEARCH AND TECHNOLOGY CENTRES IN BOLIVIA AND NIGERIA;
- AN INTERDEPARTMENTAL MEMORANDUM WITH JAPAN ON COOPERATION IN THE PEACEFUL USE OF NUCLEAR ENERGY WAS SIGNED;
- A PROGRAMME WAS LAUNCHED TO TRAIN RUSSIAN PERSONNEL FOR INTERNATIONAL ORGANIZATIONS IN ACCORDANCE WITH THE IAEA STANDARDS;
- AS PART OF THE JOINT COMPREHENSIVE PLAN OF ACTION ON IRAN'S NUCLEAR PROGRAMME, 38 TONNES OF HEAVY WATER WERE SHIPPED TO RUSSIA IN EXCHANGE FOR RUSSIAN NATURALLY ENRICHED URANIUM.

3.3.1. STRENGTHENING THE INTERNATIONAL LEGAL FRAMEWORK FOR COOPERATION

In 2016, expansion of the international legal framework continued in order to promote Russian nuclear technologies in the world.

8 intergovernmental agreements (IGAs) and 20 interdepartmental arrangements were signed (8 and 16 in 2015, 11 and 18 in 2014 respectively).



COOPERATION WITH KEY PARTNERS IN STRENGTHENING THE INTERNATIONAL LEGAL FRAMEWORK

Bolivia
Zambia
Tunisia
Cuba

Framework IGAs have been signed to establish the legal framework for cooperation in the field of nuclear technologies with Bolivia, Cuba, Tunisia and Zambia. Thus, conditions have been created for the promotion of Russian nuclear technologies in these countries and for the implementation of specific projects in the nuclear sphere.

Bolivia
Nigeria

IGAs on cooperation in the construction of research centres have been signed:

- An IGA on cooperation in the construction of a Nuclear Research and Technology Centre in Bolivia;
- An IGA on cooperation in the construction of a Centre based on a multipurpose research reactor in Nigeria.

The centres will enable the training of national research and technical personnel and the development of the necessary competences for the implementation of practical projects in the nuclear sphere. The operation of the centres will enable a wide use of radiation technologies in agriculture, health care and industry.

Japan

During the visit of Russia's President to Japan, an interdepartmental memorandum on cooperation in the peaceful use of nuclear energy was signed in December 2016. The Memorandum provides for cooperation in dealing with the consequences of the Fukushima Daiichi nuclear disaster, cooperation in the field of innovative nuclear technologies and facilitating the establishment of contacts between Russian and Japanese companies.

People's
Republic
of China

A Joint Statement by the Heads of Government of the Russian Federation and the People's Republic of China on the development of strategic cooperation in the peaceful use of nuclear power was issued in Saint Petersburg in November 2016 as part of the 21st regular meeting of the heads of the Russian and Chinese governments. It is an integrated document that reflects the balance of interests of the parties. More specifically, it provides for cooperation in the construction of new power units at Tianwan NPP and other sites in China, the construction of a nuclear power plant in China with fast-neutron reactor units, cooperation on floating thermal nuclear power plants, etc.

Algeria
Bolivia
Zambia
Jordan
Cambodia
Kenya
Laos
Paraguay

Interdepartmental memoranda have been signed:

- Memoranda on education and training of personnel in the nuclear power industry and other related fields with Jordan, Bolivia and Zambia;
- Memoranda on cooperation in the peaceful use of nuclear energy with Laos, Algeria, Bolivia, Zambia, Kenya and Paraguay;
- Memoranda on the establishment of a nuclear energy information centre in Cambodia and the establishment of a joint Russian-Cambodian working group on cooperation in the peaceful use of nuclear energy.

The signing of the documents will enable the development of nuclear power infrastructure in these countries, as well as the practical implementation of specific cooperation projects.

Finland

A Protocol has been signed on the implementation of practical measures to fulfil the obligations under the Russian-Finnish IGA on early notification of a nuclear accident and the exchange of information on nuclear facilities dated January 19, 1995. The Protocol establishes specific measures for accident notification and rapid exchange of information in the event of a nuclear accident; it also establishes procedures for joint action in the conduct of emergency exercises and consultations with the competent authorities.

Germany

Administrative arrangements have been signed between ROSATOM and the German Federal Ministry for Economic Affairs and Energy under the IGA on cooperation in the operation of research reactors dated September 1, 2014.

3.3.2.

SUPPORT FOR LONG-TERM INTERNATIONAL PROJECTS

In 2016, ROSATOM continued to provide political support for major projects, particularly for NPP construction abroad.

Bushehr NPP construction project (Iran)

In April, with joint support from ROSATOM and the Russian Federal Service for Environmental, Technological and Nuclear Supervision (Rostekhnadzor), the Iranian regulator issued a licence for the operation of power unit No. 1 at Bushehr NPP. As a result, the final acceptance certificate came into force, i.e. the power unit was legally handed over to the Iranian operator.

In September, ROSATOM's representatives attended a ceremony held in Bushehr to mark the final handover of the first power unit to the Iranian operator and the start of construction of the second and third power units of Bushehr NPP.

In December, the first advance payment was received from the Iranian party, and the seismic parameters of the site for the construction of power units No. 2 and 3 of Bushehr NPP were agreed. This enabled the launch of full-scale work on the project to build new power units at Bushehr NPP.

Kudankulam NPP construction project (India)

ROSATOM supported the preparation and holding of official ceremonies to mark the handover of power units No. 1 and 2 of Kudankulam NPP to the Indian party on August 10 and October 15, 2016. Both events were attended by the President of the Russian Federation Vladimir Putin and the Prime Minister of India Narendra Modi.

With support from ROSATOM, the entire package of contracts for the construction of the second stage of Kudankulam NPP (power units No. 3 and 4) was signed, and the wording of the Master Framework Agreement on the construction of the third stage of Kudankulam NPP (power units No. 5 and 6) was agreed and initialled with the Indian party.

In December, the intergovernmental credit protocol for the construction of power units No. 5 and 6 of Kudankulam NPP was initialled by the Ministries of Finance of the two countries. The relevant order of the Russian government was issued.

Rooppur NPP construction project (Bangladesh)

In May, the Bangladeshi regulator approved the NPP design and the statement of work for the development of design documents. In June, with the assistance of ROSATOM and the Russian Federal Service for Environmental, Technological and Nuclear Supervision (Rostekhnadzor), the Bangladeshi regulator issued a licence for the Rooppur NPP site.

An intergovernmental agreement was signed on the provision of a government loan to finance the construction of Rooppur NPP. After the loan agreement came into force in December 2016, the master contract for the construction of Rooppur NPP was brought into force, enabling the start of the main stage of construction of Rooppur NPP.

In October 2016, the Bangladeshi customer transferred the required advance payment. Upon its receipt, the Russian contractor started high-priority work forming part of the main stage of construction, including ordering high-priority equipment and long-lead equipment.

Cooperation with China

ROSATOM closely cooperated with the Atomic Energy Authority and the National Energy Administration of the PRC in accordance with the plans. A meeting of the Subcommission on Nuclear Issues was held in September to consider the existing agenda of nuclear cooperation between

Russia and China. Thematic working groups of the Subcommission held meetings. After the joint statement was made, work was organized to fulfil its objectives.

Cooperation with Belarus

ROSATOM supported the project to build the Belarusian nuclear power plant. A close working relationship has been established with the Ministry of Energy, the Ministry of Emergency Situations and other government bodies of the Republic of Belarus. Regular working consultations were held on current issues of international cooperation in the field of peaceful use of nuclear energy, including in the context of joint work in the IAEA.

Cooperation with Kazakhstan

ROSATOM continued the consistent and systematic development of strategic cooperation between Russia and Kazakhstan on the peaceful use of nuclear energy.

With support from ROSATOM, a package of documents was signed to develop the natural uranium mining and enrichment segments, which enable the implementation of one of the key provisions of the Comprehensive Programme: production of 6,000 tonnes of uranium per year. More specifically, ROSATOM, the Ministry of Energy of Kazakhstan and JSC NAC Kazatomprom signed a trilateral Memorandum of Understanding and Expansion of Strategic Cooperation in the Field of the Nuclear Fuel Cycle.

Significant progress was made towards the approval of the draft intergovernmental agreement on cooperation in research and development in nuclear power.

Cooperation with Vietnam

ROSATOM supported the project to build a Russian-design Nuclear Science and Technology Centre in Vietnam. Regular communication was maintained with the Ministry of Industry and Trade and the Ministry of Science and Technology of the country. After the National Assembly of Vietnam decided to suspend the Ninh Thuận 1 NPP project, a negotiating process was organized with the specialized Vietnamese agencies to address practical issues arising in connection with this decision.

3.3.3.

COOPERATION WITH INTERNATIONAL ORGANIZATIONS

International Atomic Energy Agency (IAEA)

ROSATOM participated in all specialized international conferences and meetings held under the auspices of the IAEA, including:

- The anniversary 60th session of the IAEA General Conference and the Scientific Forum 'Nuclear Technology for the Sustainable Development Goals';
- The Ministerial Conference on Nuclear Security.

The Russian Federation paid its contributions to the Technical Cooperation Fund in full; funding for the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) was extended for the period from 2017 through 2019; funds were allocated for the Russian programme to support the IAEA Safeguards. Three Russian regional projects (in the sphere of nuclear safety infrastructure of VVER reactors, environmental remediation and climate change) were successfully implemented as part of the IAEA technical cooperation programme. An agreement on an extrabudgetary contribution for the IAEA Programme of Action for Cancer Therapy was signed, and agreements and guidelines for cooperation as part of Russia's participation in the IAEA Safeguards Support Programme were signed. Training courses on the implementation of safeguards at gas centrifuge uranium enrichment facilities and stable isotope facilities were conducted for two IAEA inspection teams.

Continuing the current practice, ROSATOM arranged the fourth introductory visit to Beloyarsk NPP and JSC UEIP for a group of Permanent Representatives of IAEA Member States. 20 foreign visitors from 16 countries and two international organizations (the European Union and the IAEA) participated in the visit.

In order to establish a mechanism for scheduled selection and training of Russian personnel to be promoted to senior positions in the IAEA Secretariat, an industry-wide target programme was developed, and Uniform Industry-Wide Guidelines were approved. A pilot workshop was held for selected Russian experts with the participation of the Human Resources Division of the IAEA.

As part of the effort to optimize cooperation with the IAEA Secretariat, the procedure for communication between Russian agencies and organizations participating in the IAEA's technical activities was approved.

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

The Russian Federation paid membership fees to the OECD NEA in full.

Russian participation was ensured in seven international projects of the OECD NEA aimed at improving the safety of Russian nuclear power plants and creating new generations of nuclear reactors.

ROSATOM and the OECD NEA signed a Memorandum of Understanding on cooperation in education and personnel training.

ROSATOM acceded to the multilateral Agreement on the Exchange of Scientific and Technical Information Concerning Nuclear Installation Decommissioning Projects.

Under the auspices of the OECD NEA, an international audit of the Russian methodology for decommissioning costing of nuclear facilities was conducted. The conformity of Russian approaches with international ISDC standards was confirmed.

For the first time in Russia, the OECD NEA Data Bank conducted training courses involving an in-depth study of the SCALE Code System designed for simulation and calculation of neutronics of reactor cores, nuclear fuel and subcritical assemblies.

Commission of CIS Member States on the Peaceful Use of Nuclear Energy

The Commission held the seventeenth meeting, during which the participants discussed the start of the second phase of the Intergovernmental Target Programme 'Remediation of the Territories of CIS Member States Affected by Uranium Production'; the status of preparations for the first criticality at the Kazakhstan Tokamak for Material Testing; the algorithm for implementing the high-priority action plan for the implementation of the Nuclear and Radiation Safety Concept of the CIS Member States.

ROSATOM assisted in the preparation of the following resolutions of the Council of Heads of Government of CIS Member States:

- The signing of the Agreement of the CIS Member States on Information Interaction on the Movement of Radiation Sources, which will

ensure an appropriate information exchange enabling the proper recording of radiation sources and continuous tracking of their movements;

- Amending the Intergovernmental Target Programme 'Remediation of the Territories of CIS Member States Affected by Uranium Production' (contributions by the states participating in the financing of the Programme for its implementation in 2017 were approved).

3.3.4. STRENGTHENING THE NUCLEAR NON- PROLIFERATION REGIME

The Programme for Importing Nuclear Fuel from Russian-Design Research Reactors to Russia has been underway since 1999. The Programme covers 14 countries.

In 2016, spent nuclear fuel from the Maria research reactor (Poland) was imported into Russia for reprocessing. The eighth (final) batch of highly enriched SNF totalling 49 kg was transported to Russia by air. Since then, Poland has become the 11th of 14 countries participating in the Programme with no highly enriched SNF left.

The Institute of Global Nuclear Safety and Security conducted five training courses on the physical protection of nuclear materials, nuclear facilities and radiation sources and a regional workshop for representatives of Russian-speaking countries under the auspices of the IAEA. The courses focused on the implementation of the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material, which came into force in May 2016.

3.3.5. COMPLIANCE WITH INTER- NATIONAL OBLIGATIONS AND RUSSIAN LEGISLATION IN THE SPHERE OF EXPORT CONTROL

258 draft contracts (arrangements, agreements) were reviewed under the Uniform Industry-Wide Procedure. The findings of the review were sent to the industry organizations.

Two industry workshops titled 'Export Control in ROSATOM: Challenges and Development Paths' were held.

3.3.6. DEVELOPING THE NETWORK OF ROSATOM'S REPRESENTATIVE OFFICES AFFILIATED WITH EMBASSIES AND TRADE MISSIONS ABROAD

As of December 31, 2016, ROSATOM's representative offices affiliated with Russian embassies and trade missions were in operation in nine countries

(Bangladesh, Belarus, Hungary, Vietnam, India, Iran, China, Kazakhstan and Turkey) and under the Permanent Mission to the IAEA (Austria).

3.3.7. IMPLEMENTATION OF THE JOINT COMPREHENSIVE PLAN OF ACTION ON IRAN'S NUCLEAR PROGRAMME

January 16, 2016 was announced as the Implementation Day of the Joint Comprehensive Plan of Action (JCPOA) on Iran's nuclear programme. Since then, the sanctions imposed by the United Nations Security Council against Iran have been lifted. Russia played a key role in bringing about this event, which was made possible by fulfilling a key and highly difficult condition: removing all excess low-enriched

uranium and nuclear materials from Iran and transporting them to Russia in exchange for Russian natural uranium.

As part of the Russian-Iranian cooperation under the JCPOA, in September 2016, 38 tonnes of heavy water were shipped to Russia in exchange for Russian naturally enriched uranium.

Considerable progress has been made on the project to modify two cascades of gas centrifuges at the Fordow Fuel Enrichment Plant to produce stable isotopes. Pursuant to United Nations Security Council Resolution 2231, responsibility for the implementation of this project has been assigned to the Russian Federation. The project concept was agreed with the Iranian party and presented to the Joint Commission of the JCPOA in April 2016.

3.3.8. MAJOR CHALLENGES IN THE INTERNATIONAL ARENA

In 2016, the political environment in which ROSATOM had to operate on global markets became even more challenging than before. First and foremost, competition on the market for NPP construction abroad became considerably tougher. New powerful players with large financial resources and strong government support are gaining a foothold on it.

The likelihood of individual countries imposing politically motivated bans and restrictions on the supply of high-tech equipment to enterprises in the Russian nuclear industry and on raising external loans increased. It was evident that a number of states sought to use international platforms to change existing and emerging international rules and guidelines in the field of nuclear energy, which could adversely affect the Russian nuclear industry. Increasingly often,

competition fell within the area of responsibility of regulators as safety assessment requirements for nuclear power plants under construction and in operation became tighter.

Political instability and an active anti-nuclear movement persist in a number of countries.

In order to counteract these negative tendencies, ROSATOM effectively coordinated its work with the Russian Ministry of Foreign Affairs and other agencies, provided direct political support to nuclear organizations on the global market, used the platform of the IAEA and other specialized international organizations and conducted awareness campaigns at international conferences and forums.

As a result, ROSATOM's comprehensive efforts largely offset the impact of external factors and significantly broadened the international legal framework for cooperation necessary to strengthen the Russian presence on international nuclear power markets.

3.3.9. OBJECTIVES FOR 2017 AND FOR THE MEDIUM TERM

In 2017, the international legal framework for cooperation for the benefit of industry organizations and enterprises will be expanded. A new important area is the establishment

of cooperation with a number of major partner countries on the management of spent nuclear fuel and the decommissioning of nuclear facilities.

It is planned to start cooperation within the IAEA on the development of nuclear infrastructure in new countries where ROSATOM is implementing its projects. The personnel training programme for the IAEA launched in 2016 will continue.

Objectives for the medium term:

- To promote ROSATOM's integrated offer of services related to NPP construction and servicing across foreign countries ([see the section 'International Business'](#));
- To further expand the international legal framework for cooperation;
- To fulfil Russia's international obligations;
- To strengthen the nuclear non-proliferation and nuclear safety regimes.



In 2017, Russia will host the International IAEA Conference on Fast Reactors and Related Fuel Cycles (June 26-29, 2017, Ekaterinburg).

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ALL TARGETS HAVE BEEN FULLY MET;
MOREOVER, SOME TARGETS HAVE BEEN
CONSIDERABLY EXCEEDED

4.1. MINING DIVISION¹⁸

THE MINING DIVISION
(THE HOLDING COMPANY
IS JSC ATOMREDMETZOLOTO)
CONSOLIDATES URANIUM
MINING ENTERPRISES
IN RUSSIA¹⁹ AT DIFFERENT
STAGES OF THE LIFE
CYCLE, FROM GEOLOGICAL
EXPLORATION TO INTENSIVE
COMMERCIAL DEVELOPMENT
OF DEPOSITS.

¹⁸ For more information about the Division's results, see the report of JSC Atomredmetzoloto for 2016.
¹⁹ For details on uranium mining abroad, see the section 'International Business'.


KEY RESULTS IN 2016:

- URANIUM RESOURCES TOTALLED 517,900 TONNES;
- 3,005 TONNES OF URANIUM WERE PRODUCED (THE PRODUCTION PROGRAMME WAS 100% COMPLETED);
- FOR THE FIRST TIME IN SEVERAL YEARS, THE KEY ENTERPRISE, PJSC PIMCU, REACHED BREAK-EVEN POINT.

LINK BETWEEN THE DIVISION'S GOALS AND THE STRATEGIC GOALS OF ROSATOM

Strategic goal of ROSATOM

Reflection in the strategy
of JSC Atomredmetzoloto


	INCREASING THE SHARE ON INTERNATIONAL MARKETS	Implemented indirectly (by making ROSATOM's offer on the NFC market more competitive) <ul style="list-style-type: none">• Guaranteeing that the demand for Russian uranium will be met• Maintaining a competitive cost of uranium production
	NEW PRODUCTS FOR THE RUSSIAN AND INTERNATIONAL MARKETS	Implemented directly <ul style="list-style-type: none">• Ensuring sustainable profitability, including through business diversification
	REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME	Implemented directly <ul style="list-style-type: none">• Maintaining a competitive cost of uranium production• Ensuring sustainable profitability, including through business diversification

The Division's strategic goal is to meet the demand of ROSATOM for Russian uranium at a competitive price and free from any geopolitical risks.

4.1.1. RESULTS IN 2016



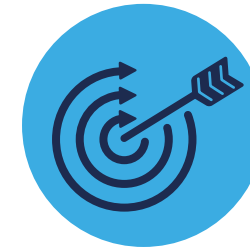
MINERAL RESOURCE BASE AND URANIUM PRODUCTION

	2014	2015	2016
Mineral resource base, kt	524.7	521.2	517.9
URANIUM PRODUCTION, T, 	2,991	3,055	3,005
including:			
PJSC PIMCU	1,970	1,977	1,873
JSC Dalur	578	590	592
JSC Khiagda	443	488	540

In 2016, the Division produced 3,005 tonnes of uranium. The Division's uranium mining enterprises completely fulfilled the production plan.

PJSC PIMCU reached break-even point; this was one of the most significant achievements of the year. For the first time in six years, the enterprise recorded a profit, and the cost of finished products was 8% below the budgeted target. In addition, a positive opinion was obtained for the design documentation on Mine No. 6. The start of its development will enable further stable growth of PJSC PIMCU.

The main facilities of the production site and associated infrastructure required for the plant to achieve the rated capacity of 1,000 tonnes of uranium per year in 2019 were put into operation at JSC Khiagda. The physical start-up of the local sorption unit forming part of the mining complex and auxiliary infrastructure facilities at the Istochnoye deposit was completed.



ACHIEVEMENT OF KEY PERFORMANCE INDICATOR TARGETS

Indicator	2015	2016 target value	2016 actual value
Adjusted free cash flow of the Division, RUB billion	1.7	4.7	5.3
Labour productivity, RUB million per person	2.61	3.1	3.1
Full cost, RUB billion	Not set	16.4	15.3
Revenue of the Division from new products within and outside ROSATOM's scope on a competitive basis, RUB million	626.5	570	1,310
LTIFR ²⁰	0.23	0.6	0.44
Number of events rated at level 2 or higher on the INES scale	0	0	0

²⁰ Hereinafter, the Lost Time Injury Frequency Rate (LTIFR) is the number of lost time injuries against the total hours worked in the reporting year normalized to 1 million man-hours.

4.1.2. DEVELOPMENT OF NEW PRODUCTS AND NEW BUSINESSES

The Division’s new businesses are being developed in three areas:

- Improving the processing depth of the mineral resource base and industrial waste (Pyrite Cinder Processing and Scandium projects);
- Development of territories with a special regional status (Pavlovskoye project);
- Business initiatives to promote the production of strategic metals and innovative products based on them (pending).

In 2016, a new product, sized coal, was launched at the Urtuysky open-pit coal mine of PJSC PIMCU. The coal has improved characteristics and is sold at a premium to the price of ordinary brown coal.

As part of the Scandium project, in 2016, the development of scandium mining technology was completed, and the construction of a pilot plant was started. The scandium reserves of the Dalmatovskoye deposit were recognized on the balance sheet, which grants the Corporation the right to commercial sales of mined scandium.

An economic assessment of the technology for the treatment of industrial waste from sulphuric acid production accumulated at the site of PJSC PIMCU was conducted for the Pyrite Cinder Processing project. The profitability of zero-waste cinder processing (with recovery of gold, non-ferrous metals and leaching cakes used in the cement industry) was confirmed.

In 2016, preparations continued for the construction of the northernmost Russian mining and processing plant at the Pavlovskoye lead and zinc deposit (on the Novaya Zemlya archipelago). Following a geological survey, balance reserves of lead and zinc ores at the deposit increased by 28.7%. The first phase of the field engineering and geological survey for the design and construction of the mining enterprise was completed.



In 2016, a priority social and economic development area was established in Krasnokamensk (with PJSC PIMCU as the core local enterprise of the town). This is the first successful experience in all regions of operation of nuclear enterprises.

A cooperation agreement was signed for the construction of a special cement plant with a capacity of more than 1 million tonnes per year, which will contribute to unlocking the region’s social and economic potential, maximizing the use of human resources, infrastructural and transport capabilities of the existing production sites in the Zabaykalsky Territory.

4.1.3. PERFORMANCE IMPROVEMENT (REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME)

Overall savings from operational efficiency improvement measures in the Division for the year exceeded RUB 850 million. More specifically:

- The cost of backfilling operations, drilling operations and materials was reduced by 19.4%, 16.4% and 6.4% respectively through the introduction of technological solutions and optimization of longwall mining at PJSC PIMCU;
- JSC Khiagda and JSC Dalur reduced the amount of time required for well penetration and preparation of uranium reserves at new deposits.

4.1.4. PLANS FOR 2017

In 2017 and subsequent years, the Division plans to maintain uranium production at a level of ~3,000 tonnes per year.

As part of the development of new businesses, in 2017, the Division plans to start:

- Production of high-purity scandium oxides, to be followed by the start of production of aluminium-scandium alloys;
- The design and subsequent construction of a pyrite cinder processing plant (its start-up is scheduled for 2019).



KEY PERFORMANCE INDICATORS FOR 2017

Indicator	Target value
Adjusted free cash flow of the Division, RUB billion	1.5
Full cost, RUB billion	15.9
Labour productivity, RUB million per person	3.1
LTIFR/reduction in the number of injuries at production sites of enterprises, including contractors (vs the 2016 baseline), %	0.54/30
Number of events rated at level 2 or higher on the INES scale	0

4.2.
FUEL DIVISION²¹

THE FUEL DIVISION IS RESPONSIBLE FOR URANIUM ENRICHMENT, DEVELOPMENT AND MANUFACTURE OF GAS CENTRIFUGES AND ASSOCIATED EQUIPMENT, FABRICATION AND SALE (INCLUDING EXPORT) OF NUCLEAR FUEL AND RELATED NON-NUCLEAR PRODUCTS. THE DIVISION’S HOLDING COMPANY IS JSC TVEL.

²¹ For more information about the Division’s results, see the report of JSC TVEL for 2016.

KEY RESULTS IN 2016:

- A NUMBER OF CONTRACTS WERE CONCLUDED FOR THE SUPPLY OF RUSSIAN TVS-KVADRAT NUCLEAR FUEL FOR WESTERN-DESIGN REACTORS;
- LONG-TERM CONTRACTS WERE SIGNED WITH EUROPEAN AND AMERICAN COMPANIES FOR THE SUPPLY OF TITANIUM PRODUCTS AND LITHIUM METAL;
- PRODUCTION OF HAFNIUM WAS ORGANIZED FOR THE NEEDS OF THE RUSSIAN ECONOMY AS PART OF IMPORT SUBSTITUTION EFFORTS.

LINK BETWEEN THE DIVISION’S GOALS AND THE STRATEGIC GOALS OF ROSATOM

Strategic goals of the Fuel Division				
Strategic goals of ROSATOM	▼	▼	▼	▼
	Growth on NFC markets	Development of the second business core	Performance improvement	Social and environmental acceptability
	Increasing the share on international markets	●		
	Reduction of the cost of products and the lead time		●	
	Development of new products for the Russian and international markets	●	●	
Business environment				●

The Division produces fuel assemblies for all types of existing Russian power reactors, research and marine reactors, for PWR and BWR reactors in Western Europe in cooperation with AREVA. It also produces TVS-KVADRAT fuel developed by the Division for Western-design PWR reactors. Today, 75 reactors (one in every six reactors in the world) use nuclear fuel produced by the Division.

4.2.1. RESULTS IN 2016



ACHIEVEMENT OF KEY PERFORMANCE INDICATOR TARGETS

Indicator	2015	2016 target value	2016 actual value
Adjusted free cash flow of the Division, RUB billion	86.6	71.3	83.9
Semi-fixed costs, RUB billion	35.9	40.2	36.9
Labour productivity, RUB million per person	8.4	8.1	8.25
10-year portfolio of overseas orders, USD billion	10.3	9.8	10.1
Overseas revenue, USD million	1,609	1,383	1,415
Revenue of the Division from new products within and outside ROSATOM's scope on a competitive basis, RUB billion	4.2	6.8	7.17
LTIFR	0.14	0.34	0.09
Number of events rated at level 2 or higher on the INES scale	0	0	0

In 2016, the Division met all contractual obligations to supply nuclear fuel to Russian and foreign customers.

As part of the work to create a new nuclear fuel for Russian nuclear power plants:

- A batch of third-generation fuel assemblies for Kola NPP was manufactured and delivered;
- Acceptance testing of REMIX fuel pellets²² intended for pilot operation at Balakovo NPP was completed. Combined pilot nuclear fuel assemblies started to be used in the core of one of the reactors;
- As part of the Proryv ('Breakthrough') Project aimed at closing the nuclear fuel cycle, acceptance tests of pilot nuclear fuel assemblies with mixed nitride uranium-plutonium (MNUP²³) fuel for the BN-600 reactor were completed (see also the section 'Research and Innovations').

In the reporting year, a number of contracts were concluded for the supply of Russian nuclear fuel for Western-design PWR reactors (which make up more than half of the total number of operating reactors worldwide):

- An agreement was signed between JSC TVEL and Global Nuclear Fuel-Americas (GNF-A) on the formation of a strategic alliance to organize joint licensing, marketing and fabrication of fuel for PWR reactor operators in the United States. In addition, the first contract for the pilot use of Russian TVS-KVADRAT fuel was signed between JSC TVEL and a US NPP operator;
- A contract was signed between JSC TVEL and Vattenfall Nuclear Fuel AB (Sweden) for the commercial supply of TVS-KVADRAT nuclear fuel for Ringhals NPP in Sweden.

²² In order to facilitate the processing of spent nuclear fuel from thermal-neutron reactors and reduce the risk of plutonium proliferation during spent nuclear fuel processing, it is proposed that uranium and plutonium be released together. As a result, the uranium-plutonium product recovered from spent nuclear fuel, from which other actinides and fission products have been removed, can be returned to the fuel cycle of thermal-neutron reactors after the addition of enriched natural uranium, taking into account compensation for uranium-236 and even plutonium isotopes. This new fuel was called REMIX.

²³ This fuel is denser than oxide fuel and will significantly improve the efficiency of the use of natural uranium in the nuclear power industry. MNUP fuel is regarded as a promising fuel for BREST-OD-300, BN-1200 and BR-1200 fast-neutron reactor units, which are currently being designed.



In 2016, a new-generation gas centrifuge for uranium enrichment was successfully tested. Its introduction will reduce the cost per separative work unit and will have a significant economic impact. The start of serial production is scheduled for 2017.

4.2.2. DEVELOPMENT OF NEW PRODUCTS AND NEW BUSINESSES

During the reporting year, the Fuel Division made significant progress in producing and selling high-tech metal products:

- JSC Chepetsky Mechanical Plant, a company within the Division, signed a five-year contract worth RUB 2 billion with a large European metal trader (Hermith GmbH) for the supply of titanium products;
- PJSC Novosibirsk Chemical Concentrates Plant (NCCP), a company within the Division,

signed a five-year contract with the European company Rockwood Lithium (a subsidiary of Albermarle Company) for the annual supply of lithium metal;

- The first Russian high-tech hafnium production facilities were established. Hafnium is used in the metals, nuclear power, defence and electronics industries. Thus, the objective of fully substituting imported hafnium and meeting the needs of the Russian economy has been achieved.

4.2.3. PERFORMANCE IMPROVEMENT (REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME)

In 2016, more than 142,000 proposals for improvements were submitted in the Fuel Division. Implementation of these proposals resulted in savings of RUB 378 million. Over 1,300 RPS projects were introduced to reduce the lead time and increase operational efficiency. Overall savings from these projects exceeded RUB 1.5 billion.

BEST RPS PROJECTS OF THE FUEL DIVISION IN 2016

Company within the Division	Project	Results
PJSC NCCP	Optimization of VVER-1000 NFA production management	The lead time has been reduced by 34%; Work in process has been reduced by 30%.
JSC PA ECP	Improving the performance of a gas centrifuge cascade	The lead time has been reduced by 20%; The downtime of main equipment has been reduced by 15%; The cost of products was reduced by RUB 12 million (in the reporting year).
JSC SCC	Reduction of inventories	Inventories have been reduced by RUB 729 million.



KEY PERFORMANCE INDICATORS FOR 2017

Indicator	Target value
Adjusted free cash flow of the Division, RUB billion	67.1
Semi-fixed costs, RUB billion	38.5
Labour productivity, RUB million per person	8.5
LTIFR	0.3
Number of events rated at level 2 or higher on the INES scale	0

4.2.4. PLANS FOR 2017

- To develop the TVS-2006 design with improved thermomechanical properties for Russian nuclear power plants;
- To complete the pilot operation of third-generation fuel assemblies in power unit No. 4 of Kola NPP;
- To introduce a vibration resistant assembly with fuel produced from regenerated uranium in power unit No. 4 of Novovoronezh NPP and power unit No. 1 of Kola NPP.

4.3.
MECHANICAL
ENGINEERING
DIVISION²⁴

THE MECHANICAL ENGINEERING DIVISION IS ONE OF RUSSIA’S LARGEST GROUPS OF MECHANICAL ENGINEERING ENTERPRISES OFFERING A FULL RANGE OF SOLUTIONS FOR THE DESIGN, MANUFACTURE AND SUPPLY OF EQUIPMENT FOR THE NUCLEAR AND THERMAL POWER INDUSTRY, THE GAS AND PETROCHEMICAL INDUSTRY, SHIPBUILDING AND THE SPECIAL STEEL MARKET.

²⁴For more information about the Division's results, see the report of JSC Atomenergomash for 2016.

KEY RESULTS IN 2016:

- **EBITDA INCREASED THREEFOLD (COMPARED TO 2015) TO RUB 6.7 BILLION;**
- **THE ORDER PORTFOLIO REACHED RUB 420.3 BILLION (WITH NEW PRODUCTS ACCOUNTING FOR 47% OF THE PORTFOLIO);**
- **LABOUR PRODUCTIVITY INCREASED BY 25%.**

The Mechanical Engineering Division (its holding company is JSC Atomenergomash) is one of Russia’s largest groups of mechanical engineering enterprises (27% of the market) offering a full range of solutions for the design, manufacture and supply of equipment for the nuclear and thermal power industry, the gas and petrochemical industry, shipbuilding and the special steel market.

LINK BETWEEN THE DIVISION’S GOALS AND THE STRATEGIC GOALS OF ROSATOM

Goals of Division	Vision of Atomenergomash	Default single-source supplier of main NPP equipment	Key player with a firm foothold on the markets for related products outside the scope of ROSATOM	Effective manufacturer and provider of competitive solutions	
	Strategic goals of Atomenergomash (until 2030)	Ensuring deliveries of key equipment for the construction of new power units at ROSATOM’s NPPs in Russia and abroad Market share of target equipment totalling at least 50%	Increase in revenue in related sectors Share of revenue totalling at least 50%	Formation of a global power engineering company Share of overseas operations in revenue totalling at least 30%	Performance improvement EBITDA margin totalling at least 20% Labour productivity no lower than the average level in global power engineering companies
Goals of ROSATOM	Increasing the share on international markets	●	●	●	●
	Reduction of the cost of products and the lead time	●	●	●	●
	Development of new products for the Russian and international markets	●	●	●	●

The Division controls the entire production chain of key equipment for the nuclear island and the turbine hall, from R&D and the release of detailed engineering designs to process engineering and manufacture of equipment.

The Division comprises more than 20 power machine engineering enterprises, including manufacturing, research, service and engineering organizations located in Russia, Ukraine, the Czech Republic and Hungary.

4.3.1. RESULTS IN 2016



ACHIEVEMENT OF KEY PERFORMANCE INDICATOR TARGETS

Indicator	2015	2016 target value	2016 actual value
Adjusted free cash flow of the Division, RUB billion	2.0	4.5	11.8
Semi-fixed costs, RUB billion	23.45	22.7	20.0
Labour productivity, RUB million per person	2.9	4.1	3.7 ²⁵
10-year portfolio of overseas orders, USD million	129	77	149
Overseas revenue, USD million	122	128	121 ²⁶
Revenue of the Division from new products within and outside ROSATOM's scope on a competitive basis, RUB billion	17.1	25.9	27.7
LTIFR	0.42	0.54	0.25
Number of events rated at level 2 or higher on the INES scale	0	0	0

²⁵ The target for the indicator was not achieved due to rescheduling and a shortfall in revenue from long-lead equipment in a number of nuclear power projects.

²⁶ The shortfall in revenue under foreign contracts was due to the postponement and/or failure to conclude certain unplanned contracts with foreign customers.

In 2016, a reactor vessel for the Belarusian nuclear power plant, which is currently under construction, was built ahead of schedule by the Division's enterprises.

Two RITM-200 reactor units were supplied for the new-generation flagship icebreaker, Arktika.

The innovative generation 3+ power unit No. 1 was put into operation at Novovoronezh NPP-2. Key equipment for the power unit was supplied by the Mechanical Engineering Division ([see the section 'Engineering Division'](#)).

Important international agreements were signed with the following companies:

- An agreement on cooperation in the energy and oil and gas industries with JSC National Company Kazakhstan Engineering;
- A supplement to the licensing agreement with the European company NEM Energy b.v. on cooperation in the field of engineering of waste heat boilers.

4.3.2. DEVELOPMENT OF NEW PRODUCTS AND NEW BUSINESSES

In 2016, the Division won a tender for the installation of a unit for the distillation of salt-containing effluents for PJSC SIBUR Holding. The technology presented by the Division was chosen as the best option in terms of the set of technical parameters and cost over the entire life cycle. It will be used at the petrochemical plant that is currently under construction in Tobolsk for hydrocarbon processing.

The Volgodonsk branch of the Division continued to manufacture columns for three refineries.



In 2016, a new business, Clean Water, was formed within the Mechanical Engineering Division. It will implement projects involving water treatment, water purification and desalination for industry and the housing and utilities sector.

In addition, in 2016, ROSATOM decided to choose JSC Atomenergomash as an integrator for a new business area, Optimized Floating Power Units, and form a project office.

The first contract was signed for the supply of a container type mini HPP for International Energy Company (Georgia). Under the contract, the power plant will be delivered in the first half of 2017.

The Mechanical Engineering Division built the first Russian industrial 3D printer using metal powder as feedstock. 3D printing of metal products will enable a transition to a new stage: ‘digital’ manufacturing covering the entire cycle, from engineering design to the finished product. It will also help to reduce costs and improve product reliability. Experts predict that over the next few years the volume of the global additive manufacturing market will exceed USD 12 billion.

4.3.3.

PERFORMANCE IMPROVE- MENT (REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME)

During the reporting year, the Division continued to work to reduce the lead time for key NPP equipment and inventories.

The lead time for a steam generator for NPPs was reduced from 877 to 488 days. One of the key organizations of the Division, JSC Afrikantov OKBM, reduced the inventory and work-in-process turnover period from 250 to 95 days.

4.3.4.

PLANS FOR 2017

Strategic priorities of the Division in 2017:

- To improve production efficiency, including through further implementation of ROSATOM’s Production System;
- To ensure timely fulfilment of all contractual obligations;
- To boost revenue across all business areas;
- To implement the import substitution programme and develop new types of equipment for the nuclear industry and for the state defence order.



KEY PERFORMANCE INDICATORS FOR 2017

Indicator	Target value
Unit semi-fixed costs, % of revenue	34.8
Labour productivity, RUB million per person	4.4
LTIFR/decrease in the severity of injuries at production sites of enterprises, including contractors (vs the 2016 baseline), %	0.42/25
Number of events rated at level 2 or higher on the INES scale	0

4.4. ENGINEERING DIVISION²⁷

ROSATOM'S ENGINEERING DIVISION IS ONE OF THE LEADERS OF THE GLOBAL NUCLEAR ENGINEERING BUSINESS. THE DIVISION COMPRISES 22 ORGANIZATIONS, INCLUDING MAJOR DESIGN INSTITUTES IN MOSCOW, SAINT PETERSBURG AND NIZHNY NOVGOROD.

²⁷ For more information about the Division's results, see the report of JSC ASE EC for 2016.

KEY RESULTS IN 2016:

- **THE FIRST CRITICALITY PROGRAMME AND THE POWER START-UP OF POWER UNIT NO. 1 OF NOVovoronezh NPP-2 EQUIPPED WITH THE WORLD'S FIRST GENERATION 3+ REACTOR WERE COMPLETED;**
- **AS OF DECEMBER 31, 2016, 8 POWER UNITS OF NPPS* WERE UNDER CONSTRUCTION IN RUSSIA;**
- **A CONTRACT FOR THE CREATION OF AN INFORMATION RESOURCE TO MONITOR THE IMPLEMENTATION OF THE MOSCOW-KAZAN HIGH-SPEED RAILWAY PROJECT WAS SIGNED WITH A STRATEGIC CUSTOMER, JSC HIGH-SPEED RAIL LINES, A SUBSIDIARY OF OJSC RUSSIAN RAILWAYS.**

*Excluding power units No. 3 and 4 of Leningrad NPP-2, for which there was no building permit.

In 2016, the formation of the Engineering Division of ROSATOM was completed. It is one of the leaders of the global nuclear engineering business. The Division comprises 22 organizations, including major design institutes in Moscow, Saint Petersburg and Nizhny Novgorod. Its holding company is JSC ASE EC (the Division operates on the international market under the ASE brand name)²⁸.

The Division provides services related to the management of projects involving the construction and modernization of complex engineering facilities, including:

- The design and construction of nuclear power plants;
- Project management services (PMC services);

- Construction of research reactors;
- Construction and modernization of facilities for radioactive waste and spent nuclear fuel (RAW and SNF) management and decommissioning of nuclear facilities;
- Maintenance services.

Competitive advantages of the Division:

- The existence of references on the Russian and foreign markets;
- The optimal ratio of cost, timing, quality and terms of payment;
- A well-developed system for the management of projects involving the construction of NPPs and other complex engineering facilities;

²⁸ The main strategic goal of the Engineering Division until 2030 is to remain a leader on the global market in terms of the number of NPP power units under construction. The Engineering Division is an EPC contractor for most NPP power units under construction and an absolute leader on the Russian market. At the same time, the majority of projects in the Division's order portfolio are foreign projects (in 10 countries around the world). For information on the Division's results in the sphere of NPP construction abroad, see the section 'International Business' and the report of JSC ASE EC for 2016.

- A high level of competence of the management team and operating personnel;
- Extensive engineering and technical capabilities and many years of experience in the construction of nuclear power plants and other complex engineering facilities;
- The Division’s own design capabilities;
- The existence of safe standard designs with generation 3/3+ VVER reactors that are competitive in terms of LCOE, capital expenses and the time of construction;
- An in-house information platform for life cycle management of a facility based on Multi-D technology.

LINK BETWEEN THE DIVISION’S GOALS AND THE STRATEGIC GOALS OF ROSATOM

Strategic goals of ROSATOM

Strategic goals of the Division

Increasing the share on international markets



Leadership in the core business: NPP construction



New products for the Russian and international markets



Operational sustainability (diversification)



Reduction of the cost of products and the lead time



Financial sustainability



4.4.1.
RESULTS IN 2016



ACHIEVEMENT OF KEY PERFORMANCE INDICATOR TARGETS

Indicator	2015	2016 target value	2016 actual value
Labour productivity (based on the Division’s own revenue), RUB million per person	3.05	3.29	3.30
10-year portfolio of overseas orders, USD billion	70.05	92.7	92.3
The Division’s 10-year portfolio of orders for new products within and outside ROSATOM’s scope, RUB billion	90.6	79.6	115.9
Number of events rated at level 2 or higher on the INES scale	0	0	0

NPP construction in Russia
Rostov NPP, power unit No. 4

- Installation of the main circulation pipe was completed;
- Installation of pressurizer piping was completed.

Novovoronezh NPP-2
Power unit No. 1

In May 2016, as part of the first criticality programme, power unit No. 1 of Novovoronezh NPP-2 reached the minimal controllable power level. In August 2016, the power unit was connected to the grid and started electricity generation for the power system of Russia.

This is the world’s first generation 3+ leading power unit at the NPP which marks the next stage in the evolution of VVER designs and complies with all post-Fukushima safety requirements.

Due to an unscheduled shutdown following the failure of a generator (and its subsequent replacement), the start of commercial operation of the power unit was postponed from the end of 2016 to the first quarter of 2017²⁹.

Power unit No. 2

- The welding of the main circulation pipe was

completed in record time (72 days, compared to 96 days at Rostov NPP);

- The concreting of the containment building dome was completed.

Kursk NPP-2

- The Russian Federal Service for Environmental, Technological and Nuclear Supervision (Rostekhnadzor) issued a licence for the construction of power units No. 1 and 2 and a permit for the NPP construction;
- Excavation of a pit for power units No. 1 and 2, the laying of utility lines and construction of an electrical substation were underway.

4.4.2. DEVELOPMENT OF NEW PRODUCTS AND NEW BUSINESSES

By 2030, the share of new businesses in the Division’s revenue should reach 30%. The Division continues to give priority to growth opportunities in market segments relevant to the core business:

- Construction of research reactors (project to build a research centre in Bolivia, [see also the section ‘International Business’](#));
- RAW, SNF and hazardous industrial waste management facilities (in 2016, a contract was concluded for the delivery of equipment to a hazardous industrial waste treatment plant in the UAE, [see also the section ‘International Business’](#));

- Project management (PMC) services (a contract for the creation of an information resource to monitor the implementation of the Moscow-Kazan High-Speed Railway project was signed with a strategic customer, JSC High-Speed Rail Lines, a subsidiary of OJSC Russian Railways);
- NPP servicing (in Russia, work is underway to extend the life of Balakovo, Kursk, Novovoronezh and Smolensk NPPs; abroad, the Division services Bushehr NPP in Iran under warranty).

²⁹ The power unit was put into commercial operation on February 27, 2017.

4.4.3. PERFORMANCE IMPROVEMENT (REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME)

In order to ensure the efficiency of construction of NPPs and other large permanent structures, the Division uses an information platform for project management based on Multi-D technology. Multi-D is an automated system for generating and issuing statements of work, managing and providing information on the progress of construction in terms of logistics, human resources, the timing of project execution, planning, monitoring and visualization of work on the construction site.

Since the introduction of Multi-D:

- The lead time at power units No. 3 and 4 of Rostov NPP has been reduced by 100 days;
- The amount of time required for obtaining customer approval of documents as part of the project to build the Belarusian nuclear power plant has been reduced threefold.

In 2016, Multi D technology gained international recognition: it won the World Nuclear Exhibition (WNE) competition in the Operational Excellence category.

4.4.4. PLANS FOR 2017

The priority of the Engineering Division is to ensure that its NPP construction projects in Russia and abroad are implemented on time and on budget and fully comply with safety requirements.

As part of the development of new businesses, in 2017, the Division plans to actively promote PMC services related to managing the life cycle of permanent structures by scaling up project management tools based on Multi-D technology beyond the NPP construction segment.



KEY PERFORMANCE INDICATORS FOR 2017

Indicator	Target value
Labour productivity, RUB million per person	3.7
Number of events rated at level 2 or higher on the INES scale	0

4.5. POWER ENGINEERING DIVISION³⁰

THE POWER ENGINEERING DIVISION GENERATES ELECTRICITY AND HEAT AT NUCLEAR POWER PLANTS AND ACTS AS THE OPERATOR OF ALL RUSSIAN NUCLEAR POWER PLANTS.

KEY RESULTS IN 2016:

- **POWER GENERATION BY RUSSIAN NUCLEAR POWER PLANTS REACHED A NEW ALL-TIME HIGH AND TOTALLED 196.4 BILLION KWH (THIS IS COMPARABLE TO ELECTRICITY CONSUMPTION IN MOSCOW AND THE MOSCOW REGION OVER TWO YEARS);**
- **INSTALLED CAPACITY OF 10 RUSSIAN NUCLEAR POWER PLANTS (35 POWER UNITS) TOTALLED 27.1 GW*;**
- **THE NPP CAPACITY FACTOR STOOD AT 83.1%.**

* Excluding power unit No. 1 of Novovoronezh NPP-2, which was at the stage of pilot operation as of December 31, 2016.

The Power Engineering Division generates electricity and heat at nuclear power plants and acts as the operator of all Russian nuclear power plants. JSC Rosenergoatom Concern, the

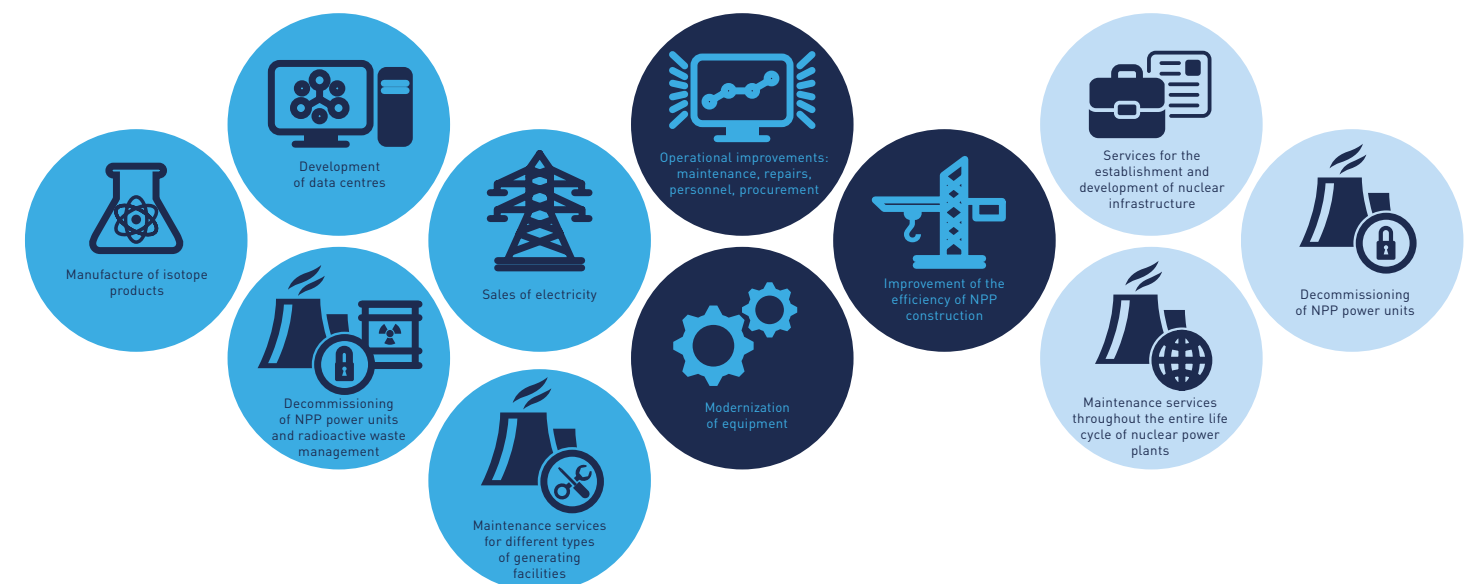
Division's holding company, is the largest company in Russia in terms of the volume of generation and ranks second in the world in terms of installed capacity.

LINK BETWEEN THE DIVISION'S GOALS AND THE STRATEGIC GOALS OF ROSATOM

NEW PRODUCTS FOR THE RUSSIAN AND INTERNATIONAL MARKETS

REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME

INCREASING THE SHARE ON INTERNATIONAL MARKETS



³⁰ For more information about the Division's results, see the report of JSC Rosenergoatom Concern for 2016.

4.5.1. RESULTS IN 2016

Electricity output at 35 power units of 10 operating NPPs totalled 196.4 billion kWh, reaching a new all-time high in the history of Russian nuclear power generation (in 2015, electricity output totalled 195.2 billion kWh).

The NPP capacity factor stood at 83.1%. Nuclear power generation accounted for 18.3% of the total electricity output in Russia.



ACHIEVEMENT OF KEY PERFORMANCE INDICATOR TARGETS

Indicator	2015	2016 target value	2016 actual value
Adjusted free cash flow of the Division, RUB billion	107.7	100.6	113.7
Nuclear power generation, billion kWh	195.2	196.7	196.4
Unit semi-fixed costs, RUB '000/MW	1,955	1,743	1,670
Index of implementation of the Division's investment programme, %	99.75	100	98.6
Labour productivity, RUB million per person	6.35	6.88	7.04
Revenue of the Division from new products within and outside ROSATOM's scope on a competitive basis, RUB billion	57.9	51.9 ³¹	56.1
LTIFR	0.02	0.15	0.065
Number of events rated at level 2 or higher on the INES scale	0	0	0

³¹ The target value was adjusted for a change in the scope of consolidation (JSC Atomenergopromsbyt and the business area focusing on automated process control systems have been transferred to another division of ROSATOM).

Commissioning of new power units in Russia

In October 2016, the innovative power unit No. 4 of Beloyarsk NPP with a BN-800 reactor started full-scale operation. This power unit has become a research test facility for the development of 'fast' reactor technologies and new types of fuel. The BN-800 project has received wide acclaim at an international level: the US energy magazine *POWER* named power unit No. 4 of Beloyarsk NPP the top power plant of the year.

Floating nuclear power plant

The Division continued to build a floating thermal nuclear power plant with an installed capacity of 70 MW to be subsequently placed in the town of Pevek, Chukotka Autonomous District. By December 31, 2016, the floating power unit had been prepared for the loading of nuclear fuel. The floating power unit is scheduled to be delivered, secured at the place of normal operation in the town of Pevek and connected to external power grids in 2019.

4.5.2. DEVELOPMENT OF NEW PRODUCTS AND NEW BUSINESSES

During the reporting year, the Division actively developed new business areas:

- NPP servicing abroad (for details, see the section 'International Business');

In 2016, the Division continued to cooperate with the Moscow Regional Centre of the World Association of Nuclear Operators (WANO MC):

- 15 representatives of ROSATOM participated in WANO peer reviews (PRs), with 3 representatives of ROSATOM participating in PRs of WANO's regional centres (Tokyo and Atlanta Centres of WANO);
- 18 Technical Support Missions were carried out in the Corporation's organizations;
- 279 representatives of ROSATOM participated in activities forming part of the Professional and Technical Development Programme.

- Isotope products for nuclear medicine and industry (for details, see the section 'Business Diversification');
- Repair and maintenance of major industrial facilities (in 2016, contracts were concluded with JSC Kola Mining and Metallurgical Company (Kola MMC), JSC Kovdor Mining and Processing Plant (Kovdor GOK) and FSUE Atomflot);
- Sales of electricity in the capacity of the 'supplier of last resort' in the Kursk, Tver, Smolensk and Murmansk Regions;
- The project to build a Data Centre at Kalinin NPP (a long-term contract with PJSC Rostelecom for most of the Centre's racks has been concluded).

4.5.3.

PERFORMANCE IMPROVEMENT (REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME)

In the reporting year, the duration of the repair of NPP power units was reduced by 107 days, which enabled additional generation of 1 billion kWh of electricity.

Work was done to restore the long-term performance of graphite stacks of RBMK-1000 reactors using improved technology at the power units of Leningrad and Kursk NPPs, which will significantly extend their life.

The Russian Federal Service for Environmental, Technological and Nuclear Supervision (Rostekhnadzor) granted permission for an increase in the heat generation capacity of reactors to 104% of the rated capacity in pilot operation mode for power unit No. 3 of Rostov NPP and in commercial operation mode for power unit No. 3 of Balakovo NPP. Thus, by December 31, 2016, all 11 of the VVER-1000 power units participating in the installed capacity expansion programme had been authorized to operate at 104% of the rated capacity.

4.5.4.

PLANS FOR 2017

Commissioning of new power units in Russia:

- Start of commercial operation of power unit No. 1 of Novovoronezh NPP-2;
- First criticality programme at power unit No. 1 of Leningrad NPP-2 and at power unit No. 4 of Rostov NPP.

As part of performance improvement efforts, in 2017, the Division will launch an optimization programme for facilities that have not been used for over two years and construction in progress/equipment inventories (construction in progress needs to be reduced by RUB 19.5 billion).



KEY PERFORMANCE INDICATORS FOR 2017

Indicator	Target value
Adjusted free cash flow of the Division, RUB billion	163.5
Nuclear power generation, billion kWh	201.1
Unit semi-fixed costs, RUB '000/MW	1,776 ³²
Index of implementation of the Division's investment programme, %	100
Labour productivity, RUB million per person	8.5
LTIFR	0.15
Number of events rated at level 2 or higher on the INES scale	0

³² The target value for 2017 is greater than the target for 2016 due to the additional cost of implementing and maintaining corporate information systems across all branches of the Division and an increase in the scope of repairs of power units.

4.6. NUCLEAR WEAPONS DIVISION

ROSATOM TOGETHER WITH THE RUSSIAN MINISTRY OF DEFENCE MAINTAINS AND DEVELOPS THE STOCK OF AMMUNITION OF THE ARMED FORCES TO ENSURE THAT ITS QUALITY AND QUANTITY GUARANTEE THE IMPLEMENTATION OF RUSSIA'S NUCLEAR DETERRENCE POLICY. THE NUCLEAR WEAPONS DIVISION IS ALSO PLAYING AN INCREASINGLY ACTIVE ROLE IN THE DEVELOPMENT OF ROSATOM'S NEW BUSINESSES.

KEY RESULTS IN 2016:

- **THE STATE DEFENCE ORDER WAS 100% FULFILLED;**
- **CONSOLIDATED REVENUE FROM CIVILIAN PRODUCTS TOTALLED RUB 76.2 BILLION, UP BY 12% COMPARED TO 2015.**

4.6.1. FULFILMENT OF THE STATE DEFENCE ORDER AND COOPERATION WITH THE MINISTRY OF DEFENCE OF THE RUSSIAN FEDERATION

In order to ensure the uninterrupted operation and security of facilities and their robustness against terrorist attacks, deliveries and maintenance of security equipment were carried out in the nuclear forces. Security systems were installed and maintained at more than 50 facilities of the Russian Ministry of Defence.

In 2016, ROSATOM conducted research and development in accordance with the state defence order (SDO) and the approved State Armament Programme for the period from 2011 through 2020. The plans for the development, production and disposal of ammunition and special maintenance equipment set out in the SDO were fully implemented.

4.6.2. DEVELOPMENT OF NEW PRODUCTS

The Nuclear Weapons Division is playing an increasingly active role in the development of ROSATOM's new businesses. In 2016, the revenue of the Nuclear Weapons Division from new products (as part of the fulfilment of the SDO and civilian businesses) grew by 118%. ROSATOM is actively developing projects in such areas as supercomputers, laser technologies, the machine tool industry, electrical engineering and numerical control systems, and taking these projects to the market.

Machine tool industry

In order to ensure the steady supply of metalworking equipment to Russian customers, enterprises in the Nuclear Weapons Division started to manufacture modern numerically controlled machines. In 2020, the consolidated revenue of the participating enterprises is expected to total RUB 8.4 billion, and by 2030, the degree of localization will reach 70%.

In 2016, the following investment projects were launched:

- The assembly and localization of manufacture of high-precision machines at FSUE M.V. Protsenko Federal Research and Development Centre Start Production Association (precision class A; with LLC Srednevolgsky Stankozavod (SVSZ) as an industrial partner);
- The manufacture of industrial laser systems at FSUE Elektrokhimpribor Plant (with IRE-Polyus as an industrial partner);
- The manufacture of electric drives for numerical control systems at FSUE Production Association Sever (in cooperation with FSUE Federal Research and Production Centre Y.E. Sedakov Research Institute of Measuring Systems);
- The manufacture of numerical control systems at FSUE Federal Research and Production Centre Y.E. Sedakov Research Institute of Measuring Systems, in cooperation with LLC ModMashSoft.

Electrical engineering

The objective of the project is to produce the key components, assemble and supply packaged transformer substations for large Russian companies (including as part of import substitution programmes). In 2016, 7 contracts for the supply of transformer substations worth a total of RUB 840 million were performed. The implementation of the project will enable FSUE Elektrokhimpribor Plant and its subsidiary, LLC Tekhenergo-Elektrokhimpribor, to develop competences in the organization of production and gain the reference experience of supplying high-tech electrical equipment.



FSUE Instrumentation Factory decommissioned unused special sites with an area of 2,500 m²; following modernization, the manufacture of automated process control systems (APCSs) for NPPs and radiation control systems has been launched at the sites.

Automated process control systems (APCSs)

The audit of NPP construction projects in Finland and Hungary was completed in 2016. Contracts for the supply and commissioning of the automated process control system (APCS) for the project in India were signed, and the APCS at Novovoronezh NPP started full-scale operation. Promotion of APCSs on the

Russian and international markets is coordinated by JSC Rusatom Automated Control Systems (JSC RASU), an organization of ROSATOM.



In 2016, a mechanism for carrying out the valuation of intellectual property of the Nuclear Weapons Division and recording it on the balance sheet was introduced. As a result, the value of the Nuclear Weapons Division's intangible assets increased by RUB 83 million to RUB 2 billion.

4.6.3.

IMPROVING

THE PERFORMANCE OF ENTERPRISES IN THE NUCLEAR WEAPONS DIVISION

In 2016, performance improvement measures were focused on reducing the lead time and the duration of production cycles.

A project was launched to reduce the lead time and production costs by optimizing cooperation between FSUE Mayak Production Association and FSUE Elektrokhimpribor Plant. As a result, the lead time was reduced by 55%, while production cost was reduced by 10%.

FSUE Elektrokhimpribor Plant reduced the lead time for the manufacture of components and assembly units for customer divisions by 30%, while work in process was reduced by 19%. ROSATOM plans to roll out the results of the project to other products in 2017.

4.6.4.

PLANS FOR 2017

- To ensure 100% achievement of objectives set out in the state defence order;
- To achieve the targets and indicators of federal target programmes;
- To commission facilities under construction at the Nuclear Weapons Division's enterprises.

4.7. NUCLEAR- POWERED ICEBREAKER FLEET

RUSSIA OWNS THE WORLD'S ONLY NUCLEAR-POWERED ICEBREAKER FLEET AND HAS A LONG TRACK RECORD IN CONSTRUCTION AND OPERATION OF NUCLEAR ICEBREAKERS.

KEY RESULTS IN 2016:

- **NUCLEAR ICEBREAKERS ESCORTED 400 VESSELS WITH A TOTAL GROSS TONNAGE OF 5.3 MILLION TONNES ALONG THE NORTHERN SEA ROUTE (THIS IS 2.5 TIMES MORE THAN IN 2015);**
- **THE WORLD'S MOST POWERFUL NUCLEAR ICEBREAKER, ARKTIKA, WAS LAUNCHED IN SAINT PETERSBURG;**
- **TWO PORT VESSELS WERE BUILT AND COMMISSIONED AHEAD OF SCHEDULE FOR THE YAMAL LNG PROJECT.**

Icebreakers equipped with nuclear power units help vessels navigate along the Northern Sea Route, making it possible to reduce the distance from Europe to Asia by more than a third.

The nuclear-powered icebreaker fleet includes:

- Two nuclear icebreakers with 75,000 h.p. two-reactor nuclear power units: Yamal and 50 Let Pobedy;
- Two icebreakers with a one-reactor unit with a capacity of about 50,000 h.p.: Taimyr and Vaygach;
- Sevmorput, a nuclear-powered LASH carrier with a 40,000 h.p. reactor unit;
- Floating maintenance bases: Imandra and Lotta;

NORTHERN SEA ROUTE



..... Northern Sea Route – 14,000 km

———— Southern Sea Route – 23,000 km

- 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.



In connection with the implementation of measures aimed at meeting the objectives of the state policy in the Arctic region of Russia, FSUE Atomflot, the federal state unitary enterprise of the nuclear-powered fleet, has been given the status of a federal nuclear organization for 25 years.

4.7.1. KEY RESULTS IN 2016

Navigation of vessels

In 2016, nuclear icebreakers escorted 400 vessels with a total gross tonnage of 5.3 million tonnes along the Northern Sea Route (195 vessels with a total gross tonnage of 2 million tonnes in 2015). Navigation of vessels by icebreakers provides a significant contribution to Russia's economic development. Cargo traffic along the Northern Sea Route is generated by the transportation of liquefied natural gas and oil. In the future, the icebreakers will begin to escort the ships carrying coal from the Taymyr Peninsula to Europe. In the coming years, cargo traffic is projected to increase sevenfold to 35 million tonnes per year.

Construction of new icebreakers

To handle the growing traffic along the Northern Sea Route, ROSATOM is upgrading its icebreaker fleet on a large scale. In 2016, the world's most powerful³³ Project 22220 nuclear icebreaker, Arktika, was launched in Saint Petersburg. Project 22220 vessels will be able to pilot convoys in the Arctic, breaking through ice that is up to three metres thick. New nuclear icebreakers will conduct vessels carrying hydrocarbons to the markets of the Asia-Pacific Region. A dual-draught design means that the vessels can be used both in Arctic waters and in the estuaries of Arctic rivers.

Overall, ROSATOM has placed orders for the construction of three Project 22220 nuclear icebreakers. In addition to Arktika, two follow-on ships are being constructed. Simultaneously, a new Russian nuclear super-icebreaker, Lider, is being designed; it will enable year-round operation in the High Arctic.

³³ The icebreaker has a two-reactor power unit; each reactor has a heat generation capacity of 175 MW.

4.7.2. NEW PRODUCTS AND SERVICES

In 2016, contracts were concluded for the construction of diesel vessels as part of an investment project to form a port fleet for the needs of OJSC Yamal LNG. It is planned to build two port tugboats, two icebreaking tugboats and one port icebreaker to provide services in the port of Sabetta. Construction of the first two tugboats was completed and they were accepted ahead of schedule in April and May 2016; the construction of the remaining three ships is scheduled to be completed before the end of 2018. The contract for the port fleet services with OJSC Yamal LNG is valid until 2040.

4.7.3. PERFORMANCE IMPROVEMENT

In 2016, the implementation of performance improvement measures at FSUE Atomflot resulted in cost savings of RUB 56.5 million. More specifically:

- Based on the analysis of power consumption by all facilities of the enterprise, the hourly power distribution profile by time of day was determined. Following the calculation of the cost of electricity (power) transmission and consideration of tariffs set by the Tariff Regulation Committee of the Murmansk Region, the enterprise switched over to a two-part tariff on electricity (power) transmission in the grids of the Murmansk Region and implemented energy conservation measures. As a result, the average estimated cost of electricity per kWh was reduced by 6%;
- An automated system for recording information on contracts was developed and implemented, resulting in a 70% reduction in the amount of time spent on documentation processing.

4.7.4. PLANS FOR 2017 AND FOR THE MEDIUM TERM

- To put into operation three new-generation icebreakers;
- To build three diesel port vessels for the Yamal LNG project;
- To reduce the ratio of unit costs to the revenue of FSUE Atomflot;
- To build up a portfolio of orders for new products and services.

ROSATOM HAS A UNIQUE RESEARCH
POTENTIAL, WHICH ENABLES THE DIGITAL
TRANSFORMATION OF THE INDUSTRY
AND THE LAUNCH OF NEW HIGH-
TECHNOLOGY PRODUCTS

5.1. RESEARCH AND INNOVATIONS



VYACHESLAV PERSHUKOV
DEPUTY CEO FOR INNOVATION MANAGEMENT



KEY RESULTS IN 2016:

- **ROSATOM LAUNCHED A NEW INNOVATIVE DEVELOPMENT PROGRAMME;**
- **PRODUCTION OF MICROSOURCES FOR BRACHYTHERAPY WAS ORGANIZED WITH A CAPACITY OF 50,000 SOURCES PER YEAR;**
- **THE A.I. LEYPUNSKY INSTITUTE FOR PHYSICS AND POWER ENGINEERING COMPLETED THE RETROFIT OF A UNIQUE COMPLEX OF LARGE PHYSICAL TEST FACILITIES THAT WILL BE USED TO PERFORM A SERIES OF EXPERIMENTS FOR PROJECTS IN THE FIELD OF NUCLEAR POWER OF THE FUTURE.**

— *In the reporting year, ROSATOM launched a new innovative development programme. What was the reason for this? What new objectives were set?*

— ROSATOM's first innovative programme was closely linked with the objectives related to the development of the Corporation's Divisions, on the one hand, and with the goal of building an innovative economy in Russia, on the other hand. We accomplished the principal objectives of the first Programme, and some targets were even exceeded. The new version of ROSATOM's Innovative Development and Technological Modernization Programme until 2030, which was approved by the Supervisory Board in 2016, is project-based. It comprises 75 projects. Funding for the Programme will total RUB 150 billion; it will be provided over a 3-year period. Different segments of the Innovative Programme will be funded from different sources.

The structure of the new Programme is identical to that of the previous one; it consists of four parts: existing and new technologies for the power industry, non-energy and infrastructure projects. In addition, we have included new businesses in the Programme as part of the diversification of ROSATOM's business; these include, for instance, non-conventional energy sources.

— *What are the key innovative projects in the Russian nuclear industry? How do they contribute to the achievement of ROSATOM's strategic goals?*

— The world has long ago reached the conclusion that in order to develop nuclear power, two principal objectives must be achieved. The first is to reduce the cost of safety systems, which drive the cost of construction of new NPPs up as the NPP safety level rises.

The second is to close the nuclear fuel cycle, as this is an efficient tool for developing new nuclear fuel and utilizing high energy radionuclides. In 2016, we completed preliminary work on the design of the BREST-OD-300 liquid-lead-cooled reactor forming part of a pilot and demonstration energy facility which we plan to build as part of the Proryv project. A new and exciting area is currently beginning to emerge: a two-component nuclear power system, which will include both water-cooled water-moderated power reactors and fast neutron reactors. This will help to address resource and environmental issues in the nuclear power industry. In the coming decade, this is likely to be a mainstream area. The construction of a multipurpose fast neutron research reactor at JSC SSC RIAR is an international research project of enormous importance. All this has been incorporated into the Innovative Development Programme. Other projects of the Programme that are intended to contribute to the achievement of ROSATOM's strategic goals include the construction of low-power reactors, the development of additive manufacturing and digital technologies, nuclear medicine and laser technologies.

— *How does ROSATOM assess its performance in the sphere of intellectual property management? How successful was 2016 from this perspective?*

5.1.1. NEW INNOVATIVE DEVELOPMENT PROGRAMME

In 2016, ROSATOM launched a new Innovative Development and Technological Modernization Programme (hereinafter referred to as the Programme), which was approved by the Corporation's Supervisory Board on June 28, 2016. The Programme is aimed at achieving the following three strategic goals of ROSATOM (for details, see the section 'Business Strategy until 2030 and Its Implementation in the Reporting Year'):

— Let us look at the trends.

Between 2014 and 2016, ROSATOM boosted revenue from licence agreements by a factor of 13, while the number of international patents jumped by a factor of 19. This massive surge is due to the fact that ROSATOM has established the industry-wide Intellectual Property Management Centre (it is an IP operator functioning within JSC Science and Innovation), which is operating efficiently.

For us, the sale of licences as such is not a priority; we develop our own technologies into a competitive finished product. Accordingly, we attach importance to such indicators as the share of innovative products in revenue and the size of the order portfolio, including overseas orders. In 2016, the share of innovative products and services in total sales of products and services in the industry stood at 13.56% against a target of 11.2%. ●

- To increase our share on international markets;
- To develop new products for the Russian and international markets;
- To reduce the cost of our products and the lead time.

In 2016, over 80 technological projects were implemented as part of the Programme; their aim was to upgrade existing technologies and develop new technologies for both energy and non-energy markets.

ROSATOM's innovative activities in the reporting year won praise from the Russian Government. The high quality of the Innovative Development Programme was highlighted in the annual National Report on Innovations in Russia for 2016.

An international news agency Thomson Reuters included ROSATOM in the top ten global innovation leaders in the field of nuclear power.

KEY RESULTS OF THE INNOVATIVE DEVELOPMENT PROGRAMME IN 2016

Indicator	Target	Actual
Share of innovative products and services in total sales of products and services in the industry	11.2%	13.6%
Number of items of intellectual property: foreign patents obtained by ROSATOM, applications for foreign patents submitted and registered under the established procedure, registered trade secrets (know-how) reflecting the commercialization and expansion of the sphere of application of research results in the nuclear industry (cumulative total)	400	479
Share of research projects implemented by universities, small and medium-sized enterprises and other organizations outside the industry	10.6%	12.7%
Increase in the share of innovative and high-technology products purchased by ROSATOM's organizations from small and medium-sized enterprises (in the reporting year)	5%	5%
Funding for employee retraining and professional development programmes run by universities	89.4 RUB million	93.7 RUB million

Over 200 organizations, including 35 universities, 14 academic institutes and 50 third-party research organizations, were engaged in the implementation of the Programme, including R&D and implementation of project deliverables.

Improvement of the innovation management system

In 2016, 113 leading experts from universities and third-party research institutions joined the Scientific and Technical Board, which is the main expert body in ROSATOM. This enabled an objective assessment of the Corporation's R&D and innovative activities for decision-making purposes.

The system for documenting responsibility for the achievement of functional KPI targets was mastered, and innovation targets were documented for executives at all levels of the functional hierarchy in the industry.



In 2016, the retrofit of a unique complex of large physical test facilities (BFS) was completed at JSC SSC RF-IPPE. All upgrades were carried out based on Russian designs and using Russian-manufactured components. ROSATOM plans to use the BFS facilities to perform a series of experiments for projects in the field of nuclear power of the future, including modelling of fast neutron reactors.

As part of the knowledge and intellectual property management system, ROSATOM implemented mechanisms for identifying protectable R&D results and providing a rationale for the form of their legal protection and the need for obtaining international patents.

In order to expand cooperation with small and medium-sized enterprises, ROSATOM ran a 'one-stop shop' application processing system.

30 universities were engaged to train specialists in areas relevant to ROSATOM and cooperate in scientific research. Over 4,000 employees of the Corporation's organizations completed retraining and professional development programmes.

In the reporting year, the SKOLKOVO Moscow School of Management launched an educational programme titled 'Management of Technological Innovations 2.0'. The programme is aimed at reshaping science and searching for solutions to form an efficient R&D management system in the industry.

The case study written as part of the Management of Technological Innovations programme gained international recognition and won the EFMD Award (this is the first time in the history of the competition that a Russian company reached the final and won a silver medal).

5.1.2. PRORYV (BREAKTHROUGH) PROJECT AIMED AT CLOSING THE NUCLEAR FUEL CYCLE

The Proryv (Breakthrough) Project is aimed primarily at a qualitative transformation of the nuclear industry. It comprises a number of initiatives which demonstrate the possibility of closing the nuclear fuel cycle (NFC) using fast neutron reactors and are aimed at developing the relevant technologies. A closed nuclear fuel cycle will significantly improve the efficiency of the usage of natural uranium and will help

solve the problem of nuclear waste accumulation and secure a reliable long-term source of clean energy.

In 2016, an engineering design of the sodium-cooled BN-1200 reactor, which is intended for large-scale commercial use, was developed.

Reactor tests of mixed nitride uranium-plutonium (MNUP) fuel in a BOR-60 research reactor and a BN-600 power reactor were continued successfully.

In 2017, ROSATOM plans to complete the development of conceptual designs of industrial energy facilities using BREST-1200 and BN-1200 reactors and to continue to conduct R&D to validate technologies under development.

In the sphere of capital construction, in 2016, ROSATOM continued to build the MNUP fuel fabrication and refabrication module (FRM) at JSC SCC and manufacture equipment for the FRM. In 2017, ROSATOM plans to make adjustments to engineering designs for the FRM and BREST-OD-300 reactors.

5.1.3. NUCLEAR MEDICINE

2016 was a breakthrough year for the development of ROSATOM's projects in the sphere of nuclear medicine. The decision was made to establish Rusatom Healthcare, which will promote nuclear medicine technology and radiation technology for irradiation and sterilization centres in Russia and abroad.

In the reporting year, the Federal Service for Surveillance in Healthcare issued JSC SSC RF-IPPE with a registration certificate for the manufacture of fully domestically produced microspheres using the iodine-125 (I-125) isotope for brachytherapy treatment of cancer. Production facilities with a capacity of 50,000 microspheres per year were established in Obninsk. At the same time, specialists at JSC SSC RF-IPPE were developing approaches to adjusting the range of microspheres to be produced for brachytherapy of other organs in the future.



Brachytherapy is a form of radiotherapy for prostate cancer. During the treatment, the maximum radiation dose is delivered directly to the tumour without damaging adjacent tissues or organs. Brachytherapy is usually performed on an outpatient basis or during a short hospital stay lasting a few days. Most patients who have undergone brachytherapy do not suffer a relapse for 10 years on average.

ROSATOM signed a long-term contract for the supply of the cobalt-60 isotope to a Canadian company Nordion. Highly radioactive cobalt is in demand on the global market and is used for cancer treatment and stereotactic surgery. To carry out the contract, ROSATOM has developed and is implementing a project to produce cobalt-60 in RBMK reactors at Smolensk and Kursk NPPs, in addition to existing production at Leningrad NPP.

Sales of molybdenum-99 (Mo-99), the most popular radioisotope for the diagnosis and treatment of cancer, increased by 68% year on year. As a result, ROSATOM's share on the international Mo-99 market reached almost 5%.

5.1.4. NEW MATERIALS



Carbon fibre is a high-technology material that is widely used in the nuclear industry, aerospace engineering, shipbuilding, wind power, construction, health care and the manufacture of consumer goods (ranging from furniture to golf clubs). PAN precursor is used as feedstock for carbon fibre production. This is the most valuable and carefully protected technology in the production chain.

Carbon fibre

One of ROSATOM's organizations, JSC RPC Khimpromengineering (forming part of UMATEX Group), is Russia's largest producer of carbon fibre and composite materials based on it. The company has been established in order to develop the Russian market of composite materials, enable full-scale import substitution and develop high-technology products that are competitive on the global market. In Russia, the company runs an R&D centre

and three factories producing carbon fibre and composite products in the Republic of Tatarstan and the Saratov and Chelyabinsk Regions. The largest factory is situated in the Alabuga special economic zone (Tatarstan); its production capacity exceeds 1,400 tonnes of carbon fibre per year. The R&D centre comprises capabilities in the sphere of research, development and improvement of technologies for the production of polyacrylonitrile (PAN) precursor and carbon fibre based on it.

In 2016, exports of Russian-manufactured carbon fibre exceeded 300 tonnes. Distribution channels were established in 11 countries, including trading houses in the Czech Republic and China. The company started commercial production of a number of new products that can compete against industry leaders in terms of quality and price. In addition, a project was approved to build a PAN production plant with a capacity of 5,000 tonnes per year.

Polymers

In the CATF of Zarechny (Penza Region) ROSATOM launched the production of new-generation composite materials: polymers modified with the C60 and C70 fullerenes (carbon-based nanoparticles). The Corporation started to manufacture products for the mining and automotive industries (as part of localization of production of components in Russia) and consumer goods. ROSATOM plans to suggest using fullerene-enhanced structural materials with unique properties in construction as their application will help to make mechanisms more resistant to wear and tear.

In addition to producing a blend of the C60 and C70 fullerenes, the Corporation intends to manufacture a wide range of polymers with special properties (polyurethane foam, polyurethane elastomers and polyurethane foam systems with a specified density).

5.1.5. PARTICIPATION IN INTERNATIONAL INNOVATIVE PROJECTS

International Thermonuclear Experimental Reactor (ITER)

ITER is a project to build the world's first experimental fusion reactor; it is being implemented in France by the international community. The aim of the project is to demonstrate the possibility of using thermonuclear fusion to produce energy on an industrial scale for peaceful purposes. If it

succeeds, the ITER project will provide humanity with an almost inexhaustible source of energy.

In 2016, the ITER Council endorsed a revised work schedule whereby the first plasma is to be produced in ITER in late 2025.

ROSATOM's enterprises develop, manufacture and supply unique high-technology equipment for the main systems of the ITER reactor.

The ITER project is a necessary step in drawing up the National Programme for the Development of Thermonuclear Fusion and Plasma Technologies; the concept of the Programme has been designed by order of the President of the Russian Federation. The next steps will include determining the form of the National Programme for the Development of Controlled Thermonuclear Fusion and Plasma Technologies, its deliverables and time frame, as well as the scope and sources of funding.

Generation IV International Forum (GIF)

GIF facilitates international cooperation in the development of fourth-generation reactor systems with improved safety, resource consumption and proliferation resistance that may be licensed, built and put into operation after 2030.

In 2016, ROSATOM signed agreements with GIF on the extension of the Sodium-Cooled Fast Reactor (SFR) and Supercritical-Water-Cooled Reactor System Arrangements for the next 10 years. Russian specialists and experts participated in GIF meetings on all areas of its activities, including the development of safety design criteria for generation 4 SFRs by a dedicated GIF working group.

IAEA International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO)

As part of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), IAEA Member States make joint efforts to help ensure that nuclear energy is available to contribute to meeting the energy needs of the 21st century in a sustainable manner.

In 2016, specialists from ROSATOM participated in work on all topics of the Project. The IAEA presented their contribution to INPRO in the document titled 'Modelling Nuclear Energy Systems with MESSAGE: A User's Guide' forming part of the Nuclear Energy Series.

In 2017, the Corporation plans to expand the scope of its work in the sphere of the nuclear fuel cycle (including the launch of the Fast Forward project) and small modular reactors (the TNPP2 project, in which Russian specialists actively participate).

Facility for Antiproton and Ion Research in Europe (FAIR)

In 2016, Russia's contribution to the construction of FAIR reached EUR 92.94 million. The value of contracts concluded with Russian suppliers of equipment for FAIR reached EUR 55.1 million (calculated based on prices as of January 2005).



In 2016, ROSATOM continued to build the Multipurpose Fast Neutron Research Reactor in Dimitrovgrad. The Corporation obtained a certificate for the implementation of joint research projects of the International Centre based on Research Reactors (ICERR) under the auspices of the IAEA.

5.1.6. INTELLECTUAL PROPERTY MANAGEMENT AND PROTECTION

Given the need to support ROSATOM's global expansion, in 2016, protection of the industry's key products and technologies abroad remained the main priority of the intellectual property management system. The active work of the Industry-Wide Competence Centre for Intellectual Property Management enabled a significant expansion in the scope of international patenting: the number of international patent applications submitted and international patents received by ROSATOM increased from 101 to 321.

PATENT ACTIVITY

Indicator	2014	2015	2016
Number of patents obtained for inventions, utility models and industrial designs, certificates for computer software and databases, number of registered items of know-how, pcs. per year	1,129	1,141	1,090
Number of applications for state registration of protectable intellectual property, pcs. per year	841	853	1,038
Number of foreign patents, pcs. per year	17	101	321

In 2016:

- Over 9,700 items of intellectual property owned by the Corporation and by organizations in the industry were recorded in the information system for intellectual property rights management;
- A system for monitoring the activity of ROSATOM's rivals on foreign markets was implemented;

- An industry-wide system for identification and legal protection of trade secrets (know-how) was introduced.

Plans for 2017:

- To develop a procedure for assessing the efficiency of integration and use of intellectual property in ROSATOM's operations;
- To submit at least 400 applications for foreign patents on potential markets;
- To use a methodology for forming portfolios of rights over technologies and making decisions on technology transfer in a manner that would help protect ROSATOM's interests on foreign markets;
- To integrate at least 60% of intellectual property created in ROSATOM into the Corporation's operations.



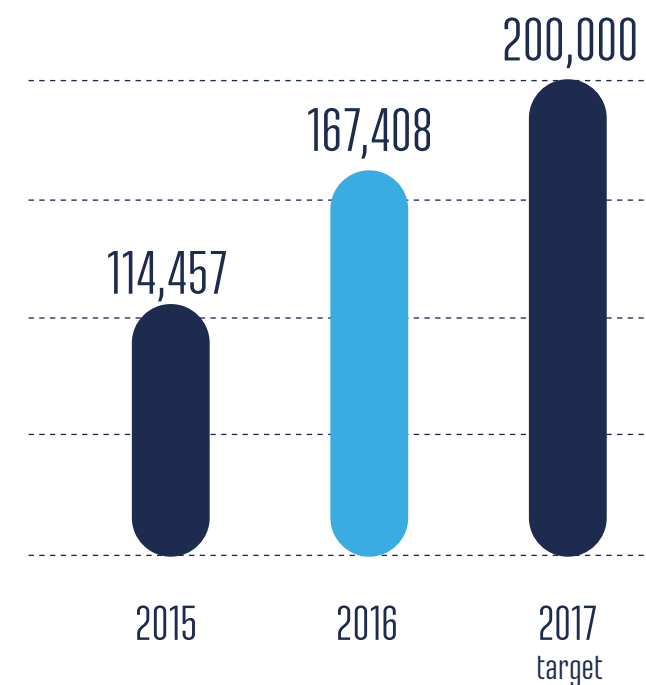
In 2016, JSC KIPC and JSC SSC RF-IPPE received the Scopus Awards for a high level of international research and publication activity.

5.1.7. KNOWLEDGE MANAGEMENT SYSTEM

In 2016:

- The first stage of the project to build integrated infrastructure for nuclear knowledge management throughout the life cycle of complex process facilities was completed. 25 techniques and tools in the sphere of engineering, content analysis, expert collaboration and education were described;
- An industry-wide catalogue of solutions for nuclear knowledge infrastructure management throughout the life cycle, RKM Solutions, was compiled;
- A knowledge management manual for universities was prepared;
- An IAEA support mission for the knowledge management system was carried out at Lenin-grad NPP.

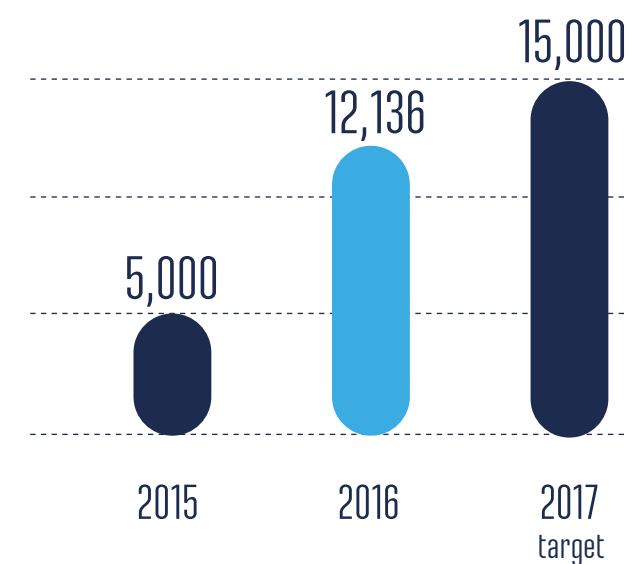
CONTENTS OF THE RESEARCH AND TECHNICAL INFORMATION PORTAL, NUMBER OF DOCUMENTS



Plans for 2017:

- To conduct a comprehensive industry-wide personnel evaluation in the sphere of knowledge and intellectual property management;
- To adopt international ISO standards in the sphere of knowledge management;
- To develop professional standards in the sphere of knowledge and intellectual property management;
- To use artificial intelligence and artificial neural network technologies in information systems for knowledge management.

INVOLVEMENT IN THE KNOWLEDGE MANAGEMENT SYSTEM, NUMBER OF EXPERTS USING THE SOCIAL NETWORKING SERVICE



5.2. BUSINESS DIVERSIFICATION



OLEG BARABANOV
DIRECTOR FOR DEVELOPMENT AND RESTRUCTURING



KEY RESULTS IN 2016:

- **REVENUE FROM NEW PRODUCTS WITHIN AND OUTSIDE THE SCOPE OF THE CORPORATION TOTALLED RUB 190.8 BILLION (AS AGAINST RUB 125 BILLION IN 2015), MAKING UP 17.2% OF THE TOTAL REVENUE;**
- **THE 10-YEAR PORTFOLIO OF ORDERS FOR NEW PRODUCTS WITHIN AND OUTSIDE THE SCOPE OF THE CORPORATION REACHED RUB 1,018.8 BILLION (AS AGAINST RUB 583.5 BILLION IN 2015).**

— *How does ROSATOM make a decision to launch a new business and how does it determine whether new businesses are promising, including in terms of strategy implementation?*

— In accordance with ROSATOM's Policy on the Development of New Businesses, new products are launched in those segments where the Corporation's organizations have the relevant competences and/or access to the market. Following a review of existing competences and an assessment of the feasibility of access to the market and market opportunities, a new product offer is developed. The offer should enable the Corporation's organizations to unlock their technological, operational and management potential, reduce exposure to high-risk segments and ensure qualitative growth of business in addition to the development of production capabilities of enterprises in the industry.

We need to have the relevant technology; existing production facilities or production facilities ready for modernization; employees that have undergone the necessary training; experience of operating on the market and an understanding of the product's evolution for the benefit of a potential consumer.

If the industry does not fully possess one of these elements, we need to have an understanding of how to develop it.

According to this approach, new businesses can be grouped into two main types. The first one involves taking our products to new markets, i.e. an expansion of the geographical footprint of the industry's products and an expansion of our presence in various market segments: B2G, B2B, B2C. This includes, for instance, radiation technologies

for health care and industry, automated process control systems, etc. The second type of new businesses is focused on boosting sales on traditional markets, which involves offering new products on those markets where we already have a foothold. These are, for instance, renewable energy, energy trading, energy storage systems, etc.

In any case, whenever a decision is made on the launch of a product or the tactic for its further development, we take into account the current strategic vision of technological development of the product, the competitive environment, consumer demand, trends in product customization, etc. We also attach considerable importance to utilizing the capacities, technologies and infrastructure in the industry to the full.

— *How is the performance of new businesses assessed?*

— **At this stage, key performance indicators include the contribution of these new businesses to the total revenue and the Corporation's order portfolio, as well as the rate of return and the payback period of projects.**

We monitor the performance of new businesses on two levels. The first is the strategic level, where high-level strategic goals and key areas of business development are identified. The second is the project level, where we determine specific approaches, actions and measures aimed at achieving local goals and objectives. Key tools for the operationalization of the Corporation's strategy for the development of new businesses include work with product strategies and portfolio-based management of projects of new

businesses, their product lines and individual products.

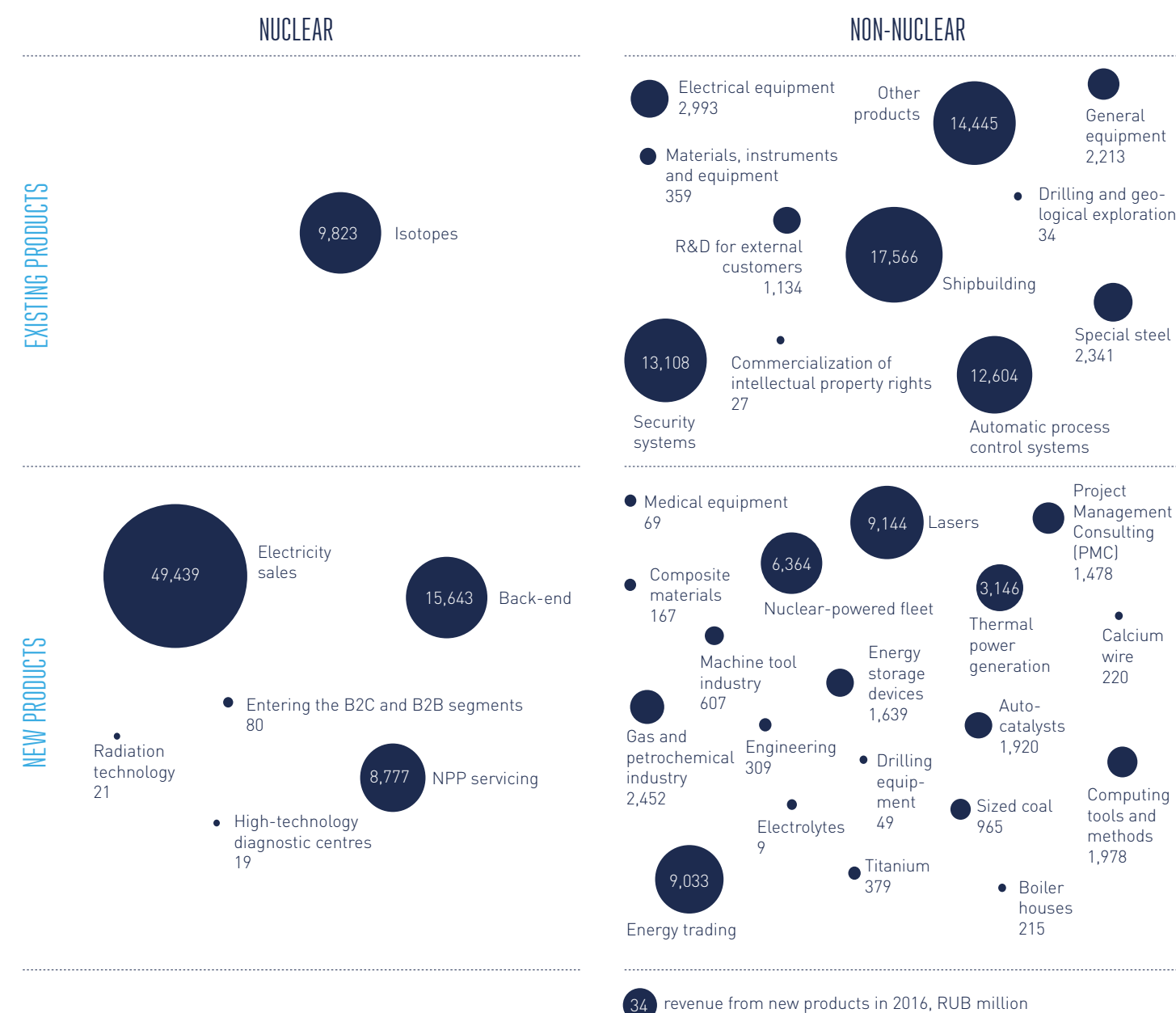
In other words, for each new business, ROSATOM develops and approves a long-term plan for the development of a product or a product line, which is called a 'product strategy'. A product strategy provides a link between strategic goals and projects to establish and develop new businesses; it also specifies the time frame and the persons responsible for its implementation.

It should be emphasized that we are continuing to improve project management mechanisms and performance indicators used for monitoring the achievement of goals and objectives in terms of developing new businesses and new products and promoting them on the market. ●

The development of new businesses and new products³⁴ makes it possible to use the expertise and technologies of the 'nuclear project' in civilian industries, ensure production capacity utilization, employ a greater number of highly qualified specialists and increase labour productivity and return on assets. ROSATOM works consistently towards expanding its areas of business using its intellectual and production capabilities, opportunities for import substitution and innovative development as a foundation for high-quality growth.

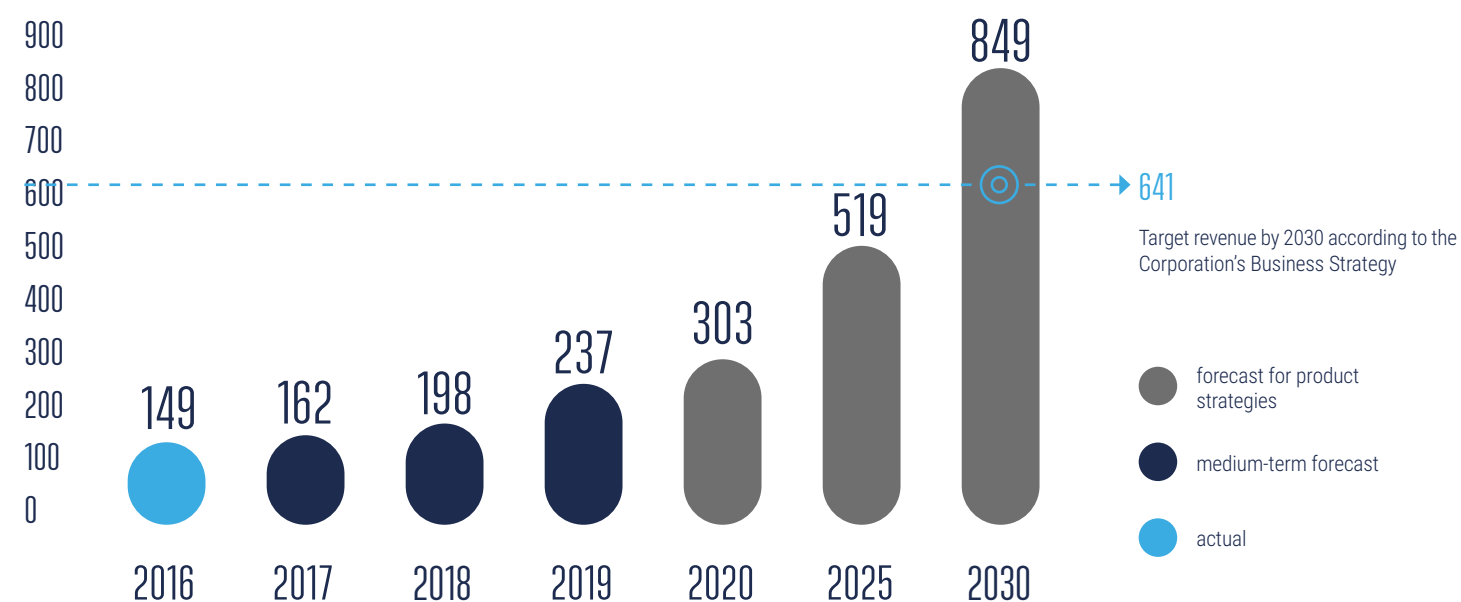
According to ROSATOM's strategic goal, by 2030, the revenue from new products should make up at least 30% of the total revenue. Accordingly, key performance indicators of new businesses include an increase in revenue from the sales of new products and maintaining the size of the 10-year order portfolio in order to achieve the strategic goal.

NEW PRODUCTS OF ROSATOM



³⁴ A new product (business) is a product outside the scope of the integrated offer covering the delivery of a nuclear power plant and research reactors and the fulfilment of the state defence order.

REVENUE FROM NEW PRODUCTS OUTSIDE THE SCOPE, RUB BILLION



5.2.1.

RESULTS IN 2016

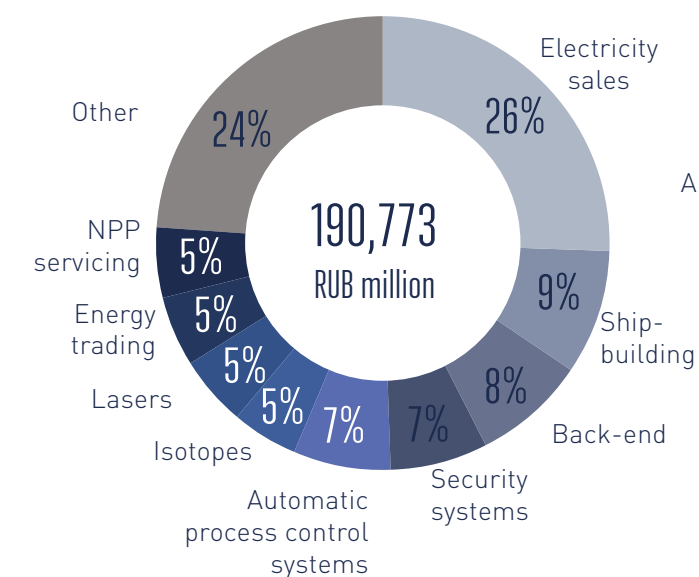
In the reporting year, revenue from new products (including intra-group turnover) totalled RUB 190.8 billion, which is 28% above the target (RUB 149 billion) and 53% higher than in 2015 (RUB 125.0 billion). The 10-year order portfolio (including intra-group turnover) reached RUB 1,018.8 billion, which is 69% above the target (RUB 603.8 billion) and 75% more than in 2015 (RUB 583.5 billion).

In 2016, new products accounted for 17.2% of the total revenue of ROSATOM³⁵.

For information on the performance of new businesses of ROSATOM's Divisions and organizations, see the sections 'International Business', 'Research and Innovations', 'Mining Division', 'Fuel Division', 'Mechanical Engineering Division', 'Engineering Division', 'Power Engineering Division', 'RAW and SNF Management and Decommissioning of Facilities Posing Nuclear and Radiation Hazards' and 'Nuclear Weapons Division'.

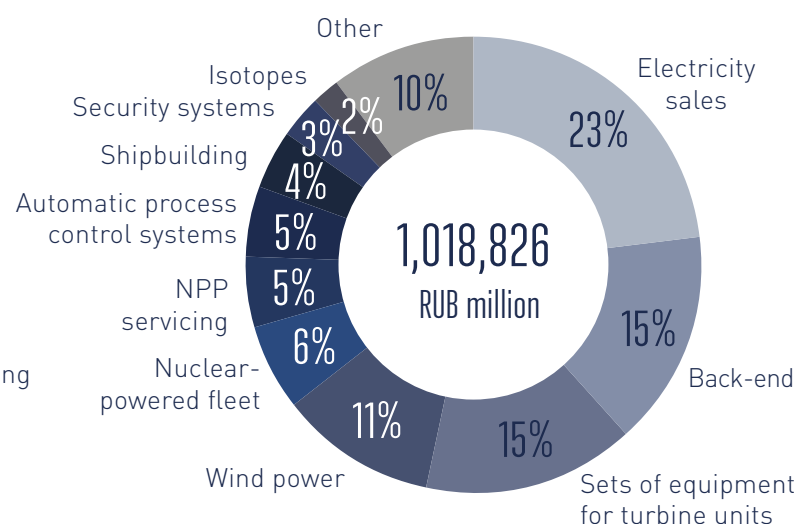
STRUCTURE OF REVENUE AND THE 10-YEAR PORTFOLIO OF ORDERS FOR NEW PRODUCTS IN 2016
(WITHIN AND OUTSIDE THE SCOPE)

REVENUE



1	Thermal power generation	+234%
2	Automatic process control systems	+194%
3	Computing tools and methods	+145%
4	General equipment	+98%
5	Shipbuilding	+70%
6	Back-end	+61%

10-YEAR ORDER PORTFOLIO



1	Sets of equipment for turbine units	+240%
2	Automatic process control systems	+173%
3	Back-end	+129%
4	PMC	+101%
5	Security systems	+82%

³⁵ Excluding intra-group turnover.

5.2.2. PLANS FOR 2017

In 2017, the key objective in the sphere of development of new businesses is to generate revenue and secure new orders outside the scope of the Corporation. ROSATOM plans to earn revenue totalling RUB 161.8 billion (excluding intra-group turnover), while the 10-year order portfolio should reach RUB 714.2 billion (excluding intra-group turnover).

An important objective in 2017 is to consolidate all industry resources in the most promising breakthrough businesses. Promising businesses are businesses that meet the following criteria over the strategic time horizon (by 2030):

- The market will become globally significant and noticeable;
- At present, the market does not exist or it does not have generally accepted/established technological standards;
- The market is focused primarily on the needs of people as end users (priority of B2C over B2B);
- The market is important for the Russian Federation in terms of meeting basic needs and ensuring security;
- There are opportunities for gaining competitive advantages and capturing a considerable market share;
- Revenue is comparable to that of conventional businesses.

Promising areas in nuclear power include the Proryv project. It is aimed at closing the nuclear fuel cycle using fast neutron reactors, which will help to unlock the power generation potential of uranium materials. The project will enable the Corporation to assert its leadership on the market for nuclear technologies and services during the next 30 years [\(see also the section 'Research and Innovations'\)](#).

Apart from the Proryv project, new promising businesses also include the following:

- Low-power NPPs;
- Nuclear fuel cycle back-end and decommissioning technologies;
- Alternative power generation methods;
- Additive manufacturing;
- Radiation technologies for health care and industry;
- Artificial intelligence and robotics;
- Energy storage devices;
- Clean water (desalination, water treatment and purification);
- Superconductors, etc.

ROSATOM finances the projects of new businesses using its own funds available for investment and raises loans from the country's leading financial institutions.

EFFICIENT
MANAGEMENT

06

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ROSATOM IS A SINGLE TEAM UNITED
BY SHARED VALUES AND THE LONG-TERM
STRATEGY

6.1.
CORPORATE
GOVERNANCE

ROSATOM’S MAIN TASK
IN THE SPHERE OF CORPORATE
GOVERNANCE IS TO
ALIGN THE MANAGEMENT
OF ORGANIZATIONS
OF THE NUCLEAR POWER
INDUSTRY AND THE NUCLEAR
WEAPON COMPLEX OF THE
RUSSIAN FEDERATION, AND
ORGANIZATIONS OPERATING
IN THE AREA OF NUCLEAR AND
RADIATION SAFETY, NUCLEAR
SCIENCE AND TECHNOLOGY
AND PERSONNEL TRAINING.

NUCLEAR INDUSTRY MANAGEMENT PROCESSES



Planning, coordination
and development

Strategic management. Setting and communicating long-term goals
Planning and goal achievement analysis
Industry development coordination
Coordination of operations in the industry



Management of relations
with the external
environment

Management of relations as the authorized body responsible for nuclear power management:

- Legislative activity;
- Government order and government task management;
- Technical regulation, etc.

Management of relations as a business entity:

- Management of government relations and relations with local communities and non-governmental organizations;
- Mass communication management.



Safety, security
and control

State security:

- Physical protection of facilities;
- State secret protection, etc.

Safe use of nuclear power:

- Implementation of the state policy for ensuring the safe use of nuclear power;
- Emergency prevention and response, etc.

Corporate security:

- Internal control and audit;
- Asset protection, etc.



Supporting
processes

Corporate governance
Legal support of activities
Risk management
Accounting and reporting
Personnel management
Procurement management
Property management and administration
IT management, etc.

VALUE CREATION ACTIVITIES

(see the section "Value Creation and Business Model")

ROSATOM’s main task in the sphere of corporate governance is to align the management of organizations of the nuclear power industry and the nuclear weapon complex of the Russian Federation, and organizations operating in the area of nuclear and radiation safety, nuclear science and technology and personnel training.

6.1.1. GOVERNING BODIES

ROSATOM’s Supervisory Board

In accordance with Article 23 of Federal Law No. 317-FZ on State Atomic Energy Corporation Rosatom dated December 1, 2007, the Supervisory Board is ROSATOM’s supreme governing body. [Information on the powers of the Supervisory Board is available on ROSATOM’s official website.](#)

The Supervisory Board comprises nine persons, including eight representatives of the President of the Russian Federation and the Government of the Russian Federation, as well ROSATOM’s Chief Executive Officer, who is a member of the Supervisory Board by virtue of his position.

The Supervisory Board members and chairman are appointed by the President of the Russian Federation.

The Supervisory Board members, except for ROSATOM’s Chief Executive Officer, are not ROSATOM’s executives.

The Supervisory Board members receive no remuneration for their participation in the work of the Supervisory Board.

Changes in the composition of the Supervisory Board:

- ROSATOM’s Chief Executive Officer, Alexey Likhachev, joined the Supervisory Board; he is a member of the Supervisory Board by virtue of his position (Decree No. 528 of the President of Russia dated October 5, 2016);
- Sergey Kirienko, First Deputy Chief of Staff of the Presidential Executive Office of Russia, was appointed Chairman of the Supervisory Board (Decree No. 716 of the President of Russia dated December 27, 2016);
- Sergey Korolev, Head of the Economic Security Service of the Federal Security Service of Russia, joined the Supervisory Board. Boris Gryzlov and Yury Yakovlev resigned from the Supervisory Board (Decree No. 28 of the President of Russia dated January 23, 2017).

COMPOSITION OF THE SUPERVISORY BOARD³⁶

Sergey Kirienko	First Deputy Chief of Staff of the Presidential Executive Office of Russia, Chairman of the Supervisory Board
Igor Borovkov	Chief of Staff of the Military Industrial Commission under the Government of the Russian Federation, Deputy Chief of Staff of the Russian Government
Larissa Brychyova	Assistant to the President of the Russian Federation, Head of the Legal Department of the Presidential Administration
Andrey Klepach	Deputy Chairman (Chief Economist), Member of the Board of Vnesheconombank
Sergey Korolev	Head of the Economic Security Service of the Federal Security Service of Russia
Alexey Likhachev	Chief Executive Officer of State Atomic Energy Corporation Rosatom
Alexander Novak	Minister of Energy of the Russian Federation
Yury Trutnev	Deputy Chairman of the Government of the Russian Federation, Plenipotentiary Representative of the President of the Russian Federation in the Far Eastern Federal District
Yury Ushakov	Assistant to the President of the Russian Federation

³⁶ As of January 23, 2017.

In 2016, the Supervisory Board held 11 meetings, including 2 face-to-face meetings, and considered 30 issues.

The Supervisory Board approved the following:

- The report on the achievement of key performance targets by ROSATOM in 2015;
- ROSATOM's key performance targets for 2016;
- Key performance targets of federal nuclear organizations for 2016;
- ROSATOM's annual report for 2015;
- ROSATOM's innovative development and technological modernization programme until 2030 (the civilian part).

ROSTATOM's CEO is responsible for monitoring the fulfilment of instructions of the Supervisory Board and its Chairman.

ROSTATOM's Chief Executive Officer

The functions and powers of the CEO are stipulated in the Federal Law on State Atomic Energy Corporation Rosatom. ROSATOM's CEO is the Corporation's sole executive body and manages its day-to-day operations.

In 2016, Alexey Likhachev was appointed as CEO of ROSATOM (Decree No. 527 of the President of Russia dated October 5, 2016). [Information on the CEO's background and powers is available on ROSATOM's official website.](#)

ROSTATOM's Management Board

The Management Board is ROSATOM's collective executive body. The Management Board includes ROSATOM's CEO, who is a member of the Board by virtue of his position, and other members of the Board. ROSATOM's CEO manages the work of ROSATOM's Management Board.

The powers of the Management Board are stipulated in the Federal Law on State Atomic Energy Corporation Rosatom³⁷.

Members of ROSATOM's Management Board are appointed and dismissed under the resolution of ROSATOM's Supervisory Board on the recommendation of the CEO. The Board members work full-time for ROSATOM or are employees of ROSATOM's organizations, joint-stock companies and their subsidiaries, as well as enterprises controlled by ROSATOM.

[Information about income, expenses, property and liabilities of the Management Board members and other employees of ROSATOM and their relatives is available on ROSATOM's official website.](#)

COMPOSITION OF THE MANAGEMENT BOARD AS OF DECEMBER 31, 2016

Alexey Likhachev	ROSTATOM's Chief Executive Officer, Chairman of the Management Board
Ivan Kamenskikh	First Deputy CEO for Nuclear Weapons
Alexander Lokshin	First Deputy CEO for Operations Management
Nikolay Solomon	First Deputy CEO for Corporate Functions, Chief Financial Officer
Kirill Komarov	First Deputy CEO for Corporate Development and International Business
Konstantin Denisov	Deputy CEO for Security
Tatyana Elfimova	State Secretary, Deputy CEO for Government Relations and Budgeting
Oleg Kryukov	Director for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning
Sergey Novikov	Deputy CEO for Economic Analysis and Planning

³⁷ Information on the powers of the Management Board and the background of the Board members is available on ROSATOM's website.

COMPOSITION OF THE MANAGEMENT BOARD AS OF DECEMBER 31, 2016

Vyacheslav Pershukov	Deputy CEO for Innovation Management
Nikolay Spasskiy	Deputy CEO for International Relations
Andrey Nikipelov	Chief Executive Officer of JSC Atomenergomash
Sergey Obozov	Director for ROSATOM Production System
Yury Olenin	President of JSC TVEL

- Changes in the composition of the Management Board in 2016:
- Alexey Likhachev was appointed as ROSATOM’s Chief Executive Officer and became Chairman of the Management Board by virtue of his position;
 - Sergey Novikov was appointed to the Management Board.
- In 2016, the Management Board held 42 meetings (all by absentee voting). The Board considered 533 issues, including the following key issues:
- The report on the achievement of key performance targets by ROSATOM in 2015;
 - ROSATOM’s key performance targets for 2016.

Auditing Commission

ROSATOM’s Auditing Commission monitors ROSATOM’s financial and business operations.

An extract from the report of the Auditing Commission on ROSATOM’s financial and business operations in 2016 is provided in Appendix 2.

COMPOSITION OF THE AUDITING COMMISSION AS OF DECEMBER 31, 2016

Roman Artyukhin	Head of the Federal Treasury, Chairman of the Auditing Commission
Alexey Lipaev	Deputy Department Director, Head of the Office for Budgetary Policy in the Sphere of the State Defence Order and Material Reserves of the Department for Budgetary Policy in the Sphere of State Military and Law Enforcement Services and the State Defence Order of the Ministry of Finance of the Russian Federation
Vladimir Katrenko	Auditor of the Accounts Chamber of the Russian Federation
Andrey Rozhnov	Deputy Head of the 12th Main Department of the Ministry of Defence of the Russian Federation
Vasily Utkin	Office Head of the Department for the Defence Industry of the Government of the Russian Federation

Commissions, boards and committees under the governing bodies

In 2016, ROSATOM had about 30 permanent committees, boards and commissions under the governing bodies.

KEY COLLECTIVE ADVISORY BODIES

Committee/Board/Commission	Chairman
Strategic Council	Sergey Kirienko, Chairman of the Supervisory Board
Operations Committee	
Staff and Incentives Committee	Alexey Likhachev, Chief Executive Officer
Steering Board of the Proryv (Breakthrough) Project	
Investment Committee	Alexander Lokshin, First Deputy CEO for Operations Management
Ethics Board	
Risk Committee	Sergey Petrov, Director for Strategic Management, Director of the Strategic Management Department
Committee on the Restructuring of Non-Core Assets, Real Property and Equity	Nikolay Solomon, First Deputy CEO for Corporate Functions, Chief Financial Officer
Receivables and Payables Management Committee	
Committee on Cost within International Sales	
Committee on Strategic Partnerships, Mergers and Acquisitions	Kirill Komarov, First Deputy CEO for Corporate Development and International Business
Charity Committee	

Committee/Board/Commission	Chairman
Unified Commission for the Procurement of Goods, Work and Services for Government Needs under a Closed Procedure	Ivan Kamenskikh, First Deputy CEO for Nuclear Weapons
Central Procurement Commission	Roman Zimonas, Director for Procurement, Logistics and Quality Management
Central Arbitration Committee (in procurement)	Pavel Tikhomirov, Head of the Competition Policy Department

6.1.2. IMPROVEMENT OF THE CORPORATE GOVERNANCE SYSTEM

In 2016, the Corporation continued to adopt new regulations governing the cooperation between ROSATOM and the holding companies of its business divisions, business incubators and industry complexes, which is a major step towards the transition to the division-based model of nuclear industry management. More specifically, the Procedure for Cooperation between ROSATOM and JSC Rusatom Service, an integrator of the foreign NPP servicing business, was adopted in the reporting year.

▶ **ROSATOM and joint-stock companies in the nuclear industry adhere to the key corporate governance principles stipulated by Russian legislation and the Corporate Governance Code (including respect for shareholder rights, determination of the procedure, format and scope of information disclosure), with some exceptions stemming from special characteristics of ROSATOM's business and legal status as the authorized body responsible for nuclear power management (restricted civilian circulation of shares of joint-stock companies on the lists approved by the Russian President and comprising Russian legal entities that may own nuclear materials or nuclear facilities).**

In order to develop the wind power business more efficiently, control over JSC VetroOGK was transferred from JSC Atomenergomash to JSC ITPC (the holding company of the Non-Nuclear Energy and Utility Complex, an incubated business).

As a mechanism for treasury support of ROSATOM's asset contribution to the development of the nuclear power and industry complex was introduced in 2016, ROSATOM updated the model for budget financing through additional issues of securities of joint-stock companies in the nuclear industry that are ultimate spending units, taking

into account the special features of the legislation of the Russian Federation.

In order to streamline corporate governance processes and promptly adopt managerial decisions, a comprehensive automated database on ROSATOM's corporate ownership structure was launched.

ROSATOM implemented a project aimed at reducing the duration of accounts receivable under government contracts (from the moment of debt creation until a claim is sent to the debtor).

6.1.3. KEY CHANGES IN THE CORPORATE STRUCTURE IN 2016

To implement the state programme of the Russian Federation 'Federal Property Management', the Private Institution Situation and Crisis Centre of ROSATOM was established.

The formation of a single engineering division of ROSATOM was continued. For this purpose, JSC ASE acquired a 23.8% shareholding in JSC ASE EC from JSC Atomenergoprom; as a result, the total stake of JSC ASE in JSC ASE EC increased to 72.8%.

To set up an engineering organization on the basis of JSC FCS&HT SNPO Eleron for the implementation of design, construction and renovation projects at facilities of the Nuclear Weapons Division, a 100% stake in the authorized share capital of LLC Kompleksny Proekt was transferred from FSUE RFNC-VNIIEF to JSC FCS&HT SNPO Eleron.

6.1.4. NON-ARM'S LENGTH TRANSACTIONS

In accordance with Federal Law No. 317-FZ dated December 1, 2007, the Supervisory Board makes decisions on conducting a transaction or a series of related transactions involving the acquisition, disposal or potential disposal by the Corporation of property whose value exceeds the limit established by the Corporation's Supervisory Board (1% of the book value of assets), and approves non-arm's length transactions. In 2016, no non-arm's length transactions were approved by ROSATOM's Supervisory Board.

6.1.5. PLANS FOR 2017 AND FOR THE MEDIUM TERM

- To continue to adopt regulations governing the cooperation between ROSATOM and the holding companies of its business divisions, business incubators and industry complexes (to adopt procedures for the cooperation with JSC Rusatom Healthcare (a single integrator in the area of radiation technologies for health care and industry), JSC RPC Khimpromengineering (the holding company of Advanced Materials, an incubated business) and LLC Rusatom Overseas, a single integrator for the promotion of integrated sales (NPP construction projects) on the foreign market);
- To implement measures for the corporatization and reorganization of ROSATOM's federal state unitary enterprises and the assignment of the status of a federal nuclear organization to some of them;
- To include new legal entities in ROSATOM's scope of management as part of the development of new businesses;
- To transfer shares in 10 joint-stock companies in federal ownership to ROSATOM as an asset contribution of the Russian Federation.

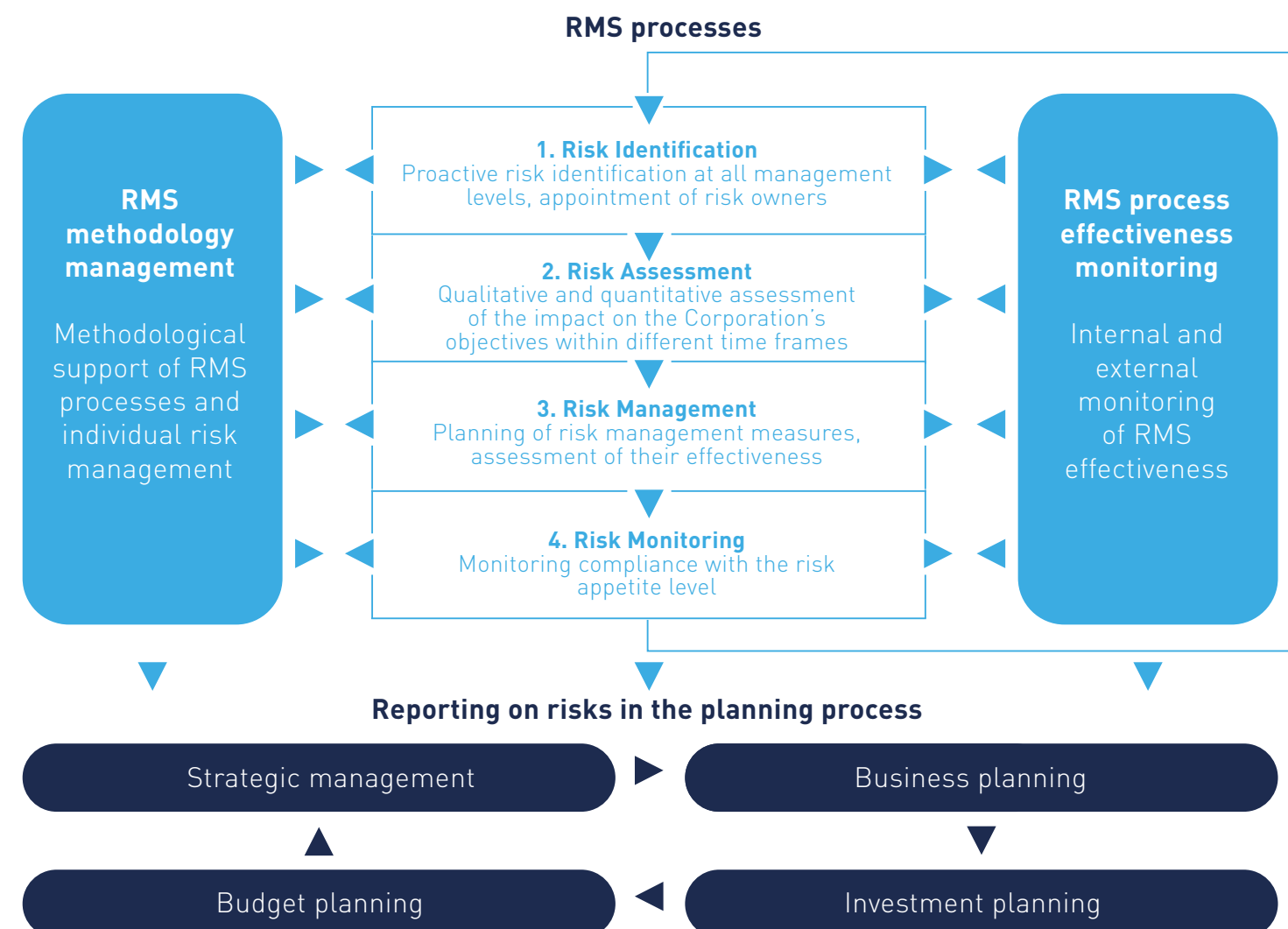
6.2. RISK MANAGEMENT

ROSATOM HAS ESTABLISHED A RISK MANAGEMENT SYSTEM, WHICH IS INTEGRATED INTO STRATEGIC, INVESTMENT AND BUSINESS PLANNING PROCESSES.

6.2.1. RISK MANAGEMENT SYSTEM

ROSATOM has established a risk management system (RMS), which is integrated into strategic, investment and business planning processes. The RMS is based on a continuous cyclical process of identifying, assessing and managing the risks that can affect the Corporation's short- and long-term performance and the implementation of its strategy.

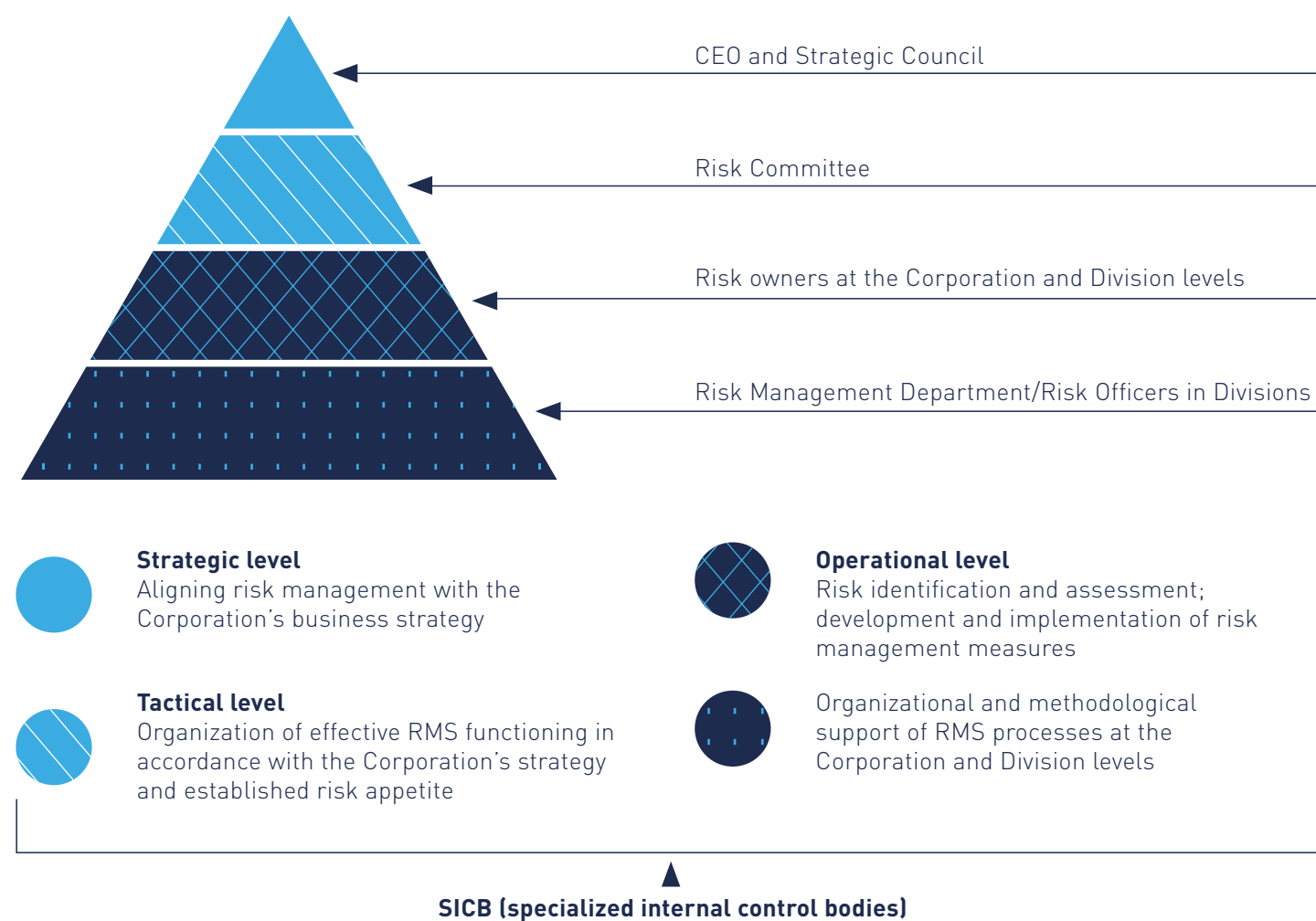
RISK MANAGEMENT PROCESS AT ROSATOM



In 2016:

- An external diagnostic assessment of the maturity of the RMS was carried out; key development areas were identified, and an approach to the development of the RMS at the level of the Corporation and its organizations was formulated;
- The investment and construction project risk management methodology was supplemented;
- The quality of risk analysis in the course of business planning was improved through the use of probabilistic modelling methods during quantitative assessment;
- The time frame and procedure for monitoring risks affecting the implementation of the State Programme 'Development of the Nuclear Power and Industry Complex' were established; this will enable timely detection of risks and management decision-making in order to minimize their impact.

ORGANIZATIONAL MODEL OF THE RISK MANAGEMENT SYSTEM AT ROSATOM

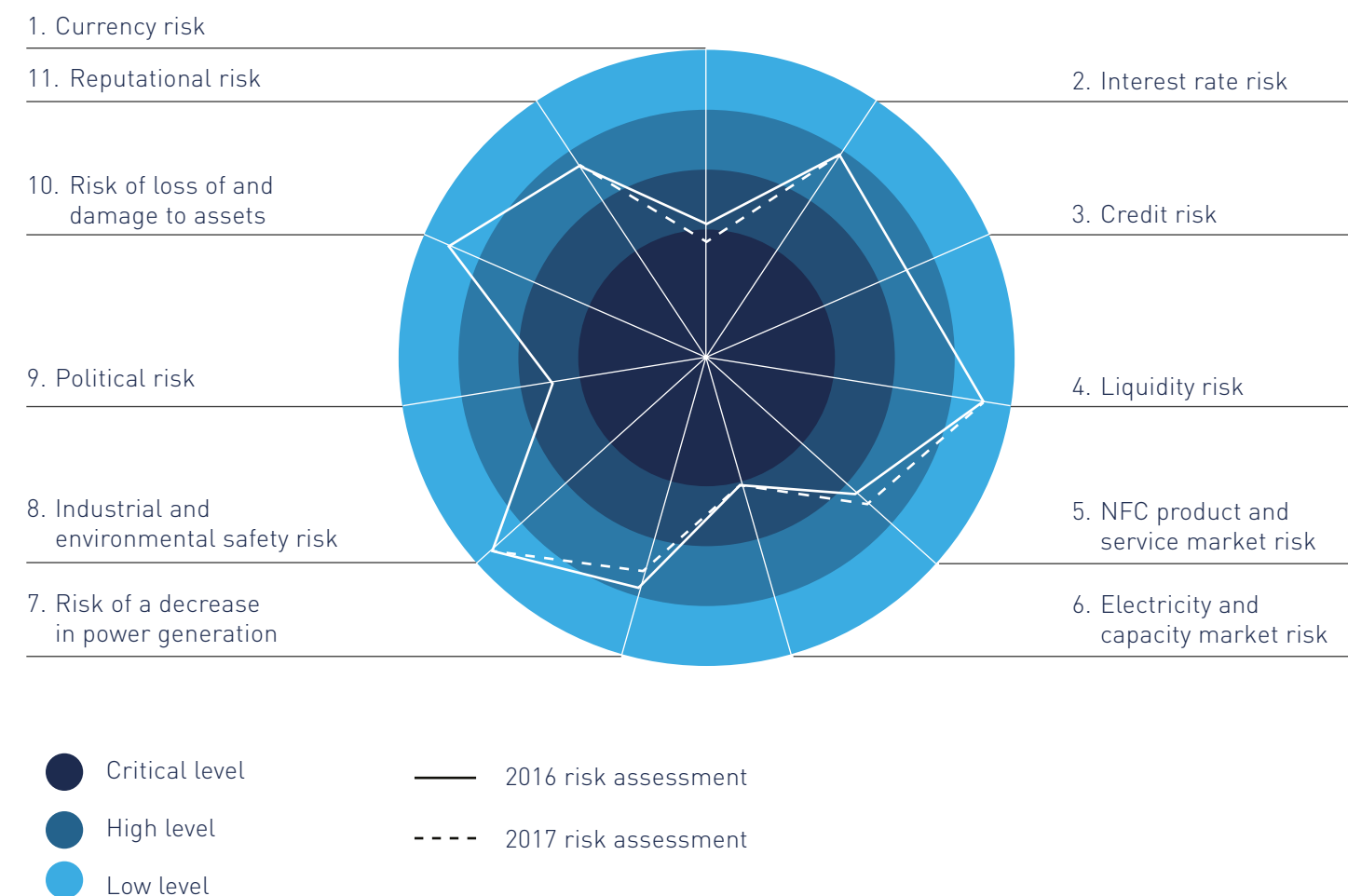


In line with international best practice, the Corporation's risk management system as a whole and its individual components are assessed by the internal audit service.

6.2.2. KEY BUSINESS RISKS OF ROSATOM³⁸

As part of the functioning of the RMS, a list of critical risks and risk owners was compiled; risks were assessed, and risk management measures were developed and implemented.

RISK RADAR



³⁸ This section covers the most significant risks.

6.2.3.

RISK MANAGEMENT OUTCOMES IN 2016

In 2016, comprehensive risk management measures largely offset the impact of external negative factors on the implementation of the Corporation’s strategy. The impact of critical risks on strategic goals is shown in the table below.

RISK MANAGEMENT OUTCOMES

ROSATOM’s strategic goals:

- 1 To increase its international market share
- 2 To reduce production costs and the lead time
- 3 To develop new products for the Russian and international markets

Change in estimated risk levels:

- ▲ — increase,
- ▼ — decrease,
- — no significant changes

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connec- tion with strategic goals
FINANCIAL RISKS			
1. Currency risk ▲ (Heads of ROSATOM’s Divisions)	Adverse changes in exchange rates	Management approaches: <ul style="list-style-type: none">Maintaining a balance of claims and liabilities denominated in foreign currencies (natural hedging);Use of financial hedging instruments. Results: <p>An optimal ratio of assets and liabilities denominated in the same currency was maintained.</p> Changes: <p>An increase in currency risk was caused by a high degree of volatility of the rouble exchange rate and the strengthening of the Russian rouble against the currencies of countries importing products manufactured by the Corporation’s organizations.</p>	<div>1</div> <div>2</div> <div>3</div>

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connec- tion 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: <ul style="list-style-type: none">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;Use of a free liquidity pool for the repayment of loans on which interest rates may be increased. Results: <p>JSC Atomenergoprom successfully placed 10-year exchange-traded bonds with a total par value of RUB 30 billion, which helped maintain a stable long-term credit portfolio.</p> <p>ROSATOM managed to keep the average interest rate on the total debt portfolio of the Corporation and its organizations denominated in Russian roubles below 10%, partly because it is comprised mainly of long-term loans raised between 2012 and 2014 at pre-crisis interest rates.</p> <p>For details, see the sections ‘Financial Management’ and ‘Investment Management’.</p>	<div>1</div> <div>2</div> <div>3</div>
3. Credit risk ● (ROSATOM’s Treasury Department for banks/heads of the Corporation’s organizations for other counterparties)	Failure by counterparties to fulfil their obligations in full and on time	Management approaches: <ul style="list-style-type: none">Setting limits for counterparty banks;Use of suretyship, guarantees, restrictions on advance payments in favour of external counterparties;Participation in working groups on improvement of the legal framework for the wholesale electricity and capacity market (including an increase in fines, improvement of the system of financial guarantees);Monitoring of accounts receivable and the financial position of counterparties;Internal counterparty solvency rating system. Results: <p>There were no significant losses through the fault of counterparties.</p> <p>Major events in the reporting year included the repayment of debt totalling EUR 601.6 million by the National Electricity Company of Bulgaria to ROSATOM in accordance with the ruling of the International Court of Arbitration under the International Chamber of Commerce in Geneva with regard to the Belene NPP project.</p> <p>For details, see the section ‘International Business’.</p>	<div>1</div> <div>2</div>

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
4. Liquidity risk ● (ROSATOM's Treasury Department for the Corporation and JSC Atomenergoprom/ Heads of Divisions)	Lack of funds for the fulfilment of obligations by the Corporation and its organizations	Management approaches: <ul style="list-style-type: none"> Centralized cash management (cash pooling); Rolling liquidity forecasts and cash flow budget; Maintaining required amounts of open lines of credit with banks; Reducing the period of keeping free cash on bank deposits; Placement of JSC Atomenergoprom's exchange-traded bonds; Discussion of matters related to state support with Russian federal executive authorities. Results: ROSATOM maintained sufficient liquidity to repay liabilities on time, preventing unacceptable losses and managing reputational risk. For details, see the section 'Financial Management'.	1 3

COMMODITY RISKS

5. Nuclear fuel cycle product and service market risk ▼ (Heads of the relevant Divisions of ROSATOM)	Adverse change in the pricing environment and demand on markets for natural uranium and uranium conversion and enrichment services	Key risk factors in the reporting year: <ul style="list-style-type: none"> Supply growth on the uranium market outpaced demand growth; A considerable amount of inventories was accumulated, putting pressure on market prices; An NPP decommissioning programme (Energiewende) is being implemented in Germany. Management approaches: <ul style="list-style-type: none"> Use of market-focused and escalation pricing mechanisms in contracts; Stipulating quantitative flexibility and options in contracts with suppliers. Results: Despite persisting stagnation of demand and a price fall on the NFC product and service markets, in 2016, the 10-year portfolio of overseas orders on these markets reached USD 35 billion. Changes: The fact that natural uranium prices and separative work unit prices are currently low limits their further reduction and at the same time creates growth opportunities if the market environment is favourable (e.g. if reactors are restarted in Japan). For details, see the section 'International Business' and annual reports of JSC TENEX and JSC TVEL for 2016.	1 2
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Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
6. Electricity and capacity market risks ● (CEO of JSC Rosenergoatom Concern)	Adverse changes in electricity and capacity prices	Management approaches: Limited possibilities to manage this risk: poor liquidity of trading platforms makes it difficult to use financial derivatives as a potential risk management tool. For details, see the 2016 annual report of JSC Rosenergoatom Concern.	1

OPERATIONAL RISKS

7. Risk of a decrease in power generation ▲ (CEO of JSC Rosenergoatom Concern)	Decrease in power generation due to equipment shutdowns and unavailability	Management approaches: <ul style="list-style-type: none"> Scheduled preventive maintenance and repairs at NPPs; Implementation of the NPP life extension programme and the programme to increase power generation (including the possibility of power units operating at above nameplate capacity). Results: Performance against the balance target set by the Russian government (the minimum annual power output) totalled 100.6%. Actual power output totalled 196.4 billion kWh, up by 0.6% compared to 2015. Changes: An increase in the risk level was caused by a planned increase in nuclear power generation, including power generation by power units using new technologies, where the main goal is to demonstrate their steady operation in all modes rather than to achieve power generation targets. For details, see the section 'Power Engineering Division' and the 2016 annual report of JSC Rosenergoatom Concern.	1
8. Industrial and environmental safety risk ● (Heads of ROSATOM's Divisions)	Major accidents/incidents at nuclear enterprises	Management approaches: <ul style="list-style-type: none"> Provision of an up-to-date legal framework; Engineering measures to ensure the safety of nuclear facilities; Maintaining a high level of professionalism and safety culture among employees. Results: Safe operation of nuclear facilities and hazardous industrial facilities. No events rated at level 2 or higher on the international INES scale. No accidents at hazardous industrial facilities. In 2016, 98.8% of employees were in the negligible and acceptable occupational risk areas. For details, see the section 'Nuclear and Radiation Safety'.	1 3

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
9. Political risk ● (International Cooperation Department of ROSATOM)	Changes in the regulatory and political climate in foreign countries imposing restrictions on the operations of the Corporation and its organizations	Management approaches: <ul style="list-style-type: none"> Cooperation with the Russian Ministry of Foreign Affairs and other authorities; Political support for global operations of nuclear organizations; Using the platform of specialized international organizations; Awareness-raising activities conducted worldwide. Results: As of December 31, 2016, the 10-year portfolio of overseas orders totalled USD 133.4 billion, up by 20.9% compared to 2015. The growth was driven primarily by the overseas NPP construction project portfolio due to the conclusion of new contracts. At year end, ROSATOM's project portfolio comprised 34 power units. ROSATOM concluded 8 intergovernmental agreements and 20 interdepartmental agreements, which is a positive trend. For details, see the sections 'International Cooperation' and 'International Business'.	1 2 3
10. Risk of loss of and damage to assets ● (Asset Protection Department of ROSATOM)	Corruption and other offences leading to the damage to/ loss of assets	Management approaches: ROSATOM has implemented an integrated industry-wide system for the prevention of corruption and other offences. Key tools for reducing the risk of corruption and other offences include the development of an industry-wide anti-corruption training system (persons undergoing training include executives holding positions involving a risk of corruption and employees responsible for anti-corruption measures). Results: In 2016, over 60 employees of ROSATOM's central office underwent training. For details, see the section 'System for the Prevention of Corruption and Other Offences' and the 2016 annual reports of JSC Atomredmetzoloto, JSC TVEL, JSC TENEX, JSC ASE EC, JSC Atomenergomash and JSC Rosenergoatom Concern.	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 the Corporation and its organizations	Management approaches: Measures are taken to shape a positive public opinion on the development of nuclear technologies through improved informational transparency and open stakeholder engagement. ROSATOM published a public strategy until 2030 outlining long-term strategic goals; this was the main event of the year in the sphere of stakeholder relations. ROSATOM continuously monitors public opinion on NPP construction and information on the decisions of government and regulatory bodies on curtailment of the nuclear industry in countries where the Corporation is implementing projects. It continuously monitors and analyses news reports in the national and international media and information obtained during business meetings, industry conferences and workshops. If it is reasonable to make changes to the schedule of NPP construction projects in Russia and abroad, the relevant decisions are agreed with all parties involved in the projects and are reflected transparently in communications with partners and other stakeholders (including the general public and local communities). Results: According to a survey by Levada-Centre, 71% of the Russian population supported the use of nuclear power in early 2017 (over the past five years, this figure ranged between 66.5% and 75.5%). Projects implemented abroad are supported by government bodies. The main Russian nuclear industry exhibition, Atomexpo 2016, titled 'Nuclear Power as a Basis for Zero Carbon Energy Balance' was attended by over 5,000 specialists and experts from 55 countries worldwide. For details, see the sections 'International Business' and 'Stakeholder Communication'.	1 3

ROSATOM implements large-scale long-term NPP construction projects and actively develops new businesses. Therefore, project and technological risks (risk of shortcomings in newly developed technologies), the risk of an incorrect assessment of market needs and trends in the course of promotion of ROSATOM's product offer on the strategic time horizon and the risk of loss of critical knowledge related to existing and newly developed products are the most relevant risks in the long term. ROSATOM gives special focus to managing these risks. It regularly assesses and monitors them, plans measures to reduce the likelihood of occurrence and mitigate these risks in order to achieve its strategic goals and monitors progress in the implementation of these measures.

6.2.4. RISK INSURANCE

Risk insurance is one of the main risk management approaches used by ROSATOM. To improve the reliability of insurance coverage, in 2016, a significant share of liability of Russian NPPs for potential nuclear damage was transferred for reinsurance to the international pooling system. This demonstrates that the international nuclear insurance community deems the safety and reliability of Russian NPPs to be adequate. In addition, in-house insurance audits were conducted with assistance from experts of the Russian Nuclear Insurance Pool.

Key enterprises of the industry will continue to be audited for insurance purposes in 2017.

6.2.5. OBJECTIVES FOR 2017 AND FOR THE MEDIUM TERM:

To further develop the RMS, ROSATOM plans to:

- Support the development of the RMS in the Corporation's divisions (taking into account the findings of external diagnostic assessment);
- Roll out a single risk management approach for NPP construction projects;
- Monitor risks affecting the implementation of the State Programme 'Development of the Nuclear Power and Industry Complex' on a regular basis and develop measures to minimize their impact.

6.3. PERFORMANCE OF GOVERNMENT FUNCTIONS

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.

KEY RESULTS IN 2016:

- **ROSATOM PARTICIPATED IN THE CONSIDERATION OF MORE THAN 300 BILLS;**
- **ROSATOM CONTINUED TO IMPLEMENT FIVE FEDERAL TARGET PROGRAMMES AND THE STATE PROGRAMME OF THE RUSSIAN FEDERATION 'DEVELOPMENT OF THE NUCLEAR POWER AND INDUSTRY COMPLEX'.**

6.3.1. LAW DRAFTING

In the reporting year, the Corporation participated in the consideration of more than 300 bills, including:

- Draft amendments to bills submitted by federal executive authorities, the Russian Government and the Federal Assembly of the Russian Federation;
- Bills published on the official website for posting information on the drafting of laws and regulations by federal executive authorities and the results of their public discussion (www.regulation.gov.ru).

Pursuant to the Decree of the President of Russia, the Corporation prepared a draft of the Federal Law on Making Amendments to Article 31 of the Federal Law on the Use of Nuclear Energy (Federal Law No. 356-FZ dated July 3, 2016 signed by the President of Russia). This law has made it possible to align Federal Law No. 35-FZ on Combating Terrorism dated March 6, 2006 and Federal Law No. 170-FZ on the Use of Nuclear Energy dated November 21, 1995 and to create a legal framework for improving the protection of nuclear facilities against terrorism by creating special-use areas around them (a security area with a special legal status).

6.3.2. COOPERATION WITH THE FEDERAL ASSEMBLY OF THE RUSSIAN FEDERATION

As part of cooperation with the chambers of the Federal Assembly of the Russian Federation, ROSATOM prepared information and analytical materials, and the Corporation's representatives participated in 30 meetings of Committees, Commissions and Advisory Boards, 5 round-table meetings, 8 international forums, congresses and conferences, 5 parliamentary hearings and 9 'government hour' sessions.

Representatives of the State Duma and the Federation Council of the Federal Assembly of the Russian Federation took part in 6 forums and conferences organized by ROSATOM.

In the reporting year, ROSATOM received 57 enquiries from representatives of the chambers of the Federal Assembly of the Russian Federation. All enquiries were considered within the time frame stipulated by law, and enquirers received substantiated replies. The enquiries were focused mostly on the following topics:

- Sale of items of real property by nuclear enterprises;
- Social security;
- Development of regions where nuclear facilities are situated;
- Provision of financial assistance;
- Optimization of production facilities and downsizing at nuclear facilities;
- Implementation of long-term international projects, including the construction of Akkuyu NPP;
- Support for scientific research.

6.3.3. IMPLEMENTATION OF THE STATE PROGRAMME OF THE RUSSIAN FEDERATION 'DEVELOPMENT OF THE NUCLEAR POWER AND INDUSTRY COMPLEX'

In the reporting year, ROSATOM continued to implement the state programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex'.

Overall performance against the targets set in the state programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex' was assessed at 101.45%. This assessment reflects the achievement of outcomes of measures and target indicators set for 2016 and takes into account the volume of budgetary and extrabudgetary funding used for implementing measures forming part of the state programme.

6.3.4. IMPLEMENTATION OF FEDERAL TARGET PROGRAMMES

In 2016, the enterprises and organizations of ROSATOM fully implemented measures forming part of 5 federal target programmes. To implement these measures (included in the part of the federal budget for which information is publicly available), ROSATOM raised funds totalling RUB 35.7 billion, including RUB 18.1 billion from the federal budget and RUB 17.6 billion from extrabudgetary sources.

6.3.5. CONTRIBUTION TO THE IMPLEMENTATION OF THE 'MAY DECREES' OF THE PRESIDENT OF RUSSIA

As part of the implementation of the decrees of the President of Russia dated May 7, 2012, in the reporting year, ROSATOM and its organizations achieved the following results:

- Under Decree No. 597 on Measures for Implementing the State Social Policy, in 2016, the actual nominal salary was increased by 8.4% compared to 2015 ([see the section 'Personnel Management'](#));
- Under Decree No. 596 on the Long-Term National Economic Policy (the requirement for an increase in investment to at least 27% of GDP by 2018), in 2016, the actual indicator reached 26.4% of revenue. In 2016, the share of innovative products in total sales in the industry reached 13.56% ([see the section 'Research and Innovations'](#));
- Labour productivity at nuclear enterprises increased by 210.9% compared to 2011.

6.3.6. PROVISION OF PUBLIC SERVICES

In 2016, we continued to develop a system for electronic communication during the provision of public services, including via the Integrated Public Services Portal. Information on the following public services provided and functions performed by ROSATOM was included in the Federal Register of Public Services and posted on the Integrated Public Services Portal:

- Issue of permits to institutions, joint-stock companies of the Corporation and their subsidiaries, as well as to enterprises controlled by ROSATOM for the construction of nuclear facilities whose construction and renovation may involve expropriation of land (including land buyout) for government needs, and the issue of permits to these legal entities for the commissioning of the said facilities;
- State construction supervision during construction and renovation of facilities owned by federal nuclear organizations;
- Issue of written permission to move nuclear materials and nuclear facilities across the Russian border (for the purpose of transit across the country).

Thus, as a result of the work done in 2016, the Federal Register of Public Services now contains information on all public services provided and supervisory functions performed by ROSATOM.

6.3.7. STATE PROPERTY MANAGE- MENT AND RESTRUCTURING OF NON-CORE ASSETS

In 2016, ROSATOM registered its title to 274 items of real property (buildings and structures).

450 items of federal real property were excluded from the scope of the Corporation. More specifically:

- 398 items of federal real property were transferred free of charge to local governments or to the Russian Treasury in order to address regional issues and provide the population with utility infrastructure;
- 52 items of federal real property were liquidated due to the total or partial loss of usefulness to consumers.

In 2016, 159 non-core items of real property of joint-stock companies in which ROSATOM owns more than 25% of shares were excluded from the scope of the Corporation. More specifically:

- 134 items were sold;
- 12 items were transferred for free to the federal government and municipal governments;
- 13 items were liquidated.

Proceeds from the sales totalled RUB 748 million.

As regards the property of joint-stock companies in which ROSATOM owns less than 25% of shares and companies whose shares are held by the Russian Federation represented by ROSATOM, in 2016, 570 non-core assets were excluded from the scope of the industry. More specifically:

- 309 assets were sold;
- 237 assets were transferred free of charge to the federal government and municipal governments;
- 24 assets were liquidated.

Proceeds from the sales totalled RUB 1.35 billion.

6.4. FINANCIAL AND INVESTMENT MANAGEMENT

THE MAIN GOAL OF ROSATOM'S FINANCIAL STRATEGY IS TO ENSURE THE FINANCIAL SUSTAINABILITY OF THE CORPORATION AND ITS ORGANIZATIONS IN A CHANGING ENVIRONMENT AND TO MAXIMIZE THE EFFICIENCY OF FINANCING AND FINANCIAL RISK MANAGEMENT.

KEY RESULTS IN 2016:

- A TOTAL OF ABOUT RUB 25.7 BILLION WAS SAVED THROUGH INTRA-GROUP FINANCING WITHIN THE INDUSTRY BETWEEN 2010 AND 2016;
- JSC ATOMENERGOPROM RAISED FUNDS FROM THE PENSION FUND OF THE RUSSIAN FEDERATION BY PLACING 10-YEAR EXCHANGE-TRADED BONDS WITH A TOTAL PAR VALUE OF RUB 30 BILLION, WHICH HELPED MAINTAIN A STABLE LONG-TERM CREDIT PORTFOLIO.

6.4.1. FINANCIAL MANAGEMENT

6.4.1.1. Implementation of ROSATOM's financial strategy

Given the scale of ROSATOM's business in Russia and abroad, the Corporation's management attaches great importance to the financial sustainability of nuclear organizations in a changing environment. The financial strategy is an integral part of ROSATOM's overall business strategy. The main goal of ROSATOM's financial strategy is to ensure the financial sustainability of the Corporation and its organizations in a changing environment and to maximize the efficiency of financing and financial risk management.

One of the key objectives in 2016 was to tackle the issue of underinvestment and secure adequate liquidity at a reasonable price in a turbulent financial environment.

If the cost of borrowing increases, the most favourable conditions can be achieved if borrowing is centralized. Therefore, in 2016, ROSATOM continued to make efforts to:

- Centralize the treasury functions;
- Optimize the Group's debt portfolio.

6.4.1.2. Improving the efficiency of treasury transactions

The decision to centralize principal financial transactions was made by the Management Board of ROSATOM in 2010 as part of the approval of an industry-wide financial policy. Cash flow management is centralized through:

- An established single industry-wide legal framework regulating financial management (first and foremost the Financial Policy, which has been adopted by all organizations within the scope of consolidation);
- Vertical integration of treasury departments in subsidiaries, which are functionally accountable to the Treasury Department of ROSATOM (this treasury structure enables 100% control of funds in the industry);
- Concentration of principal treasury functions of nuclear organizations in the Treasury Department of ROSATOM, which communicates with nuclear organizations and is essentially a liquidity management centre;
- An industry-wide automated system for recording treasury transactions, which enables the recording of all treasury transactions across the scope of consolidation of the Corporation on a daily basis.

In 2016, ROSATOM continued to work towards:

- Accumulating spare cash on the accounts of pool leaders³⁹;

- Improving the accuracy of payment scheduling (a rolling liquidity forecast);
- Maintaining a competitive cost of servicing of the consolidated debt portfolio.

6.4.1.3. Bond placement; maintaining credit ratings

In the reporting year, JSC Atomenergoprom⁴⁰ raised funds from the Pension Fund of the Russian Federation by placing 10-year exchange-traded bonds with a total par value of RUB 30 billion (the coupon rate was set at 9.33%; the terms and conditions of the placement provide for a two-year call option and a six-year call option). This helped maintain a stable long-term credit portfolio.

JSC Atomenergoprom continued to make efforts to maintain its credit ratings assigned by international rating agencies. Each Big Three rating agency (S&P, Moody's Investors Service, Fitch Ratings) rated JSC Atomenergoprom at the level of Russia's sovereign credit ratings: BB+/Ba1/BBB-. Moreover, two of the three international rating agencies (S&P and Fitch Ratings) upgraded the standalone credit rating of JSC Atomenergoprom to the level of the Company's final rating.

To reduce the cost of documentary transactions and borrowings, the Corporation continued to use suretyship as security for repayment of advance payments and fulfilment of contractual obligations in the course of procurement using its own funds and non-budgetary funds and as a means for reducing the cost of financing.

JSC AtomCapital (a wholly-owned subsidiary of ROSATOM acting as a pool leader in intra-group financing of FSUEs) enabled an optimal debt burden distribution between JSC Atomenergoprom and organizations and enterprises outside its scope.

6.4.1.4. Plans for 2017 and for the medium term

Given the risk of increasing debt burden as a result of external influences, ROSATOM needs to:

- Ensure a consistent payment discipline for intra-group financing;
- Improve the accuracy of medium-term cash flow planning;
- Prevent internal competition for credit resources between organizations;
- Continue to centralize cash management;
- Focus on maintaining relations with supporting banks as the most reliable partners providing accessible funds in terms of both volumes and cost;
- Fulfil all of its obligations, including covenants, to current lenders and rating agencies;
- Discuss project financing arrangements to reduce recourse on ROSATOM and minimize the use of the Corporation's consolidated investment resources (including the use of project financing instruments).

ROSATOM also plans to expand the range of its financing instruments (provided 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 organizations in the industry on acceptable terms.

The Corporation managed to keep the average interest rate on the total debt portfolio denominated in Russian roubles below 10%, partly because the Group's portfolio is comprised mainly of long-term loans raised between 2012 and 2014 at pre-crisis interest rates.

³⁹ A pool leader is an organization of the Corporation on whose accounts spare cash is accumulated and subsequently redistributed between ROSATOM's organizations through loan agreements. A pool leader is appointed under the resolution of ROSATOM's executive bodies.

⁴⁰ JSC Atomenergoprom consolidates civilian assets of the Russian nuclear industry; 100% of voting shares in the company are held by ROSATOM.

6.4.2. INVESTMENT MANAGEMENT



EKATERINA LYAKHOVA
DIRECTOR FOR INVESTMENT MANAGEMENT
AND OPERATIONAL EXCELLENCE



KEY RESULTS IN 2016:

- **THE INVESTMENT PROGRAMME WAS 93% COMPLETED;**
- **RETURN ON THE INVESTMENT PORTFOLIO STOOD AT 17.7%.**

— *What is the role of investments in the implementation of ROSATOM's long-term strategy? What would you say were the key achievements in this area in the reporting year?*

— Today, the world is changing very rapidly, which means that in our medium-term strategy and especially in the long-term strategy we can no longer rely on advances made 30 or 40 years ago. Even those technologies in the industry that are still relevant in terms of their scientific and technical potential and give ROSATOM a competitive edge need to be improved or integrated with related new technologies. Moreover, quite often they need to be 'digitalized'. Therefore, investments are undoubtedly crucial as they enable such shifts in the Corporation's existing or new businesses.

One of the projects in the Fuel Division has enabled us to optimize the uranium conversion process chain. We expect that in 2017, this will help to reduce the cost of production at this stage of processing by 24%. In addition, we seek to develop new businesses on the basis of ongoing research and development. For instance,

the analysis of the market for isotope products has revealed potential demand, which has enabled us to expand the range of such products for various areas of activity, such as fundamental research, microelectronics, medical diagnostics and the development of gamma radiation sources for non-destructive testing systems.

— *What are the priorities of ROSATOM's investing activities in 2017 and in the medium term?*

— **In the medium term, we aim to maintain a reasonable balance between optimization in our traditional areas of business and development of new areas (such as radiation medicine, additive manufacturing, supercomputers, robotics, etc.).**

It is common knowledge that one should never hurry when making investments, so we do not intend to make any drastic changes in the near future.

But we have already made a firm decision about an additional area in which we will be working as investors: we will work towards creating and developing the business environment.

We realize that some new projects are only partly related to the current practices in the industry and that in order to develop or optimize traditional businesses, it is often necessary to think outside the box. Therefore, it is important to form a group of people capable of tackling these tasks.

Unlike project managers, these are primarily middle managers of industry enterprises who see opportunities for productive changes in their own or related areas, who are willing and able to assume responsibility and who drive internal transformation by initiating projects in the industry and supporting their implementation.

In addition, we plan to strengthen our ties with 'development institutes' and draw on the experience of our foreign colleagues. ●

6.4.2.1. Key approaches to investment management

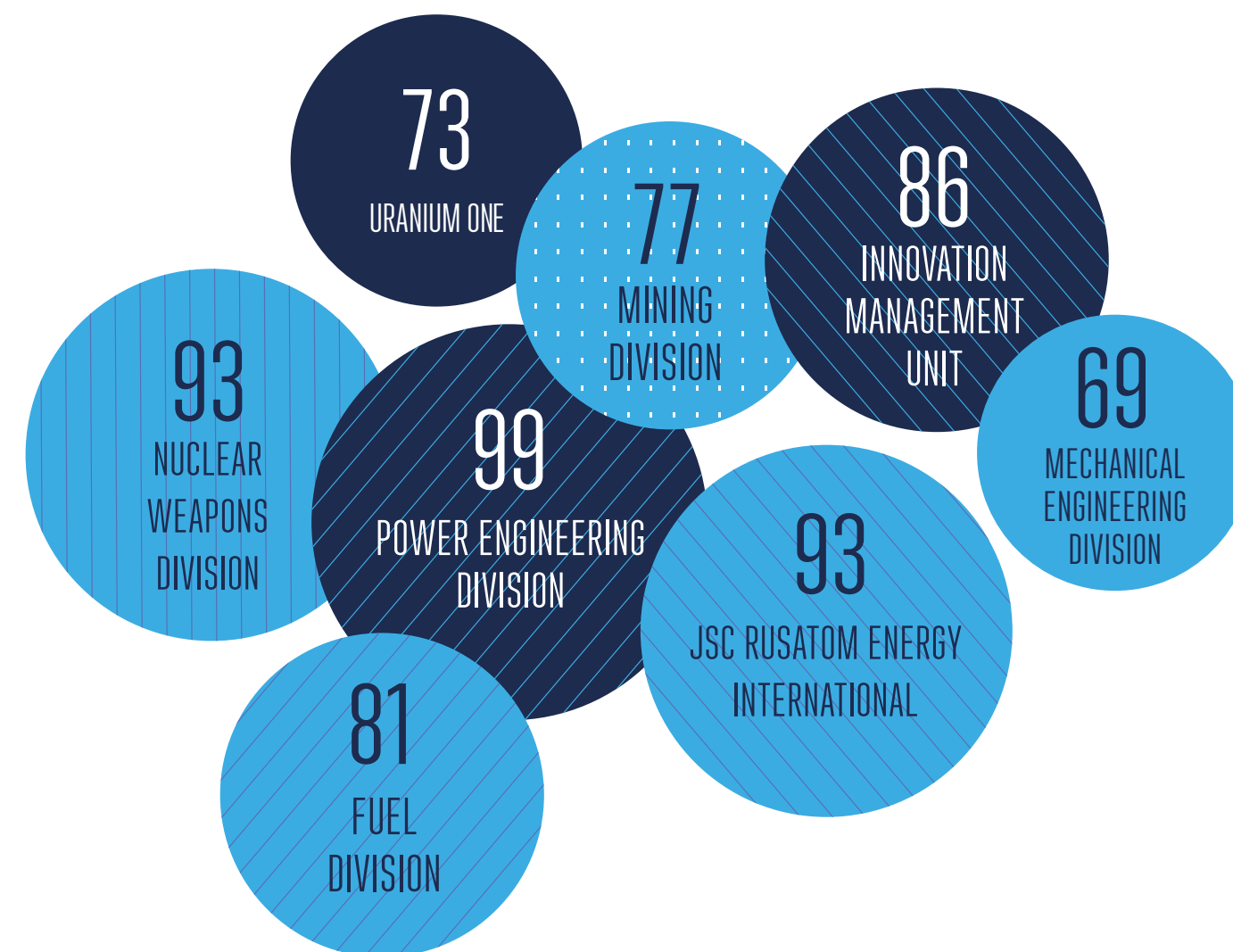
- Investment decisions are made collectively by the governing bodies of ROSATOM and its organizations;
- Decisions on key milestones of projects vital for ROSATOM are made and the projects are monitored at the level of the Corporation;
- Investment decisions related to ongoing maintenance of assets are delegated to organizations;
- To improve the efficiency 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 organizations in the industry for a year and for the medium term based on available investment resources and the required rate of return on investment;
- Deviations from project implementation plans in the organizations in the industry are monitored at the level of the Corporation;
- Organizations in the industry use a phase-gate approach to project implementation;
- Experts are engaged to perform an in-depth probabilistic risk analysis for ROSATOM's most important projects;
- A comprehensive audit is conducted, which helps formulate recommendations on how to improve planning and implementation of investment projects;
- ROSATOM is developing approaches to raising financing as an alternative to using its own funds.

6.4.2.2. Results in 2016

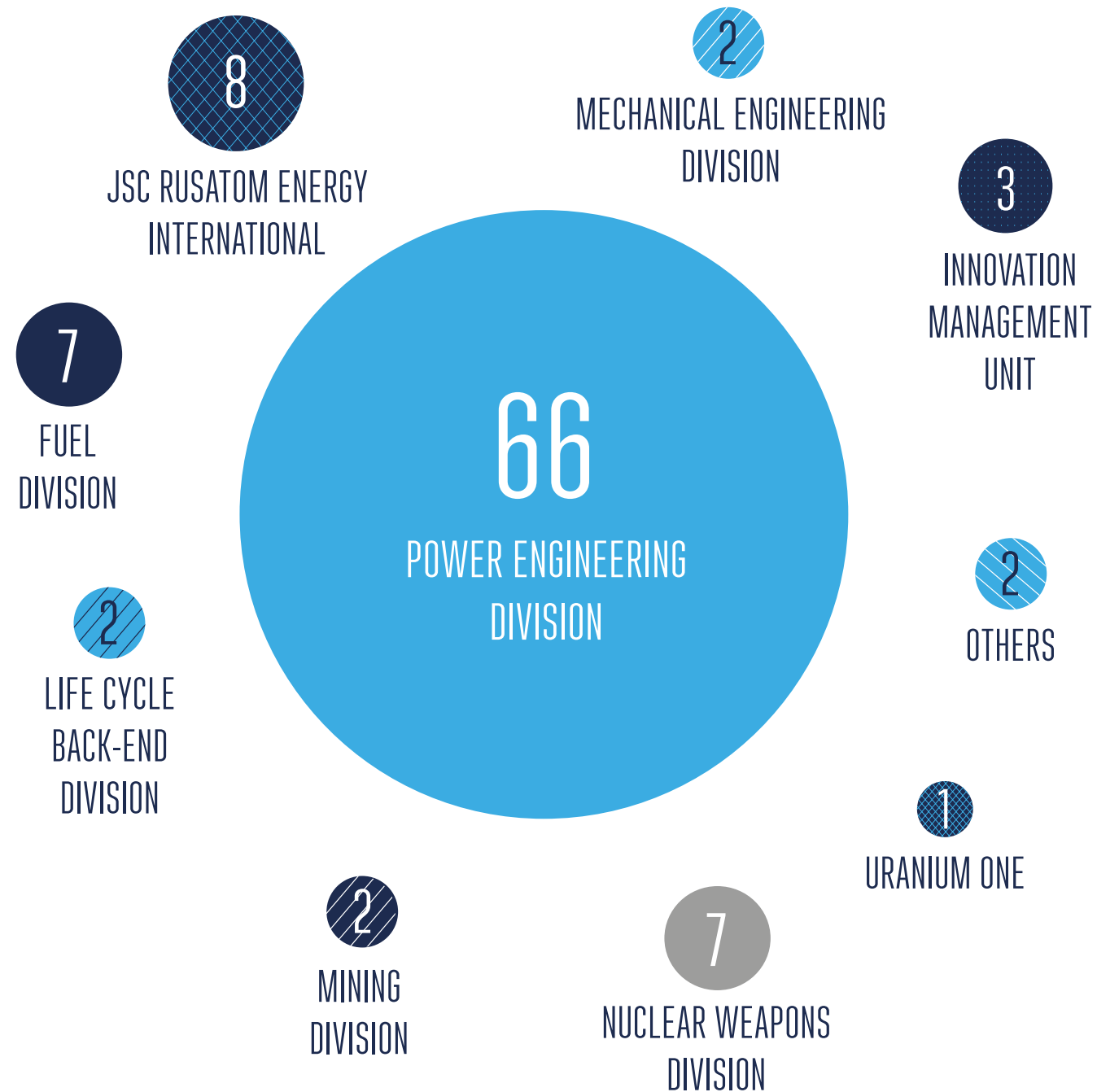
In 2016, ROSATOM's investment programme was 93% completed. ROSATOM, including its Divisions, did not implement the investment programme in full due to measures to achieve financial savings and postponement of funding of certain projects to the subsequent reporting periods.

Return on the investment portfolio stood at 17.7%.

PERFORMANCE OF CORE DIVISIONS AND COMPLEXES AGAINST THE INVESTMENT PROGRAMME TARGETS, %



INVESTMENTS BY CORE DIVISION/COMPLEX IN 2016, %

KEY INVESTMENT PROJECTS OF ROSATOM⁴¹

Division/complex	Project	Key results in 2016 ⁴²
Fuel Division	Modernization of separation facilities at JSC UEIP	A process unit with ninth-generation gas centrifuges was put into operation
	Project Columbus (enabling and supporting the first stage of commercial deliveries of Russian-design nuclear fuel to the US market)	An international consortium was formed in order to license Russian-design fuel for PWR reactors in accordance with the requirements of US regulators
	Development of the design and technology for the manufacture of superconducting wire at the request of CERN	A positive opinion on the quality of pilot samples of the wire was obtained from CERN; this enables ROSATOM to participate in the tender for the supply of superconducting wire for the Large Hadron Collider
JSC Rusatom Energy International	Construction of Akkuyu NPP (Turkey)	Amendments were made to Turkish legislation (including the electricity market law), enabling ROSATOM to obtain the necessary licences and start the construction of the NPP
	Construction of Hanhikivi NPP (Finland)	The first packages of licensing documentation prepared using ADLAS technology, which is new to ROSATOM's Project Team, were submitted to the Radiation and Nuclear Safety Authority of Finland (STUK). The first packages of input data for the design of Hanhikivi NPP were received from GE-Alstom. JSC Experimental Design Bureau Gidropress prepared a package of documentation providing a rationale for the reactor vessel technology

⁴¹ Apart from NPP construction in Russia (information on the implementation of the investment programme of the Power Engineering Division is provided in the 2016 report of JSC Rosenergoatom Concern).

⁴² For details, see the relevant sections of the Report and the annual reports of JSC Atomredmetzoloto, JSC TVEL and JSC Atomenergomash for 2016.

KEY INVESTMENT PROJECTS OF ROSATOM

Division/complex	Project	Key results in 2016
Nuclear-powered icebreaker fleet	Construction of port vessels to be operated in the port of Sabetta for OJSC Yamal LNG	Two port tugboats were built and commissioned ahead of schedule, which enabled the start of operation of the port fleet in the port of Sabetta
Mining Division	Uranium mining in Russia	Positive opinions and permits were obtained for the construction and commissioning of a number of facilities at the Division's uranium mining enterprises
Mechanical Engineering Division	Manufacture of NPP equipment at Atomash in Volgodonsk	Machinery was upgraded; new welding equipment was purchased; a site for the final assembly of steam generators, a set of equipment for local heat treatment, modern testing and quality control systems, etc., were provided
Life Cycle Back-End Division	Construction of a pilot and demonstration centre for spent nuclear fuel reprocessing at FSUE Mining and Chemical Plant	The first start-up facility was put into commercial operation
New businesses	Establishment of a state-of-the-art plant for the production of PAN precursor	The Division's product strategy based on the project was developed and approved; independent experts confirmed the target cost of production of PAN precursor; the site for the construction of the plant was selected; front-end engineering design was completed, and technical specifications were drafted for main process equipment
	Wind power	Lagerwey was selected as the technological partner for the construction of wind farms in Russia.

6.4.2.3. Measures to improve investment efficiency

ROSATOM continued to adjust the system of incentives for participants of investment activities and projects (to ensure that managers and members of project teams reach project milestones and that project owners obtain benefits from the project that were stated earlier).

The Corporation is implementing a project to establish a Project Management School, which will serve as a single industry-wide platform for project talent management.

A system was developed for project risk management based on the assessment of the likelihood of events or scenario conditions by industry experts.

The first project to develop an industry-wide automated project portfolio management system (the Sirius information system) was completed; this will help to improve the accuracy of project milestone planning and the strictness of budget accounting and to assign personal responsibility to key members of the project team.

In 2016, ROSATOM acted as a partner of the Project Olympus contest held by the Analytical Centre for the Government of the Russian Federation. JSC Science and Technologies, JSC AEM-Technology, JSC Afrikantov OKBM and JSC Chepetsky Mechanical Plant (organizations of ROSATOM) submitted contest entries in the 'Integrated Project Management System' and 'ROSATOM's Project Management System' categories and won prizes and awards.

6.4.2.4. Challenges of the reporting period and mitigation measures

Challenge	Mitigation measures
Underinvestment (higher cost of credit resources, restrictions on raising funds on the global market), which limits the Corporation's ability to build an investment project portfolio	<ul style="list-style-type: none">• Securing external funding;• Making timely decisions to abandon or suspend a number of projects;• Optimizing project budgets using technological and price analysis.

Challenge	Mitigation measures
Inadequate rationale for investments	<ul style="list-style-type: none"> • Standardization of requirements for project management, supporting materials, material quality control procedures; • Improvement of the project review institution; • Improvement of the industry-wide knowledge base on investment activities and projects; • Development of competences of project team members.
Major changes in the external environment (macro parameters)	<ul style="list-style-type: none"> • Search for new projects, technological and design solutions for ongoing projects to optimize investment expenditures; • Improvement of accuracy in investment and project planning; • Stricter control over the intended use of funds; • Abandoning ineffective projects; • Improvement of the risk management system.
Lack of manoeuvrability of the project portfolio	<ul style="list-style-type: none"> • Giving priority to projects with the shortest payback period (DPP); • Linking projects through shared deliverables to track their mutual influence.
Lack of professional project managers	<ul style="list-style-type: none"> • Creating centralized tools for assessment, training and formulation of individual development plans; • Development of a system of financial and non-financial incentives for the project manager and the project team; • Developing career path options for project team members and project managers.

6.4.2.5. Plans for 2017 and for the medium term

- To develop the competences of participants of projects and investment activities;
- To improve the system of incentives for participants of projects and investment activities;
- To increase the level of process automation and minimize manual data input through the integration of the Sirius information system with other corporate IT systems;
- To improve the accuracy of medium-term investment forecasts.

6.5. OPTIMIZATION OF PRODUCTION AND BUSINESS PROCESSES AND COST REDUCTION

RPS PRINCIPLES
HELP TO ACHIEVE
ONE OF ROSATOM'S
STRATEGIC GOALS:
TO REDUCE THE
PRODUCTION COST
AND THE LEAD TIME.

KEY RESULTS IN 2016:

- **IN 2015 AND 2016, PRODUCTION INVENTORY IN ROSATOM'S ORGANIZATIONS WAS REDUCED BY RUB 20 BILLION;**
- **LABOUR PRODUCTIVITY IN THE INDUSTRY INCREASED BY 8%;**
- **SAVINGS FROM THE IMPLEMENTATION OF THE COST REDUCTION PROGRAMME (PORA) TOTALLED RUB 5.9 BILLION.**

6.5.1. ROSATOM'S PRODUCTION SYSTEM⁴³

ROSATOM's Production System (RPS) is a lean manufacturing culture and a continuous process improvement system providing ROSATOM with a competitive advantage on a global level. RPS principles help to achieve one of ROSATOM's strategic goals: to reduce the production cost and the lead time by detecting and eliminating all types of losses in production and in offices and improving the performance of each employee.

In 2016:

- We optimized 64 production flows;
- We implemented 2,000 projects aimed at the optimization of production and office processes;

- Employees in the industry submitted 60,000 proposals for improvements; over 45,000 of them were implemented;
- 26,000 employees completed RPS training courses; 120 RPS coaches were certificated; ~5,000 people received training at 14 Process Factories (platforms for practical training in RPS principles and tools).

Enterprises forming part of ROSATOM's Production System (RPS enterprises)

In 2015, it was decided to apply a systematic approach to the roll-out of RPS at industry enterprises. This involves the following:

- Decomposition of goals to the level of area supervisors;
- Optimization of manufacturing of an enterprise's core products (production flows);
- Implementation of RPS projects and proposals for improvements;
- Training and motivation of employees.

⁴³ For details on the RPS implementation at the industry enterprises, see the sections on the operations of ROSATOM's Divisions and the reports of JSC Atomredmetzoloto, JSC TVEL, JSC Atomenergomash, JSC ASE EC and JSC Rosenergoatom Concern for 2016.

In 2016, 18 industry enterprises participated in the system-wide roll-out of RPS. They were set the following targets:

- To achieve at least 90% of the business goals of an enterprise;
- To achieve 100% of qualitative and quantitative targets for production flows;
- To ensure that 90% of executives have achieved their targets for personal RPS projects;
- To ensure that 100% of project managers and participants have undergone training;
- To achieve a level of employee involvement in RPS totalling 50–75%.

In 2016, 12 out of 18 enterprises were given the status of an RPS Leader as they achieved targets for all indicators.

In 2017, 5 more enterprises will be included in the scope of the system-wide roll-out of RPS. By 2020, ~30 enterprises whose core products account for about 8% of the total production cost in ROSATOM’s production and process chain are expected to be involved in RPS.

In addition to the development of RPS enterprises, minimum mandatory RPS requirements have been approved for all industry enterprises.

In 2016, RPS engineering standards for construction projects of ROSATOM were developed; they include the following requirements:

- The milestones in the construction of a facility should be reached on time;
- The target cost of a project (facility) in the prices of respective years of construction should be reached;
- The actual scope of construction and installation operations and health and safety targets (LTIFR/ reduction in the severity of injuries at production sites).

The pilot sites have been chosen for RPS implementation in 2017: power unit No. 2 of Novovoronezh NPP-2, power unit No. 4 of Rostov NPP, power units No. 1 and 2 of Kursk NPP-2, power units No. 1 and 2 of the Belarusian NPP, the Multipurpose Fast Neutron Reactor construction project, capital construction projects in the CATF of Sarov and at FSUE Mining and Chemical Plant.



In 2016, the following results were achieved at 18 RPS enterprises:

- **The ratio of costs to revenue decreased by 5–20%;**
- **The inventory turnover period was shortened by 10–29% (in days);**
- **Labour productivity increased by 9–54%;**
- **The lead time for the manufacture of core products decreased by 15–52% (by 30% on average).**



As from 2018, 23 enterprises participating in the system-wide roll-out of RPS are required to take into account a candidate’s experience in and knowledge of RPS when including the candidate in the succession pool and appointing him or her to a higher position. In the future, this requirement will be applied to all industry enterprises.

6.5.2. ROSATOM’S COST OPTIMI- ZATION PROGRAMME

In 2016, ROSATOM launched a two-year Cost Optimization Programme (PORA) aimed at:

- Developing and implementing non-production cost management tools to improve the performance of ROSATOM and its organizations;
- Achieving savings totalling RUB 5 billion from cost reduction in 2016 and 2017.

As part of the PORA programme:

- Standards are revised/set (e.g. standards on rental payments, the number of vehicles to be provided, tariffs for telecommunication services, etc.);
- Industry-wide rules are issued (the travel policy, haulage guidelines, etc.);
- Requests for goods and services are consolidated; procurement is centralized; costs are reduced due to the economy of scale and standardization of requirements.

In 2016, overall savings from the implementation of projects forming part of the PORA programme totalled RUB 5.9 billion. In 2017, savings are expected to total RUB 3.1 billion.

SAVINGS FROM PROJECTS FORMING PART OF THE PORA PROGRAMME IN 2016

Project	Savings, RUB billion
Electricity (modernization of lighting; renovation of thermal insulation of buildings; relocation of production facilities, sale and mothballing of facilities; replacement of windows, thermal insulation of facades)	1.6
IT services/telecommunications/advertising/security/consulting/others (uniform preferential tariffs set by mobile operators for industry enterprises; reduction in the use of consumables for printing; category-based procurement of materials)	1.9
Lease/repairs (review of rental rates; optimization of rented space; accommodating subsidiaries and branches in one business centre; intra-industry lease)	0.8
Transport (reduction of the number of vehicles in accordance with the requirements for the standards of provision and use of transport; implementation of monitoring and objective control systems; optimization of logistic routes)	1.2
Business trips (agreements/corporate discounts from airline companies and hotel chains; business trip optimization in terms of the length of stay; reduction of the number of business trips through the transition to video conferencing)	0.4
Total	5.9

6.6. PROCUREMENT MANAGEMENT



ROMAN ZIMONAS

DIRECTOR FOR PROCUREMENT, LOGISTICS
AND QUALITY MANAGEMENT



KEY RESULTS IN 2016

- **OVERALL SAVINGS FROM COMPETITIVE PROCUREMENT PROCEDURES (USING ROSATOM'S OWN FUNDS AND FEDERAL BUDGET FUNDS) TOTALLED RUB 29.82 BILLION;**
- **THE SHARE OF ELECTRONIC PROCUREMENT TOTALLED 99%;**
- **THE VALUE OF CONTRACTS CONCLUDED WITH SMALL AND MEDIUM-SIZED ENTERPRISES TOTALLED RUB 72.5 BILLION;**
- **PURSUANT TO THE ORDER OF THE PRIME MINISTER OF RUSSIA TO DISCLOSE INFORMATION ABOUT COUNTERPARTIES, ROSATOM DISCLOSED INFORMATION ON ~18,000 COUNTERPARTIES (100%).**

— **ROSATOM is a global company that does business worldwide. How does the Corporation's procurement system support the implementation of international projects?**

— ROSATOM actively participates in large-scale ambitious projects in foreign countries: its ten-year portfolio of overseas orders currently exceeds USD 133 billion.

The procurement system is based on the principles of openness and transparency, competition and equality among participants. Strict observance of legislative requirements is also a key aspect incorporated in the design of ROSATOM's procurement system. The procurement system has a certain degree of flexibility and can be adapted to an overseas working environment.

For instance, ROSATOM's Uniform Industrial Procurement Standard (UIPS) gives priority to

compliance with the national legislation of the countries where ROSATOM is implementing its projects. We can supplement the UIPS with additional requirements for suppliers and procurement procedures stipulated by the legislation of the country of a foreign customer or by a contract. The customer's requirements are extended to subcontractors along the entire cooperation chain. The notification and procurement documentation are developed in English and in the national language of the customer state, as a minimum. Additional information on procurement is published in the national electronic and/or print media providing information on bidding and tenders. It is important to note that the UIPS itself has been translated into English and is available on the English version of ROSATOM's procurement website.

— **An important aspect of operations of major international companies is to communicate corporate requirements to their partners and suppliers in order to ensure transparency and sustainability of supply chains. What measures does ROSATOM take in this regard?**

— ROSATOM’s procurement system complies with all basic international procurement principles. Competitive and open selection of suppliers and contractors that conform to reasonable, documented and verifiable requirements ensures that the procurement system is accepted by foreign customers and can be extended to contractor organizations outside of ROSATOM’s scope of consolidation.

We can set requirements not only for participants but also directly for manufacturers, both in terms of the legal capacity and having all the necessary licences and permits and in terms of experience in the manufacture of the relevant products. This allows us to guarantee, to a certain degree, that experienced and reliable manufacturers are selected. Moreover, a mandatory requirement for the disclosure of information on ultimate owners and beneficiaries by all organizations participating in the procurement process helps to reduce corruption risks and the risk of unlawful gains and redistribution of funds. In addition, we have an established practice of extending the requirements of foreign customers to all contractors and suppliers to be engaged. ●

The Uniform Industrial Procurement Standard (UIPS) (the Regulations on Procurement) of ROSATOM is the main document that regulates the procurement activities of ROSATOM and industry organizations.

Governing and supervisory bodies:

- Central Procurement Commission;

- Permanent procurement commissions of the Divisions;
- Central Arbitration Committee of ROSATOM and arbitration committees of the Divisions;
- Chief Controller.

Official procurement website:
www.zakupki.rosatom.ru.

6.6.1. IMPLEMENTATION OF THE ANNUAL PROCUREMENT PROGRAMME

In accordance with the Annual Procurement Programme for 2016, 33,689 competitive purchases totalling RUB 415.1 billion were made using the funds of ROSATOM and its organizations. Savings totalled RUB 28.2 billion (9.4% of the amount of actual purchases).

601 competitive purchases totalling RUB 35.86 billion were made using federal budget funds in accordance with Federal Law No. 44-FZ on the Contract System of the Federal and Municipal Procurement of Goods, Works and Services. Savings totalled RUB 1.62 billion (5% of the actual purchases).

As a result of the implementation of the Annual Procurement Programme, contracts were concluded with 17,996 counterparties. 52% of the contracts were concluded with small and medium-sized enterprises based on the results of procurement procedures. The share of electronic procurement totalled 99%.

AMOUNT OF COMPETITIVE PURCHASES AND ACHIEVED SAVINGS⁴⁴, RUB BILLION

	2014	2015	2016
Total amount of procurement orders placed under an open competitive procedure	556.2	643.59	450.96
Using ROSATOM’s own funds	432	622.4	415.1
Using federal budget funds	125.4	21.19	35.86
Total savings, including:	19.5 (5.3 %)	27.33 (4.82 %)	29.82 (9 %)
Savings from competitive procurement procedures using ROSATOM’s own funds	17.1 (6.9 %)	26.4 (4.8 %)	28.2 (9.4 %)
Savings from competitive procurement procedures using federal budget funds	2.4 (2.0 %)	0.93 (5.3 %)	1.62 (5 %)

⁴⁴ Savings from competitive purchases are the difference between the set initial maximum purchase price and the purchase price obtained as a result of competitive procurement procedures. Only actual procurement procedures were taken into account.

6.6.2. EXPANSION OF ACCESS TO PROCUREMENT PROCEDURES FOR SMALL AND MEDIUM-SIZED ENTERPRISES

Pursuant to Decree No. 1352 of the Government of the Russian Federation on the Special Features of Participation of Small and Medium-Sized Enterprises in the Procurement of Goods, Works and Services by Certain Types of Legal Entities dated December 11, 2014 (Decree No. 1352), nuclear organizations covered by the Decree achieved the target for the share of procurement: 21,893 contracts worth a total of RUB 72.5 billion were concluded with 8,222 small and medium-sized enterprises (SMEs).

A cooperation agreement has been concluded between ROSATOM and JSC Federal Corporation for Small and Medium-Sized Business Development; a joint working group has been created to deal with issues related to providing access to procurement for SMEs. Under the agreement, product categories to be purchased from SMEs have been identified for further development of category strategies and conducting competitive procurement procedures (including centralized procurement of paper for nuclear organizations); a special information brochure on procurement activities of ROSATOM and its organizations has been developed and circulated to SME suppliers.

In addition, in the reporting year, nuclear organizations covered by Decree No. 1352 published their annual reports on the procurement of goods, works and services by certain types of legal entities from small and medium-sized enterprises in the Integrated Information System in a timely manner.



In 2016, ROSATOM was awarded for the performance of its procurement system in the 2016 National Procurement Transparency Ranking. The Corporation was awarded the top ranking, Guaranteed Transparency, according to the annual survey of the National Association of E-Commerce Participants; it was also awarded the top prize, Company of the Year in Competitive Procurement, in the 2016 Competitive Procurement Leader competition.

6.6.3. IMPROVEMENT OF THE INDUSTRY-WIDE PROCUREMENT SYSTEM

In 2016, we developed category strategies⁴⁵ for materials and equipment, as well as for pilot categories of services; the category management of logistics was introduced in 73 of ROSATOM's organizations whose purchases of materials, equipment and works/services make up at least 85% of the total annual procurement programme. The value of contracts concluded under category strategies totalled RUB 178 billion. Savings from category-based procurement totalled RUB 15.2 billion, with additional savings⁴⁶ totalling RUB 10.6 billion.



In 2016, 154 training events were held in ROSATOM's Corporate Academy, including 90 professional development courses on various topics related to procurement activities. A total of 2,848 people underwent training, including 132 representatives of organizations interested in supplies to enterprises in the nuclear industry.

The Regulations on Procurement were amended to introduce anti-dumping measures that involve increasing the amount of contract performance security by a factor of 1.5 if the entity awarded the contract has proposed a contract price (taking into account all rebids) which is 50% or more below the initial maximum price.

The Uniform Industrial Procurement Standard was amended to enable foreign suppliers to participate directly in procurement procedures held by ROSATOM's organizations via electronic trading platforms (ETPs). Foreign bidders are now allowed to submit their bids via ETPs without certifying them with a personal electronic signature; the original bid documents must then be submitted to the organizer of the procurement procedure in paper format.

The requirements imposed by external customers on ROSATOM's organizations with regard to subcontractors, suppliers and associate contractors to be engaged under income-generating contracts, including organizations in the industry, may now be extended throughout the entire chain of cooperation.

ROSATOM's representative offices and organizations registered outside the Russian Federation were given access to the corporate procurement management system to enable procurement in foreign countries. The Uniform Industrial Procurement Standard of ROSATOM, key documents and model

⁴⁵ A category strategy is a plan of action to enable efficient procurement, supply and inventory management.

⁴⁶ Additional savings are savings from the development of category strategies (reduction of the initial maximum price below the level of the previous purchase).

forms for preparing and conducting procurement procedures outside the Russian Federation were translated into English.

In addition, bidders are now allowed to submit extracts from the Uniform State Register of Legal Entities or from the Uniform State Register of Individual Entrepreneurs generated on the website at <http://egrul.nalog.ru> as part of their bids; notification forms for non-competitive procurement have been developed and introduced; a number of mechanisms have been implemented to reduce the lead time in procurement.

6.6.4. COMMUNICATION WITH SUPPLIERS

ATOMEX International Forum

The 8th International Forum of Nuclear Industry Suppliers ATOMEX 2016 was held in Moscow in October 2016. The Forum was attended by 1,960 people and 244 companies from 16 countries. Over 60% of the participants represented supplier companies, with over 30% of them representing small and medium-sized enterprises. The number of supplier companies participating in the Forum increased by 50% compared to 2015.

The programme of the Forum included the plenary session and breakout sessions, workshops for suppliers on how to apply the principles of participation in competitive procurement procedures and work with ETPs.

ROSATOM's representatives also participated regularly in conferences and other events focusing on the development of the procurement system, such as the 11th National Forum and Exhibition 'GOSZAKAZ — For Transparent Public Procurement', the 4th National Conference 'Procurement in the Defence Industry', etc.

6.6.5. PLANS FOR 2017 AND FOR THE MEDIUM TERM

In 2017, we plan to carry out over 297 competitive procurement procedures using federal budget funds totalling over RUB 18.8 billion and 27,335 competitive procurement procedures using the funds of ROSATOM and industry organizations totalling over RUB 730.3 billion. Procurement schedules have been posted on the websites at www.zakupki.gov.ru and www.zakupki.rosatom.ru and the organizations' own websites.

In 2017, the organizations of ROSATOM covered by Decree No. 1352 plan to purchase products worth a total of over RUB 46.4 billion from small and medium-sized enterprises.

We will continue to implement category management. The scope of purchases to be covered by category management is expected to total RUB 450 billion (without taking into account possible changes in the Annual Procurement Programme).

To improve the foreign procurement methodology, ROSATOM plans to develop industry documents establishing the procedure and rules for procurement as part of the implementation of foreign projects taking into account the legislative requirements in the countries where ROSATOM is implementing its projects, the Russian legislation and concluded contracts.

In the sphere of quality management, the Corporation plans to:

- Develop the methodology for inconsistency management, a defect classification list and a uniform approach to inconsistency management at enterprises;
- Implement 'built-in quality' tools at all stages of procurement, conclusion and performance of a contract (a stage-gate process: a phase-by-phase refinement of product quality requirements; elimination of causes of known inconsistencies; evaluation of product compliance with the stated requirements; standardization of technical specifications and quality plans; conducting audits; improvement of contract appendices concerning quality);
- Create an integrated information system on quality and indicators describing the impact of detected inconsistencies on changes to the time frame and costs of performed operations.

In accordance with the Interim Uniform Industry-Wide Procedure for the Procurement of Critically Important Goods, Works and Services, in 2017, the Corporation plans to:

- Incorporate built-in quality mechanisms in the procurement process;
- Standardize technical specifications for goods, works and services to be purchased, and hold an open professional discussion of requirements and standard technical specifications;
- Audit the accuracy and reliability of information on manufacturers, contractor companies and service companies when purchasing standardized goods.

6.7. INTERNAL CONTROL SYSTEM

THE INTERNAL CONTROL SYSTEM OF ROSATOM AND ITS ORGANIZATIONS IS BASED ON:

- RUSSIAN LAWS AND REGULATIONS;
- THE IAEA REQUIREMENTS;
- THE COSO MODEL (THE COMMITTEE OF SPONSORING ORGANIZATIONS OF THE TREADWAY COMMISSION);
- GUIDELINES FOR INTERNAL CONTROL STANDARDS FOR THE PUBLIC SECTOR BY THE INTERNAL CONTROL STANDARDS COMMITTEE OF THE INTERNATIONAL ORGANIZATION OF SUPREME AUDIT INSTITUTIONS (INTOSAI).

KEY RESULTS IN 2016:

- MAJOR DEVIATIONS IN THE COURSE OF OPERATIONS OF ROSATOM AND ITS ORGANIZATIONS WERE DETECTED ON TIME AND IN FULL, WHICH WAS CONFIRMED BY AN INDEPENDENT PERFORMANCE ASSESSMENT OF THE INTERNAL CONTROL AND AUDIT SERVICE BY THE CORPORATION'S TOP MANAGEMENT;
- DURING RAPID MONITORING OF FINANCIAL MANAGEMENT QUALITY BY THE RUSSIAN MINISTRY OF FINANCE FOR 2016, ROSATOM'S INTERNAL CONTROL SYSTEM SCORED 100 POINTS ON ALL DIMENSIONS OF THE CONTROL AND AUDIT ASSESSMENT, WHICH IS THE HIGHEST POSSIBLE SCORE;
- DURING AN INTEGRATED ASSESSMENT OF THE IN-HOUSE FINANCIAL AUDIT BY THE ACCOUNTS CHAMBER OF THE RUSSIAN FEDERATION, THE CORPORATION SCORED 6.72 POINTS OUT OF A POSSIBLE 7;
- SERGEY SUKHANOV, AN EMPLOYEE OF ROSATOM'S CENTRAL OFFICE, WON THE BEST INTERNAL CONTROLLER COMPETITION ORGANIZED BY NON-PROFIT PARTNERSHIP NATIONAL UNION OF INTERNAL AUDITORS AND CONTROLLERS;
- CERTIFICATION IN ACCORDANCE WITH THE INTERNAL CONTROLLER PROFESSIONAL STANDARD WAS CONDUCTED FOR THE FIRST TIME IN RUSSIA.

6.7.1. RESULTS IN 2016

Development of the internal control system

In the course of preparation of a consolidated monitoring plan for specialized internal control bodies (SICB) in the reporting year, focus areas included monitoring of the achievement of ROSATOM's strategic goals and priorities. In 2016:

- Compliance with consolidated schedules of initiatives aimed at achieving strategic goals was monitored;
- Performance against KPI targets of 30 key executives in the industry was audited;
- Implementation of plans to reduce the amount of unused facilities under construction and equipment to be installed (in order to achieve the target reduction in production cost and the lead time) by ROSATOM's organizations was monitored;
- Heads of SICB in ROSATOM's Divisions were assigned personal responsibility for independent monitoring of the achievement of the Corporation's strategic goals and priorities.

To develop stakeholder control and reduce the risk of default on contractual obligations, the Business Reputation Rating information system was introduced. The system contains information on suppliers' default on obligations under contracts with organizations in the nuclear industry. The system makes it possible to calculate the business reputation score of a supplier, which is used as one of the qualitative criteria for the selection of suppliers in the course of procurement procedures.

In addition, in 2016, a risk map was approved for the Hanhikivi 1 NPP investment and construction project; it will help to improve the monitoring of investment and construction activities.

Conducting inspections

SICB conducted 641 inspections in 165 organizations of ROSATOM. 9 inspections were conducted by external regulators, including 5 inspections by the Accounts Chamber of the Russian Federation. No instances of misuse or illegal use of budgetary funds or assets were detected.

Findings of inspections conducted in 2016 show an improvement of financial and business discipline in a number of areas. There was a reduction in the number of violations during the performance of government contracts and investment agreements, tax assessment and accounting, as well as in the number of instances of non-compliance with local regulations.

Following the inspections, 563 corrective measures were developed and approved by the management of ROSATOM and its organizations. Implementation of corrective measures remains effective, which helps to reduce the likelihood of repeated violations.

Stricter sanctions began to be imposed for violations: based on the findings of inspections conducted in the reporting year, disciplinary sanctions were imposed on 582 employees of ROSATOM's organizations, including the dismissal of 6 senior managers. 13 findings of inspections conducted by SICB were submitted to asset protection departments for further analysis.

Stakeholder control

In 2016, the Central Arbitration Committee of ROSATOM and the arbitration committees⁴⁷ of the Power Engineering and Fuel Divisions received 1,029 reports (complaints) from suppliers

about violations of the Uniform Industrial Procurement Standard. 691 complaints were investigated; 262 complaints (38%) were deemed to be substantiated. Other complaints were withdrawn by complainants before being investigated by an arbitration committee or were dismissed on the following grounds:

- Because the deadline for filing the complaint had passed;
- Because a similar complaint had been considered by the Federal Antimonopoly Service;
- Because the complainant was not entitled to file a complaint (after the deadline for submitting bids has passed, complaints may only be filed by bidders who have submitted a bid).

Systematic work of arbitration committees, including detailed explanations provided during the investigation of complaints to customers/procurement authorities with regard to the nature of detected violations and quarterly publication of information on arbitration precedents on the official procurement website of the nuclear industry, has enabled a considerable reduction in the number of violations during large-scale procurement.

[See also the section 'Procurement Management'.](#)

6.7.2. PLANS FOR 2017

To improve the performance of the governance and control system in ROSATOM's divisions, the performance of SICB will be further improved by:

- Giving priority to the development of audit and expert analysis;
- Expanding the range of tools used for thematic inspections (inspection (audit) of one of ROSATOM's core businesses to assess the achievement of strategic goals and priorities), whose findings enable SICB to determine the degree of assurance that the Corporation's goals and priorities will be achieved;
- Enhancing preventive control in order to avoid potential deviations before key decisions are made;
- Developing a framework for the transition to monitoring based on 'big data' (monitoring of large sets of managerial and accounting data).

Stakeholder control during public procurement and asset sales will be developed by:

- Expanding the scope of work of arbitration committees to cover Divisions (setting up arbitration committees in Divisions);
- Rolling out the business reputation rating system for assessing suppliers in the nuclear industry.

ROSATOM plans to ensure full and timely detection of major deviations in its financial and business operations that may hinder the Corporation and its organizations from achieving their business goals (the relevant measures include assigning greater responsibility to SICB in Divisions).

In addition, in 2017, investment and construction risk maps will be rolled out to other projects.

⁴⁷ These bodies are responsible for ensuring compliance with the law and out-of-court settlement of disputes during placement of orders for goods, work and services for the needs of ROSATOM and its organizations.

6.8. PREVENTION OF CORRUPTION AND OTHER OFFENCES

ROSATOM HAS IMPLEMENTED AN INTEGRATED INDUSTRY-WIDE SYSTEM FOR THE PREVENTION OF CORRUPTION AND OTHER OFFENCES.

Measures to prevent corruption and other offences were implemented in accordance with ROSATOM's Anti-Corruption Plan for 2016 and 2017 prepared on the basis of and pursuant to Federal Law No. 273-FZ on Combating Corruption dated December 25, 2008, Decree No. 147 of the Russian President on the National Anti-Corruption Plan for 2016 and 2017 dated April 1, 2016 and other anti-corruption laws and regulations.



In the reporting year, ROSATOM complied with legislative requirements with regard to restrictions, prohibitions and obligations imposed on employees of state-owned corporations.

Employees provided information on their income, expenses, property and liabilities under the procedure established by the legislation; this information was posted on ROSATOM's official website.

6.8.1. RESULTS IN 2016

ROSATOM improved the legal framework underlying its anti-corruption efforts:

- The following orders were published: On Approving the Procedure for the Prevention of Any Potential Conflicts of Interest by ROSATOM's Employees (replacing a similarly titled order adopted in 2014 that had become invalid); On Amending the Regulations on the Commission on Compliance with Professional Conduct Requirements and Resolution of Conflicts of Interest in ROSATOM; On Approving the Procedure for Registration and Review of Potential Conflicts of Interest Reported by ROSATOM's Employees;
- Measures were taken to ensure that the charters of key organizations in the nuclear industry comply with the requirements of anti-corruption legislation.

ROSATOM improved the efficiency of anti-corruption measures in the course of procurement of goods, work and services for the needs of the state [\(see also the section 'Procurement Management'\)](#):

- Amendments to the Uniform Industrial Procurement Standard underwent an anti-corruption review in order to eliminate factors contributing to corruption.
- The annual procurement plan was made publicly available (via the integrated procurement information system); electronic procurement was conducted via electronic trading platforms; anti-corruption clauses were included in contracts related to ROSATOM's business operations.

Corruption risks in business processes of nuclear organizations were assessed, and compliance of the organizations' anti-corruption efforts with the requirements of anti-corruption legislation was monitored.

Training centres in the industry provided anti-corruption training to employees of ROSATOM and its organizations and ran professional development programmes for executives responsible for preventing corruption and other offences. In 2016, over 60 employees of ROSATOM's central office, including heads of divisions, completed anti-corruption training programmes approved by the Presidential Administration of Russia.

Organizational and supervisory measures were implemented to keep ROSATOM informed about the implementation of the necessary anti-corruption measures by senior executives of organizations in the industry.

In the reporting year, ROSATOM continued to run awareness campaigns, including via the industry media, to form a zero tolerance attitude to any corrupt practices among employees in the industry. Measures were taken to enhance the role of the Hotline as a tool for providing feedback on matters related to the prevention of corruption and other offences.

The experience of ROSATOM's organizations involved in foreign trade was summarized. The list of major risks associated with the possibility of application of foreign anti-corruption laws, their consequences and measures to mitigate these risks was compiled.

For information on the outcomes of anti-corruption measures implemented in ROSATOM's Divisions, see the 2016 annual reports of JSC Atomredmetzoloto, JSC TVEL, JSC TENEX, JSC ASE EC, JSC Atomenergomash and JSC Rosenergoatom Concern.

6.8.2. PLANS FOR 2017

- To improve the efficiency of anti-corruption management in ROSATOM and its organizations, including through timely detection, prevention and resolution of conflicts of interest among employees;
- To assess corruption risks in business processes forming part of the implementation of large-scale projects;
- To develop professional skills of executives responsible for preventing corruption and other offences;
- To arrange comprehensive monitoring of the organizations' anti-corruption efforts, with a focus on the principle that detected instances of corruption and other offences are inevitably punished in accordance with the law;
- To continue to run awareness campaigns in order to form a zero tolerance attitude to any corrupt practices among employees in the industry.



ROSATOM IS A RESPONSIBLE COMPANY
THAT CREATES A FAVOURABLE
ENVIRONMENT FOR ITS EMPLOYEES
AND MAKES AN IMPORTANT
CONTRIBUTION TO THE DEVELOPMENT
OF RUSSIAN REGIONS

7.1. PERSONNEL MANAGEMENT



TATYANA TERENTYEVA
DIRECTOR FOR HUMAN RESOURCES

KEY RESULTS IN 2016:

- **THE AVERAGE MONTHLY SALARY TOTALLED RUB 69,700 PER MONTH (+8.4% AGAINST 2015);**
- **31.9% OF EMPLOYEES WERE AGED UNDER 35;**
- **THE EMPLOYEE ENGAGEMENT RATE STOOD AT 77% (ON A PAR WITH THE BEST EMPLOYERS IN RUSSIA);**
- **54% OF MEMBERS OF THE EXECUTIVE SUCCESSION POOL WERE APPOINTED TO A NEW POSITION;**
- **OVER 1,000 UNIVERSITY GRADUATES WERE HIRED BY NUCLEAR ORGANIZATIONS.**

— *Personnel is the key capital of a modern high-tech company. What is the role of staffing in the implementation of ROSATOM's long-term strategy? What are the primary risks and challenges in personnel management in the short and long term?*

— In the current environment, where the global economy is becoming digital and the speed of penetration of technologies and innovations is increasing day by day, yet there is an ever-widening gap between the leaders and companies lagging behind on the market, the main focus is on the innovative potential and creativity of employees.

People offer breakthrough developments and technologies that enable a business to not just be at market level, but one or two steps ahead of competitors.

And whereas in the short term the priority objective of staffing is the search for, training and retention of high-potential employees,

the long-term objective is to develop an environment and corporate culture consistent with the business strategy, enabling the best employees to show and develop their talents for the benefit of the business.

I think that currently, the largest risks and challenges are associated with growing competition and the speed at which new technologies are being implemented. In order to be ahead of others, you don't need to just move, you need to move quickly. Given the growth of robotization, automation and platform solutions based on the analysis of big data, by 2030, not only will low- and medium-skilled workers be gradually replaced by highly competent specialists, but also all existing professions will become

more complex. A specialist will be responsible for a larger number of sequential functions and areas of work. This will require greater responsibility, mobility and readiness for change on the part of both employees and employers. Those who are able to adapt faster than others will have an increasing advantage.

— *What key competences do you think an employee of ROSATOM should have? Given global trends and technological development, how will this set of competences change in the future?*

— In my opinion, technological trends and the high level of informatization of the modern society will ultimately change the entire structure of the labour market and lead to a growth in demand for manual skills. There will be a shortage of capabilities that 'make people human': proactive

specialists with creative and critical thinking who are imaginative, share values consistent with the interests of the business and are ready for cross-cultural interaction. Even today, we can already see globalization of demand for a number of professions: English-speaking programmers, engineers, developers and designers.

In the near future, ROSATOM, like its competitors, will not just need specialists with a second language, but highly educated leaders who have broad all-round knowledge, are willing to take on ambitious projects and multitask in a constantly changing business environment, and are able to negotiate and establish relations with any clients and customers at an international level. ●

In 2016, ROSATOM and its organizations employed 249,900 people, including 1,900 people in foreign organizations. 143,900 employees⁴⁸ (57.6% of the total headcount) have a university degree. 3,487 employees (1.4%) are Candidates and Doctors of Sciences.

AVERAGE HEADCOUNT BY BUSINESS AREA, '000 PEOPLE

Division/complex/organization	2014	2015	2016
Nuclear Weapons Division	89.26	92.38	95.23
Mining Division	10.04	8.19	7.28
Uranium One Holding	2.9 (2.8 ⁴⁹)	2.9 (2.8)	1.58 (1.48)

Division/complex/organization	2014	2015	2016
Fuel Division	25.17	22.53	22.13
Sales and Trading Division	0.55	0.54	0.57
Power Engineering Division	50.15	51.0	48.57
Mechanical Engineering Division	20.46 (0.2)	19.1 (0.2)	17.28 (0.32)
Advanced materials and technologies	0.75	0.69	0.64
Overseas Division	0.64	0.7	0.79
New businesses	-	-	0.39
Engineering Division	17.7 (0.18)	18.00 (0.15)	14.99 (0.11)
Life Cycle Back-End Division	10.04	9.96	9.62
Innovation Management Unit	14.54	12.27	11.89
Administrative units	4.46	6.03	6.6
ITPC	1.5	3.5	3.44
Security units	8.4	8.51	8.65
Non-core assets	1.21	0.36	0.29
ROSATOM, total	257.77	256.66	249.94

The age of employees averaged 43.5 years. 31.9% of employees were aged under 35.

In 2016, the personnel turnover rate stood at 10.45%. Over the past three years, this rate has been decreasing due to the competitiveness

⁴⁸ Hereinafter, in accordance with the GRI Sustainability Reporting Standards (GRI SRS), the term 'employee' is equivalent to the GRI term 'employee'.

⁴⁹ The figures in brackets indicate the average headcount in foreign organizations of the Divisions.

of remuneration and the benefit package offered by the Corporation (in 2014 and 2015, the turnover rate stood at 12.8% and 11.15% respectively).

The downsizing at ROSATOM forms part of measures to achieve the strategic goal of reducing the production cost and the lead time. As part of these measures, work processes are automated, new production and management technologies are introduced, and a number of functions are outsourced. This helps to improve the performance of organizations.

In the reporting year, the Power Engineering Division implemented a downsizing programme, and employees that were made redundant were provided with all necessary support, including transfer to other NPPs or enterprises of ROSATOM.

In 2016, the Mechanical Engineering Division changed the scope of consolidation (which involved a reduction in the number of enterprises included in the Division) and implemented downsizing measures (including outsourcing of certain functions, such as transport, auxiliary facilities, etc.).

The change in the number of employees in the Engineering Division was due to the completion of work on a number of construction projects, organizational changes in the Division (including integration with JSC ATOMPROEKT) and measures aimed at increasing labour productivity and improving business performance.

In 2016, the Mining Division carried out a comprehensive performance improvement programme (including downsizing), which made it possible to make a profit at year end.

At the same time, in recent years, there has been an increase in the number of employees in the

organizations of the Nuclear Weapons Division. This is due to the development of new civilian manufacturing enterprises.

In the medium term (until 2019), no significant change in the average headcount is expected (fluctuations in the number of employees are projected at 1–2% of the total headcount).

7.1.1. STAFF COSTS

In 2016, staff costs totalled RUB 279.6 billion, up by 6% year on year. The costs per employee per year increased from RUB 1,033,200 in 2015 to RUB 1,114,200 in 2016.

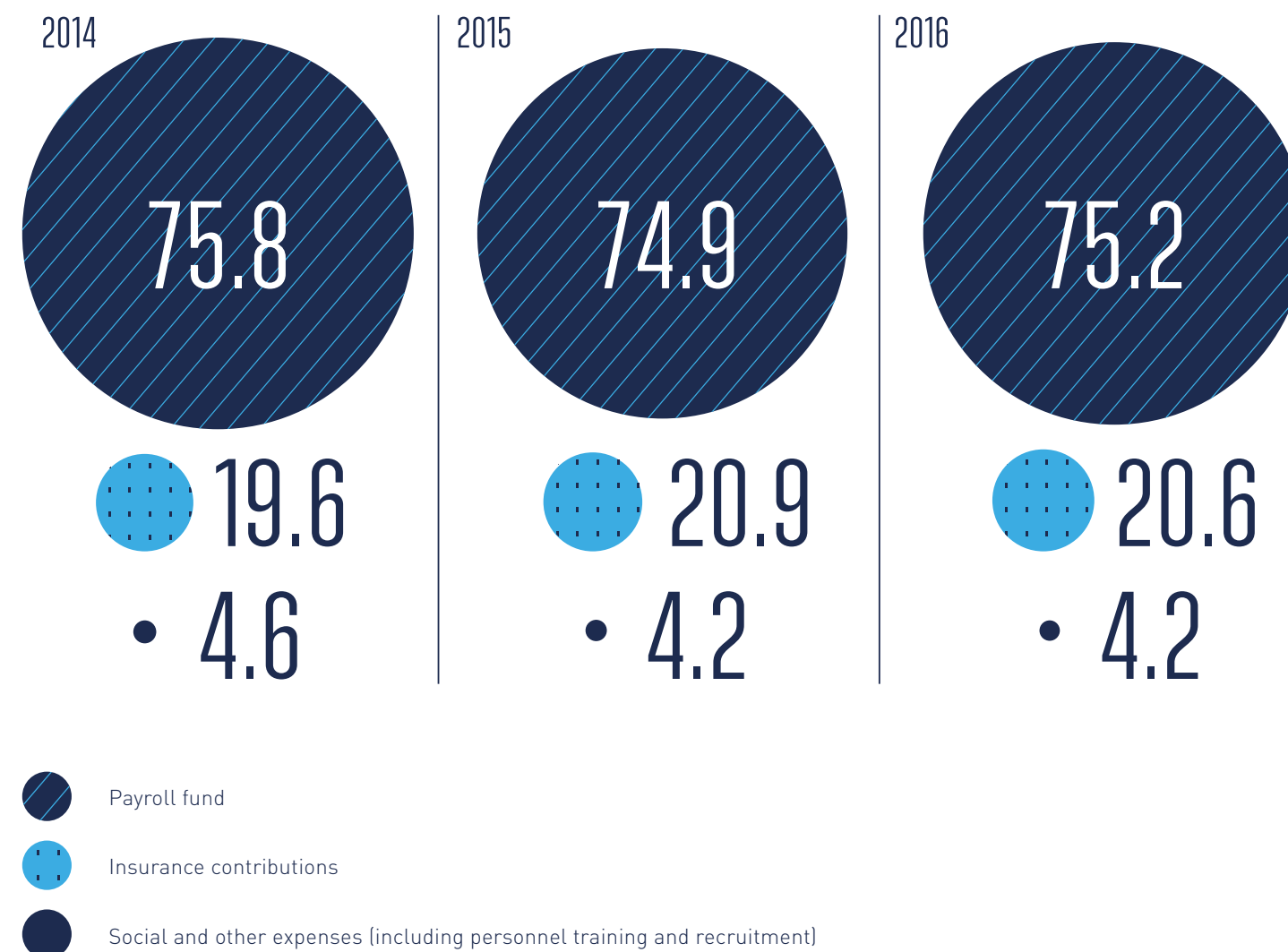
Remuneration system

The current remuneration system in ROSATOM:

- Provides adequate remuneration matching the compensation in the best Russian companies;
- Is result-based: strengthening the link between employees' compensation and their efficiency and achievement of key performance indicators (KPIs). Managerial KPIs of ROSATOM are linked to the strategic goals and KPIs established for the Corporation by the Supervisory Board. Strategic objectives set for the organizations and enterprises are converted into KPI maps of specific executives and cascaded down to business units and employees.

In 2016, the monthly average salary per employee in ROSATOM increased by 8.4% against 2015 and totalled RUB 69,700 per month.

STRUCTURE OF STAFF COSTS, %



7.1.2. CAREER AND SUCCESSION MANAGEMENT

Industry-wide succession pool

A centralized programme to build and develop the executive succession pool (ESP) has been implemented since 2012 to ensure succession and train executives to be appointed to managerial positions in ROSATOM. ESP members are included in the executive succession pool through the career and succession planning process. The level that they occupy in the ESP is determined by the target position of a candidate within the ESP.

In 2016, the ESP comprised 1,751 people. A year-on-year decrease in the number of ESP members was due to strict selection criteria, which include a requirement that the next career move should be defined and approved. This helps to determine what position an ESP member is preparing to occupy and to track his/her subsequent progress towards the target position.

NUMBER OF EXECUTIVE SUCCESSION POOL (ESP) MEMBERS BY EMPLOYEE CATEGORY

ESP level	Programme	Number of participants		
		2014	2015	2016
Senior executives	ROSATOM's Assets	91	155	84
Middle-level executives	ROSATOM's Capital	473	870	582
Junior executives	ROSATOM's Talents	843	1,102	1,085
TOTAL		1,407	2,127	1,751

In 2016, ESP members completed a module-based training programme aimed at developing managerial knowledge and skills. During their participation in the training programme, ESP members implemented over 900 individual projects contributing to the achievement of ROSATOM's strategic goals.

The share of ESP members appointed to vacant top-level, senior and junior executive positions reached the target and totalled 54%.

APPOINTMENT OF ESP MEMBERS TO NEW POSITIONS

	2014	2015	2016
Share of ESP members among senior, middle-level and junior executives that were appointed to new positions, %	26	38	54
Share of ESP members appointed to vacant top and senior executive positions (TOP 30 and TOP 1000) in the reporting period, %	33.75	41.75	48.95

Personnel assessment

ROSATOM and its organizations use a competence model based on the industry values of ROSATOM. The competence model is built into the main HR management processes: recruitment, annual performance assessment, career and succession planning, screening and development of the succession pool, training and an industry-wide mentoring system.

In 2016, 43,809 employees (17.5% of the average headcount) underwent a RECORD-based assessment (including performance assessment based on KPI maps, assessment of professional and technical knowledge and skills and assessment based on corporate values).

7.1.3. PERSONNEL TRAINING

Training, professional development and improvement of employees' competences are integral to fostering competitiveness and improving the quality of the internal labour market in the nuclear industry.

In 2016, 107,670 employees of ROSATOM and its organizations underwent training and retraining and completed professional development programmes. The number of training hours per employee averaged 24 hours⁵⁰.

⁵⁰ The number of training hours has been calculated based on the average headcount.

The share of employees who underwent training in the reporting period totalled 43% of the average headcount.

ANNUAL AVERAGE TRAINING HOURS PER EMPLOYEE BY EMPLOYEE CATEGORY

Employee category	Average number of hours per employee		
	2014	2015	2016
Executives	39	37	41
Specialists and white-collar employees	20	18	17
Blue-collar employees	24	35	27

NUMBER OF EMPLOYEES WHO UNDERWENT TRAINING

Employee category	Number of employees who completed at least one training programme		
	2014	2015	2016
Top executives	15	77	22
Senior executives	967	1,131	1,196
Middle-level executives	7,543	6,562	6,667
Junior executives	17,257	14,826	12,413
Specialists and white-collar employees	44,210	44,311	36,742
Blue-collar employees	51,295	50,794	50,630
Total	121,287	117,701	107,670

7.1.4. COMMUNICATION PROJECTS

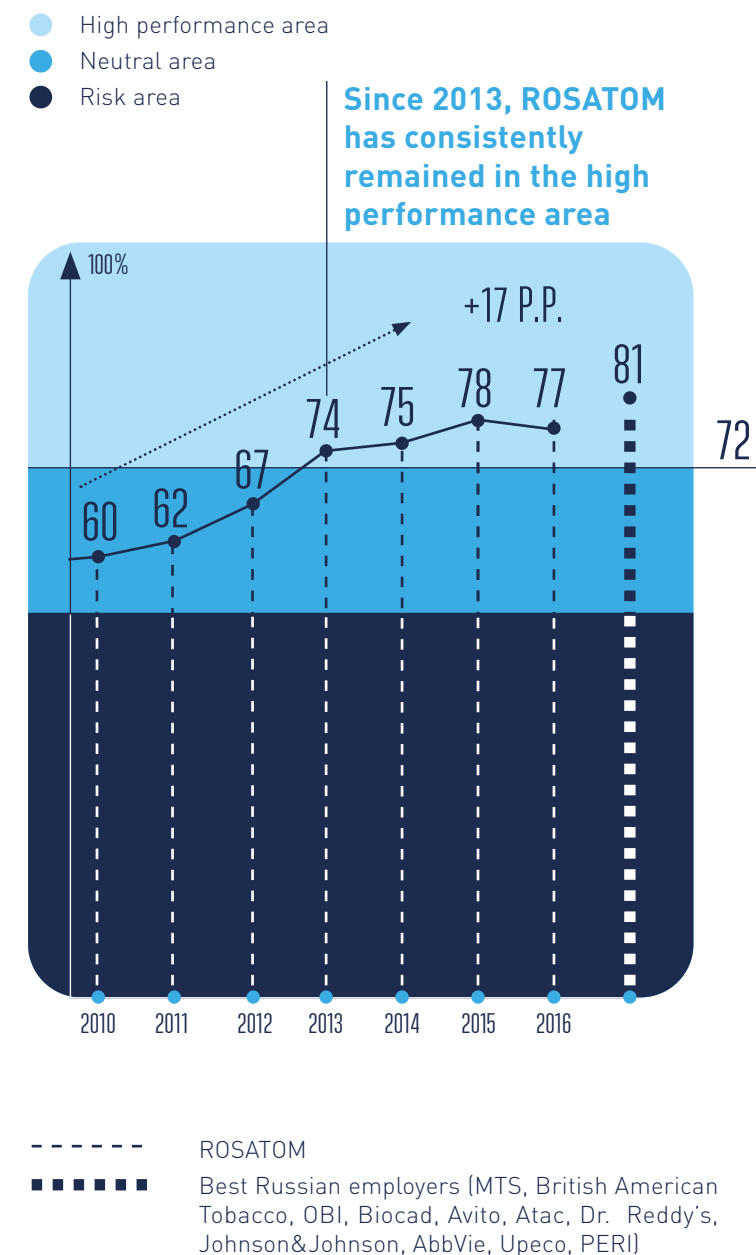
Employee engagement surveys

Employee engagement surveys have been conducted at nuclear enterprises since 2011. Over 6 years, the number of organizations participating in the survey has increased from 45 to 62 (these enterprises employ over 200,000 people, with over 45,000 people participating in the survey every year).

Since the first survey was conducted, the employee engagement rate increased by 17 percentage points and reached 77% by year-end 2016. According to the international company Aon Hewitt, which conducts employee engagement surveys around the world, the Corporation's result exceeds the average employee engagement rate at Russian manufacturing companies (60%) and corresponds to the level of the best employers of the country.

The target for the next three to five years is not only to maintain the employee engagement rate within the high performance area (at least 72%) but also to achieve this employee engagement rate in 90% of industry organizations that participate in the survey.

CHANGES IN THE EMPLOYEE ENGAGEMENT RATE IN ROSATOM, %



ROSATOM's Person of the Year Contest

ROSATOM's Person of the Year is an industry contest aimed at recognizing the achievements of the best employees in the industry. The primary selection criteria include significant results of work, effective

approaches to solving problems and adherence to corporate values. An employee may be nominated for the contest either independently or on the recommendation of a line manager. The contest includes individual and team nominations.

The programme participants are selected in several stages. Winners in divisional occupations are selected at the level of holding companies of the Divisions; winners in general corporate occupations are selected at the level of functional responsibility centres in ROSATOM, while winners in special categories corresponding to ROSATOM’s values are selected by the Central Panel chaired by the CEO of the Corporation.

The number of nominees increases by 25% every year. In 2016, 1,465 applications were submitted, and 260 people won prizes.

Code of Ethics

ROSATOM has in place the Code of Ethics and Professional Conduct for Employees. The Code of Ethics promotes the corporate values and establishes the relevant ethical principles of conduct in the course of interaction with a wide range of external and internal stakeholders. The rules of conduct set out in the Code concern combating corruption, ensuring the security of resources, property and information, occupational, industrial and environmental safety, preventing conflicts, resolving conflicts of interest and keeping up the corporate image.

The Code of Ethics is designed to:

- Prevent risks associated with the violation of laws or ethical principles of conduct adopted by ROSATOM;
- Strengthen the business reputation of the Corporation;

- Introduce the system of corporate values across the nuclear industry.

In order to effectively apply the Code of Ethics, the Ethics Board has been established in ROSATOM. Its principal task is to assist employees in resolving situations related to the provisions of the Code of Ethics. The Board consists of executives of ROSATOM’s business units, representatives of the trade union and veterans of the industry.

7.1.5.
SOCIAL POLICY

ROSATOM’s social policy is designed to:

- Make ROSATOM more attractive as an employer;
- Engage and integrate young professionals and highly skilled specialists;
- Improve employee loyalty;
- Improve the efficiency of social expenses.

Employment benefits provided to employees and retirees comply with the Uniform Industry-Wide Social Policy (UISP), which is based on standardized corporate social programmes.

The structure of corporate social programmes and the relevant expenses are determined based on 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 of employees);
- Traditions established in ROSATOM (companies in the Russian nuclear industry always pay great attention to retired employees who

have worked in the industry for a long time; veterans receive social assistance and are involved in various events, including working with young people);

- State policy aimed at promoting the development of mass sports, providing additional pensions and supporting families with children, young professionals, people in need, etc.

EXPENDITURE ON CORPORATE SOCIAL PROGRAMMES, RUB BILLION

Corporate social programmes	2014	2015	2016
Voluntary health insurance and personal insurance against accidents and diseases	2.1	1.4	1.7
Health resort treatment and recreation for employees and their children, including:	1.0	0.9	1.1
• Health resort and rehabilitation treatment for employees	0.7	0.6	0.8
• Health resort treatment and recreation for children	0.3	0.3	0.3
Improving the living conditions of employees	0.6	0.8	0.8
Private pension plans	1.0	1.0	1.2
Support for retirees	2.0	1.3	1.3
Sporting and cultural events	1.0	1.3	1.2
Assistance to employees	0.8	1.0	1.2
Other	1.5	1.9	1.3
Total:	10.0	9.6	9.8

Sporting events

Promotion of physical education and sports is one of ROSATOM's top priorities. The Corporation takes measures to promote a healthy lifestyle and encourage employees to do sports in order to achieve harmonious development, improve their health and remain active at work. In 2016, 27 sporting events were held in the industry; they were attended by 20,000 employees of the Corporation.

The highlight of the year was the 11th Summer Spartakiad for Employees in Nuclear Power, Industry and Science 'Atomiada 2016'. 500 top athletes in the industry competed in the final stages of the event for 108 sets of medals in 10 disciplines. In the competitions, 12 athletes showed results at the level of the Master of Sports of Russia and 23 athletes at the level of a Candidate for Master of Sports.

In the reporting year, ROSATOM was one of the first major companies to start implementing the Ready for Labour and Defence (RLD) National Sport and Fitness Programme. 7 specialized RLD sports festivals and 10 sporting events including components of the RLD Programme were held. Over 3,000 employees took part in these events, and 32% of participants successfully passed the tests of the RLD Programme.

At the 13th International Workers' Sports Festival in Varna, Bulgaria (1,300 participants from 16 countries), ROSATOM's team of 49 athletes won 37 medals (14 gold, 18 silver and 5 bronze). At the 16th International Issyk Kul Sports Games in Cholpon-Ata, Kyrgyzstan (1,000 participants from 9 countries), ROSATOM's team of 21 athletes won 24 medals (16 gold, 5 silver and 3 bronze). The

Corporation's team took part for the first time in the 36th International Workers' Games organized by the Hapoel Central Council in Eilat (Israel) and became the undisputed leader, winning 43 medals (26 gold, 15 silver and 2 bronze).

Industry-Wide Agreement on Nuclear Power, Industry and Science

ROSATOM adheres to the Industry-Wide Agreement on Nuclear Power, Industry and Science for 2015–2017. The Agreement is based on the established practice of social partnership in the nuclear industry and is aimed at implementing the Integrated Standardized Remuneration System, the Uniform Industry-Wide Social Policy and the Occupational Safety Management System.

The Agreement has been developed and is implemented jointly with the Russian Trade Union of Nuclear Power and Industry Workers.

The Agreement gives priority to the protection of employees' lives and health (the sections 'Occupational Safety' and 'Social Policy'). 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 build an integrated health care programme titled Health. The Agreement incorporates the opportunities provided by the new legislation on the special inspection of working conditions (SIWC) and stipulates an additional mechanism for cooperating with the trade union in conducting an SIWC and analysing inspection findings.

[See the section 'Occupational Safety'.](#)

Work of the Interregional Social Movement of Veterans of Nuclear Power and Industry (ISMV NPI)

ISMV NPI comprises 127 veteran organizations with over 320,000 members. These include 80 veteran organizations affiliated with ROSATOM numbering 142,500 people (including 135,600 retirees). ISMV NPI is a member of the International Union of Veterans of Nuclear Energy and Industry, which has been entered into the list of accredited organizations by resolution of the IAEA Board of Governors (this is the first time that a non-governmental organization has been given the opportunity to participate in the work of the IAEA on a regular basis).

In 2016, the Executive Directorate of ISMV NPI reviewed 1,349 enquiries from veterans concerning medical support, awarding veterans with decorations for their work achievements and financial support for veteran organizations.

At the request of ISMV NPI, Veteran of Nuclear Power and Industry badges were awarded to 512 people; decorations for work achievements and certificates of appreciation from ROSATOM were awarded to 291 veterans; Patriot of Russia commemorative medals were awarded to 7 veterans.

In 2016, the 5th Festival of Ensembles of Veteran Organizations of Rosenergoatom Concern 'Energy of Life 2016' was held in Kurchatov; it was attended by 250 veterans of the industry.

A cooperation agreement was concluded with the organization 'Veterans of Nuclear Science, Power and Industry of the Republic of Kazakhstan'. Measures were taken to establish international relations with nuclear industry veterans in the Republic of Uzbekistan and the Republic of Belarus.

Collective agreements in all of the Corporation's organizations provide for a minimum notice period of two months for significant operational changes, and of three months for situations that may lead to mass dismissal.

Collective agreements cover 86.9% of employees working at ROSATOM's enterprises.

7.1.6. COOPERATION WITH UNIVERSITIES AND RECRUITMENT OF YOUNG PROFESSIONALS

Cooperation with universities

ROSATOM is committed to working with young professionals and recruiting talented young people into the nuclear industry. In the reporting year, the Association Consortium of Core Universities of ROSATOM continued its work; as of December 31, 2016, 15 specialized educational institutions were part of the Association.

In 2016, a total of 2,015 students attended universities under arrangements with ROSATOM.

6,211 students undertook internships in the Corporation's organizations. In 2016, 1,085 university graduates were hired, with almost half of them graduating from core universities.

Cooperation with NRNU MEPhI

In order to encourage top school leavers in Russia to undergo training in innovative areas of development of the nuclear industry, in the reporting year, ROSATOM and NRNU MEPhI continued to provide vocational guidance.

A total of ~22,000 students took part in school competitions organized by NRNU MEPhI. In particular, over 14,000 school students from 61 federal subjects of Russia took part in ROSATOM's industry-specific physics and mathematics competition (included in the National List of School Competitions).



Over 60 organizations in the nuclear industry and 7,800 students and graduates took part in the Career Days held by ROSATOM.

NRNU MEPhI has been included in leading global and national university rankings:

- **Top 20 of the Times Higher Education BRICS & Emerging Economies University Ranking;**
- **Top 50 of the QS University Rankings BRICS;**
- **Top 100 of the QS Physics & Astronomy subject ranking;**
- **1st place among engineering universities in the ranking of demand for Russian universities compiled by Russia Today International News Agency and the Centre for Labour Market Research;**
- **2nd place in the Interfax National Ranking;**
- **3rd place in the National Ranking compiled by Expert RA.**

In 2016, the average score achieved in the Unified State Examination by students who were enrolled on the course in the main industry-specific discipline, Nuclear Physics and Technology, increased by 2.1 points to 89.3 points (as against 87.2 points in 2015). The University was included in the top 10 Russian universities in terms of the quality of admitted entrants (based on the average score in the Unified State Examination); it scored 87.8 points and ranked jointly in 5th place with Moscow State University (6th place in 2015).

7.1.7. INTERNATIONAL COOPERATION IN EDUCATION

In 2016, ROSATOM continued to develop the system for exporting Russian nuclear education to markets potentially attractive to ROSATOM. Foreign students were trained in nuclear disciplines at Russian universities. Foreign students study at NRNU MEPhI, as well as in ROSATOM's core universities and partner universities.

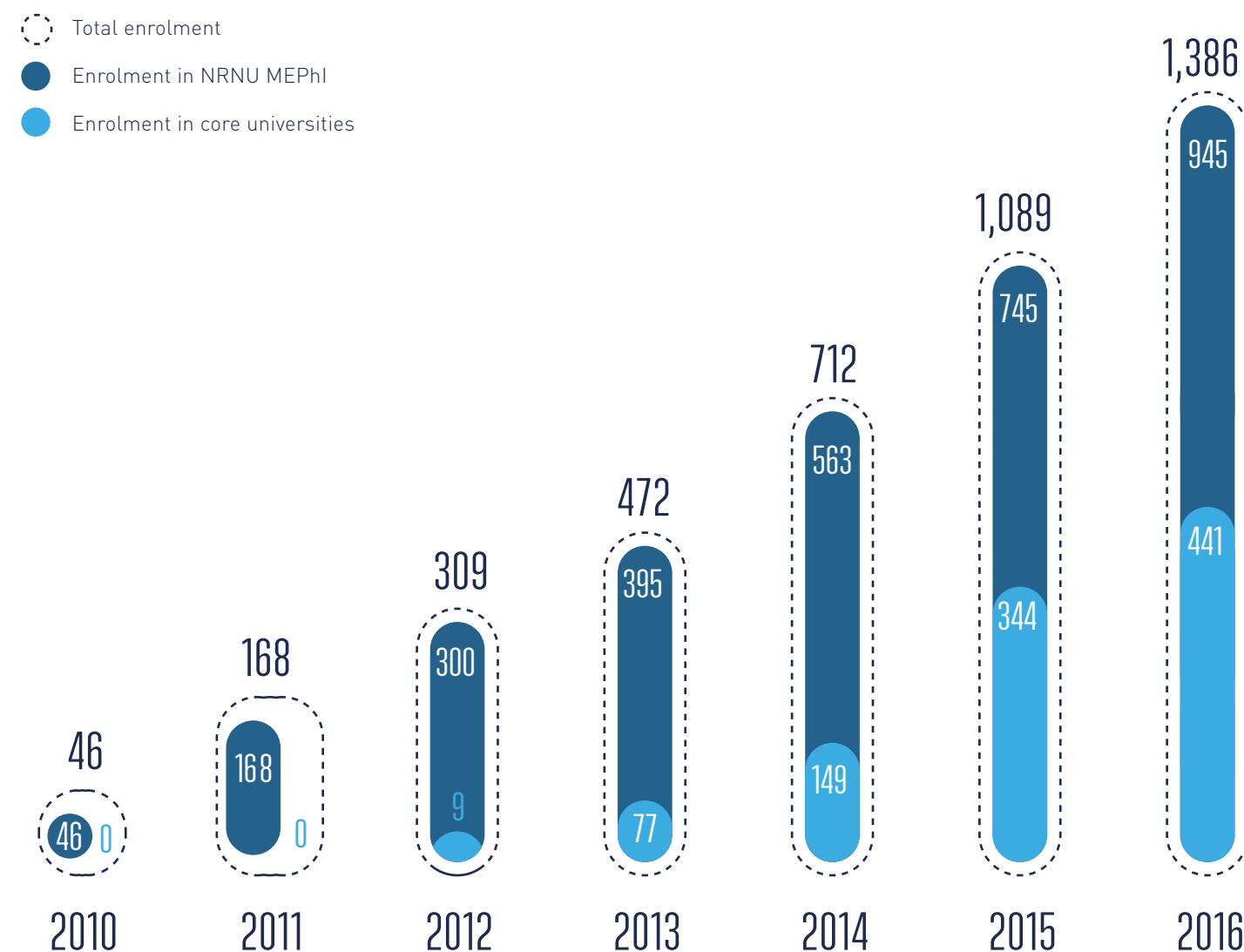
As of December 31, 2016, a total of ~1,400 people were studying in Russia, including students from Vietnam, Bangladesh, Jordan, Egypt, Algeria, Nigeria, the Republic of South Africa, Cuba and other countries (a total of 37 countries). Another ~300 students are due to enrol in 2017.

7.1.8. STRENGTHENING THE EMPLOYER BRAND; PRIZES AND AWARDS IN HR MANAGEMENT

In 2016, ROSATOM won six major awards and rankings in HR management:

- ROSATOM was the absolute winner of the Leadership Index annual national ranking of the best companies for work and career compiled by the Rabota.ru recruitment portal and the business magazine *Elite Personnel*;
- For the first time, ROSATOM received the Best Employer 2016 international certificate from Aon Best Employer for the high employee engagement rate;
- For the second consecutive year, ROSATOM was ranked in the top three of the Annual Ranking of the Best Russian Employers compiled by HeadHunter;
- According to a survey conducted by the international company Universum among students specializing in engineering and natural science disciplines, ROSATOM was ranked in the top five best Russian employers, in first place in the Engineering and Production sector for the third consecutive year;

GROWTH OF THE NUMBER OF FOREIGN STUDENTS AND SPECIALISTS STUDYING IN RUSSIA (PEOPLE), CUMULATIVE TOTAL



- ROSATOM was ranked in the top 10 of the 2016 student ranking of the best employers according to FutureToday;
- Tatyana Terentyeva, Director for Human Resources of ROSATOM, won in the 17th National Ranking and the TOP 1000 Russian Managers National Award of the Russian Managers' Association and Kommersant Publishing House (the TOP 1000 Russian Managers annual ranking included another four senior managers of the Corporation).

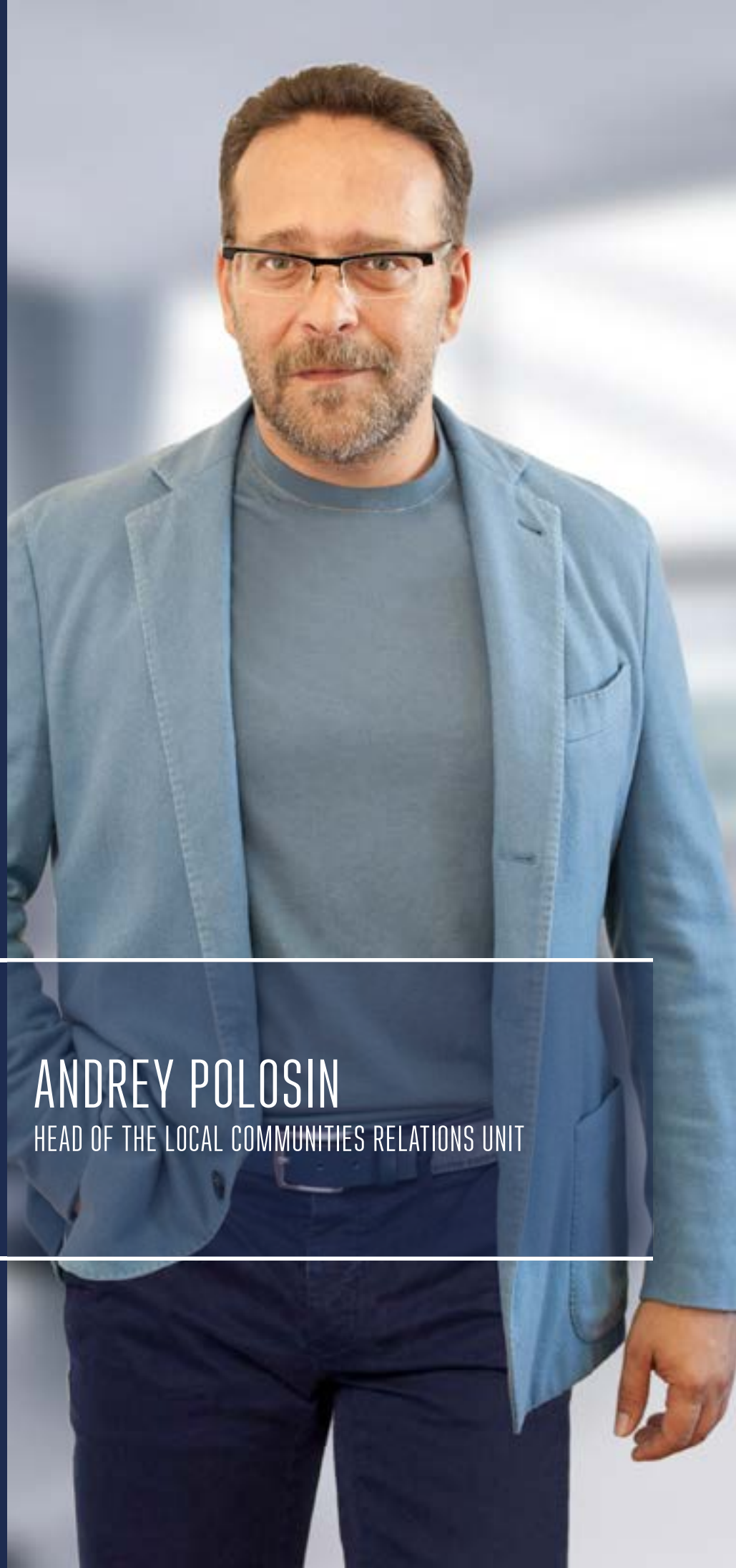
7.1.9. PLANS FOR 2017 AND FOR THE MEDIUM TERM

- To encourage employees to achieve high-priority business objectives;
- To develop leaders at all levels of management;
- To develop employees' competences at a pace required for the development of businesses;
- To build a result-oriented culture in the industry;
- To improve the level of satisfaction of the Corporation's businesses with the performance of the HR function.

7.2. DEVELOPING THE REGIONS OF OPERATION



ANDREY POLOSIN
HEAD OF THE LOCAL COMMUNITIES RELATIONS UNIT



KEY RESULTS IN 2016:

- **TAXES PAID TO RUSSIAN BUDGETS OF ALL LEVELS TOTALLED RUB 125.3 BILLION;**
- **NPPS ACCOUNTED FOR 18.3% OF THE TOTAL ELECTRICITY OUTPUT IN RUSSIA;**
- **RUB 1,078 MILLION WERE ALLOCATED FOR CHARITY PROGRAMMES.**

– ROSATOM traditionally pays particular attention to the areas in which its enterprises are located. What is the reason for this?

– 10 cities with NPPs, 10 closed administrative and territorial formations (CATFs) and a number of towns and cities housing enterprises and research centres that are important for the industry, such as Obninsk, Dimitrovgrad, Elektrostal and Glazov, are of particular importance to ROSATOM's operations. High-tech production facilities are located in these towns and cities.

Nuclear towns and cities emerged when the country's nuclear industry was being created and breakthrough technologies were being introduced. They have accumulated competencies, capacities and resources that can be used not only by ROSATOM, but by the entire country as well.

Our towns and cities are not only the future of the industry. We believe that we can shape the future.

– In 2016, the media published a large number of articles on the prospects for the creation of Priority Social and Economic Development Areas (PSEDAs) in the closed administrative and territorial formations. When will the first residents appear in the PSEDAs?

– Closed administrative and territorial formations were given an opportunity to create PSEDAs in order to support the development of new manufacturing enterprises and create new jobs. Although the idea has been proposed by ROSATOM, it is being implemented with assistance from government bodies of all levels. In 2016, a great deal of work was done: a decision was made to set up a Management Company, and applications for the establishment of PSEDAs in the closed administrative and territorial formations were developed and sent to the Russian Ministry of Economic Development. In 2017, we expect the Russian Government to make a decision on

the establishment of several PSEDAs, and we expect residents to appear there a few months after the relevant decrees are issued. One of the first residents of the PSEDA in the town of Sarov should be a subsidiary of FSUE RFNC-VNIIEF that has been established to implement a joint project with the Republic of Tatarstan to digitalize production and management processes.

– *How will nuclear towns and cities be developed in the future? What is the priority in 2017?*

– We seek to create new jobs, upgrade urban infrastructure and change and modernize the urban landscape. It is also important for us to support culture and to maintain the highest possible educational standards of general and special education. Our task is to create an environment in which nuclear towns and cities can develop as dynamically as the core local enterprises.

In 2017, we will continue to implement our well-known long-term projects such as the Territory of Culture, ROSATOM’s School, The Citizen of the Country of ROSATOM, and Glory to Creators.

The format of the Territory of Culture project will be changed. We aim to help cultural institutions in the towns and cities to develop in line with

people’s current demands. In response to the standards introduced by the Russian Ministry of Culture, we are beginning to develop a new cultural strategy for the nuclear towns and cities. The crucial first step is to improve the efficiency of cultural institutions.

The project titled ROSATOM’s School offers cutting-edge learning formats for children in the nuclear towns and cities. We are also taking on board the plans to expand the scope of ROSATOM’s international projects. In 2016, international multilingual children’s camps were opened for the first time.

– *How do you plan to change the urban environment?*

– We see that our towns and cities require modernization in terms of infrastructure and the urban environment. Following discussions with representatives of the towns and cities, we have designed a new project, Urban Technology, which will be launched in 2017. The project will improve the efficiency of municipalities and the quality of life of urban dwellers by providing the towns and cities with new technological solutions ranging from digital management models to hardware. In addition, ROSATOM has started to cooperate with the Russian Ministry of Construction, Housing and Utilities to introduce modern solutions in landscaping and construction. The first results will be obtained in 2017, but the overall work plan that we are developing covers a 10-year period. ●

7.2.1. ENSURING THE ENERGY SECURITY OF RUSSIAN REGIONS

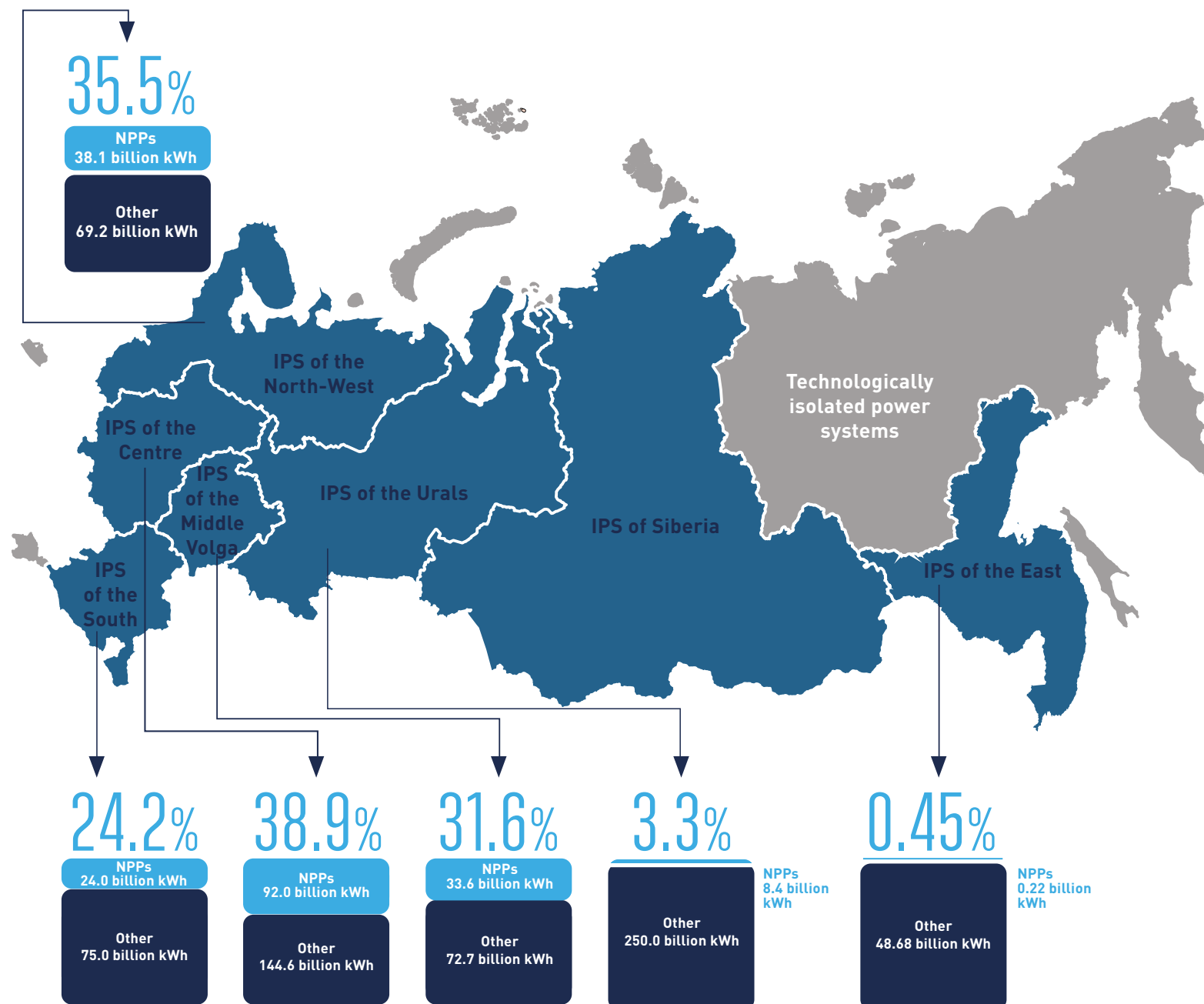
In 2016, NPPs accounted for 18.3% of the total electricity output in Russia (18.6% in 2015). Nuclear power generation contributes significantly to Russia’s regional power systems.

SHARE OF NUCLEAR POWER GENERATION IN THE TOTAL POWER GENERATION IN RUSSIA IN 2016 BY REGION (INTEGRATED POWER SYSTEM [IPS]).

Indicator	Russia	European Russia*	IPS of the Centre	IPS of the Middle Volga	IPS of the North-West	IPS of the South**	IPS of the Urals	IPS of the East**
Nuclear power generation, billion kWh	196.4	196.15	92.0	33.6	38.1	24.0	8.4	0.22
Power generation in Russia, billion kWh***	1,071.7	807.6	236.6	106.3	107.3	99.0	258.4	48.9
Share of nuclear power generation, %	18.3	24.3	38.9	31.6	35.5	24.2	3.3	0.45

* European Russia: IPS of the Centre + IPS of the Middle Volga + IPS of the North-West + IPS of the South + IPS of the Urals.
** Including isolated systems.
*** Data on power generation in Russia in 2016 according to the press release of the System Operator of the Unified Power System dated January 11, 2017 (www.so-ups.ru).

SHARE OF NUCLEAR POWER GENERATION IN THE TOTAL POWER GENERATION IN 2016 BY REGION



7.2.2.

TAX PAYMENTS TO BUDGETS OF VARIOUS LEVELS

ROSATOM's organizations and enterprises have a significant impact on budget revenue in ROSATOM's regions of operation. In 2016, payments to budgets of all levels totalled RUB 125.3 billion.

TAXES PAID BY ROSATOM AND ITS ORGANIZATIONS, RUB BILLION

	2014	2015	2016
Total	101.9	164.5	125.3
to the federal budget	68.4	100.5	82.4
to the budgets of federal subjects of Russia	32.6	63.2	42.3
to local budgets	0.9	0.8	0.6

The decrease in tax payments was due to a decline in the revenue and the tax base of several of ROSATOM's organizations as a result of a drop in prices on the nuclear fuel cycle front-end markets and foreign exchange losses (arising from the strengthening of the Russian rouble against other currencies during the reporting year). [For details, see the section 'Financial and Economic Results'.](#)

7.2.3.

COOPERATION WITH SUPPLIERS AND CONTRACTORS
IN THE REGIONS OF OPERATION

The construction and commissioning of nuclear facilities, including NPP power units, creates new jobs: a number of employees are recruited from local communities within a 100 km radius of the construction site. In addition, every job in the construction of an NPP creates another 10 to 12 jobs in related sectors of the economy (the metals industry, mechanical engineering, etc.).

NUMBER OF ORGANIZATIONS AND EMPLOYEES ENGAGED IN NPP CONSTRUCTION IN 2016

NPP	Number of major organizations engaged	Total number of employees	including:	
			engineering and technical personnel	workers
Baltic NPP, power units No. 1 and 2	2	40	5	35
Beloyarsk NPP, power unit No. 4	31	815	263	552
Novovoronezh NPP-2, power units No. 1 and 2	40	5,311	1,061	4,250
Leningrad NPP-2, power units No. 1 and 2	36	3,396	264	3,132
Rostov NPP, power unit No. 4	36	3,603	386	3,217
Kursk NPP-2, power units No. 1 and 2	23	688	142	546
Total:	168	13,853	2,121	11,732

7.2.4.

SOCIAL AND ECONOMIC DEVELOPMENT OF THE TOWNS
AND CITIES OF OPERATION AND CATFS

In 2016, in accordance with ROSATOM’s strategic goal of developing new products at enterprises in the towns and cities of its operation, the Corporation took measures to enable the establishment of new high-tech production facilities unrelated to core activities (the second core of business).

Establishment of priority social and economic development areas in the CATFs in the nuclear industry

Six applications for the creation of priority social and economic development areas (PSEDAs) in CATFs have been submitted to the Russian Ministry of Economic Development. The proposals were developed by the governments of federal subjects of Russia where the CATFs are located, with the participation of core local enterprises and administrations of the CATFs. In addition, in 2016, an authorized federal executive agency responsible for the establishment of PSEDAs in the CATFs was appointed (the Russian Ministry of Economic Development), and it was decided to establish a PSEDA Management Company in the CATFs.

A priority social and economic development area was established in Krasnokamensk, Zabaykalsky Territory (the town is home to PJSC PIMCU, the key enterprise of ROSATOM’s Mining Division). Work was underway to prepare an application for the creation of a PSEDA in the monotown of Glazov, Udmurt Republic (the town is home to JSC Chepetsky Mechanical Plant, an enterprise of the Fuel Division).

ROSATOM’s organizations and enterprises are located in more than 70 municipalities in 38 federal subjects of Russia. Important regions of operation include 10 towns and cities with nuclear power plants (with a population of 690,000 people) and 10 closed administrative and territorial formations (CATFs) of the nuclear industry (with a population of over 650,000 people).

The target scenario for the development of CATFs until 2030 is to maintain their role in national defence and security. In addition, closed administrative and territorial formations will become key centres for the development of the nuclear industry, and in particular of the Nuclear Weapons Division.

Plans for 2017 are as follows:

- To approve decrees of the Russian government on the creation of PSEDAs in several CATFs in the nuclear industry;
- To transfer the shareholder's rights in the PSEDA Management Company in the CATFs to ROSATOM;
- To sign tripartite agreements for the establishment of priority development areas and the launch of projects of first residents.

Activities of innovative clusters in the nuclear industry

In the reporting year, ROSATOM continued to develop territorial innovative clusters in the CATF of Zheleznogorsk, the CATF of Sarov, the town of Dimitrovgrad and in the Saint Petersburg – Sosnovy Bor – Gatchina agglomeration. In 2016, members of the clusters began actively using the high-priority manufacturing and innovative infrastructure created earlier.

Zheleznogorsk

The launch of the first start-up facilities of an industrial park with an area of 10,000 m² was the most important outcome of the development of the Zheleznogorsk cluster. The park is focused on high-priority areas of development of the cluster: space and nuclear technologies. The expert council responsible for the evaluation of projects to be implemented in the industrial park selected eight projects and decided to conclude investment agreements. In 2016, the residents of the park were in the process of developing design documents. The launch of the first production facilities is scheduled for the first half of 2017.

In addition, in 2016, implementation of a project to create a power source based on the nickel-63 isotope (so-called nuclear batteries) was continued.



A priority social and economic development area is a part of a federal subject of Russia where a special regime for business and other activities is imposed. This includes tax benefits (the principal benefits are as follows: corporate income tax payments to the federal budget at the rate of 0% and to the budget of the federal subject of Russia at the rate of no more than 5% during the first five years and at least 10% during the next five years; insurance contributions at the rate of 7.6%), application of the customs procedure of a free economic zone, preferential lease rates on real property and other types of incentives.



In 2016, clusters in the nuclear industry took part in the competition organized by the Russian Ministry of Economic Development to participate in the high-priority project: Development of Innovative Clusters That Are World-Class Leaders in Investment Potential. Based on the results of the competition, the innovative cluster of the Ulyanovsk Region (including the Dimitrovgrad nuclear cluster) and the Technopolis Yenisei innovative cluster in the Krasnoyarsk Territory (which includes the CATF of Zheleznogorsk) were included in the list of project participants.

Sarov

An engineering centre has been established (with investment in equipment and software totalling RUB 78.8 million). In the reporting year, the engineering centre provided services related to the design of individual production processes and process flow diagrams and conducted technical audits, energy audits, diagnostic assessment and inspection of equipment and engineering systems intended for the use in production.

With assistance from Autonomous Non-Profit Organization Cluster Development Centre Sarov, a project was launched to establish a research laboratory specializing in hydrocarbon technologies in order to enable a more efficient use of hydrocarbon fuels. Investment totalled RUB 85 million.

In 2016, organizations forming part of the cluster implemented 35 joint projects aimed at developing the Sarov Innovative Cluster, including:

- A centre for collective access to software products for engineering development and modelling (FSUE RFNC VNIIEF, LLC Sintek, CJSC Consar and LLC Sintek-Engineering);
- A centre for flexible production and mock-up of complex technical systems (Consortium Engineering Centre of the Sarov Cluster);
- Development of a new generation of vibration-based diagnostic systems (LLC Sarov-Volgogaz, Engineering Centre of Autonomous Non-Profit Organization Cluster Development Centre Sarov, FSUE RFNC VNIIEF and JSC Technopark Technology);
- Establishment of a pultrusion centre (LLC NPP Pultrusion Centre, JSC Technopark Sarov and JSC Technopark Technology).



In 2016, ROSATOM continued to cooperate with the Association of CATFs in the Nuclear Industry in the following areas:

- **Cooperation with local governments;**
- **Improving health care services provided to the population of the CATFs;**
- **Creation of PSEDA and development of small and medium-sized enterprises in the CATFs;**
- **Ensuring that the development of the nuclear power industry is acceptable to the society (including through the preparation of ROSATOM's public annual report).**

7.2.5.

IMPLEMENTATION OF COOPERATION AGREEMENTS BETWEEN ROSATOM AND FEDERAL SUBJECTS OF RUSSIA

In 2016, ROSATOM continued to implement cooperation agreements with federal subjects of Russia. Federal subjects of Russia allocated over RUB 2 billion from their budgets to fund measures implemented under the agreements to promote the social and economic development of ROSATOM's regions of operation.

Initiatives and amount of funding	Municipality (ROSATOM's operating region)
1 Capital construction projects: RUB 238.2 million:	
<ul style="list-style-type: none">2 public housing buildings (27 flats and 12 flats)	Novouralsk
<ul style="list-style-type: none">2 nursery schools	Zarechny (Penza Region), Desnogorsk
<ul style="list-style-type: none">A sports centre	Desnogorsk
<ul style="list-style-type: none">A flyover	Polyarnye Zori
<ul style="list-style-type: none">A community centre with a library and a cinema	Kurchatov
2 Major repairs of municipal utilities: RUB 124.6 million	Novovoronezh, Lesnoy, Zarechny (Sverdlovsk Region), Kurchatov, Desnogorsk, Roslavl, Kransokamensk

Initiatives and amount of funding	Municipality (ROSATOM's operating region)
3 Major repairs of buildings of cultural, educational and sports organizations (including nursery schools): RUB 300.1 million	Novovoronezh, Lesnoy, Kransokamensk, Desnogorsk, Polyarnye Zori, Kurchatov, Glazov, Zarechny (Sverdlovsk Region)
4 Beautification of streets and areas around the buildings, repairs of roads and pavements, purchase of special vehicles: RUB 177.1 million	Novouralsk, Zarechny (Sverdlovsk Region), Kurchatov, Polyarnye Zori, Volgodonsk, Lesnoy, Kransokamensk
5 Support for small and medium-sized enterprises: RUB 96.9 million	Seversk, Novouralsk, Lesnoy

7.2.6.

IMPLEMENTATION OF SOCIAL AND CHARITY PROGRAMMES IN ROSATOM'S REGIONS OF OPERATION

Continuing the traditions of the nuclear industry, ROSATOM and its organizations adhere to the principles of responsible business. The Corporation is guided by the priorities of the social and economic development of Russia, its regions and its cities, including the CATFs in the nuclear industry, and consistently implements industry-wide social and charity programmes [\(for details on ROSATOM's approaches to charity work, click the link\).](#)

AREAS OF CHARITY WORK IN 2016

	Scope, RUB million
Initiatives to preserve and build up the historical and cultural heritage of Russia	332
Assistance provided at the request of individuals and local governments, including emergency medical aid and non-financial assistance	161
Educational initiatives and support for projects of educational institutions	156.5
Initiatives to develop children’s sports and popular amateur sports and the promotion of a healthy lifestyle	134
Contests of social and charity projects	98
Patriotic education and donations for commemorative events	79
Assistance to veterans, disabled persons, orphans and people in need	48.5
Initiatives in the field of culture and spiritual and moral education of young people	69
Total	1,078

ROSATOM’s School

ROSATOM’s School is an industry-wide educational programme aimed at supporting and modernizing the unique educational systems in the towns and cities where ROSATOM’s enterprises are located in line with the leading Russian and global trends in social, economic and technological development. Five nursery schools (in the towns of Zelenogorsk, Novouralsk, Zarechny (Penza Region), Ozersk and Tryokhgorny) and four schools (in the town of Sarov, Zarechny (Penza Region), Novouralsk and Zele-nogorsk) participate in the programme.

In 2016, five global networking events were held for talented children. More than 5,000 students participated in the online stage of these events. More than 300 children participated in the face-to-face stage.

Engineering and creative shifts were held at the ROSATOM’s School International Multilingual Children’s Camp in Hungary and Indonesia, with more than 100 participants from Russia, Hungary, Bulgaria, the Czech Republic, Indonesia, Vietnam and South Korea.

Over 300 teachers and educators from the towns and cities participating in the ROSATOM’s School project received work-related training from the best teachers in the 2015/2016 academic year, with 27 people undergoing work-related training in the best educational institutions in Finland and Austria.

ROSATOM’s Territory of Culture

The objective of the programme titled ROSATOM’s Territory of Culture is to introduce the best works of art and to support local initiatives in the towns and cities where nuclear facilities are located. The motto of the programme is: ‘Culture should be open in a closed town’.

In 2016, under an Agreement with the Federal Centre for the Support for Touring, major theatres (the Yermolova Theatre, the Theatre on Malaya Bronnaya Street and the Tabakerka Theatre) did a tour in the CATFs. A theatre festival titled Around the Classics was held.

ROSATOM continued to implement a large-scale project titled An Open-Air Museum. A new exhibition, Depiction of Russian History in Paintings from the Tretyakov Gallery, was opened in Zele-nogorsk and Zheleznogorsk. An Open-Air Museum was opened in Tryokhgorny.

- A number of industry-wide festivals were held:
- The 11th National Performance Competition for teachers of children’s art schools in the towns and cities of ROSATOM’s operation;
 - The Novouralsk Fanfares Industry-Wide Festival of Wind and Jazz Bands;
 - The Valery Dmitriev Interregional Music Festival for Children and Young People;
 - A festival of sacred choral music titled From Heart to Heart;
 - An open arts festival involving ensembles working in different genres at an open-air venue in Zelenogorsk;
 - A festival of orchestras in Snezhinsk.

34 tours of performers were organized, including the tours of the Moscow Virtuosi Chamber Orchestra under Vladimir Spivakov; Oleg Mityaev, the Boyan Orchestra, Olga Budina, Valery Garkalin, the Oleg Lundstrem State Jazz Music Chamber Orchestra and the Pyatnitsky Choir.

7.3. WORK OF ROSATOM'S PUBLIC COUNCIL

THE AIM OF THE PUBLIC COUNCIL IS TO ENGAGE RUSSIAN CITIZENS, NON-GOVERNMENTAL ORGANIZATIONS AND PROFESSIONAL ASSOCIATIONS, RESEARCH INSTITUTIONS AND LOCAL GOVERNMENTS IN THE FORMULATION OF RECOMMENDATIONS FOR ROSATOM ON DEVELOPING THE NUCLEAR POWER INDUSTRY.

ROSATOM's Public Council was formed in 2006; in 2016, it celebrated the 10th anniversary of its establishment. The aim of the Public Council is to engage Russian citizens, non-governmental organizations and professional associations, research institutions and local governments in the formulation of recommendations for ROSATOM on developing the nuclear power industry.

The main areas of its work include the following:

- Organization of research; conducting research and expert activities;
- Work in the regions, conducting public dialogue forums;
- Public awareness campaigns, educational, social and cultural activities.

Members of the Public Council constantly focus on such matters as ensuring nuclear, radiation and environmental safety, addressing nuclear legacy issues and promoting social and economic development in ROSATOM's regions of operation.

In 2016, the Public Council assisted in organizing an International Public Environmental Impact Assessment involving a review of supporting materials for the licence for the operation of power units at Leningrad NPP-2. Following the review, it was concluded that operation of power units No. 1 and 2 will be environmentally safe and will have a minimal impact on the environment.

Public dialogue forums

In the reporting year, the Public Council traditionally organized dialogue forums on the safe use of nuclear energy:

- The Regional Public Dialogue Forum *Nuclear Energy in the Arctic: Environment and Safety* (May 12–13, Murmansk);

- The 11th International Public Dialogue Forum *Nuclear Energy, Society, Safety* (November 22–23, Moscow), which was attended by over 400 people from 18 countries worldwide.

Contest of socially important projects

As part of ROSATOM's ongoing cooperation with non-governmental and non-profit organizations in its regions of operation, the Corporation held an annual contest of socially useful initiatives implemented by non-profit organizations and associations. To be eligible to participate in the contest, an applicant organization must invest its own funds totalling at least 25% of the total project cost.

445 projects from 28 Russian regions where ROSATOM's organizations and enterprises operate were entered in the contest in 2016. Following the contest, 79 projects worth a total of RUB 55.8 million were implemented.

CONTEST OF SOCIALLY IMPORTANT PROJECTS

	Number of presented projects	Number of approved projects	Cost of implemented projects, RUB million
2014	360	101	48.0
2015	501	73	47.8
2016	445	79	55.8

7.4. STAKEHOLDER ENGAGEMENT

THE CORPORATION FOSTERS
SYSTEMATIC AND CONSTRUCTIVE
STAKEHOLDER ENGAGEMENT
IN EACH AREA OF ITS BUSINESS
AND COMMUNICATES WITH
SOCIETY AS A WHOLE.

KEY RESULTS IN 2016:

- **71% OF THE POPULATION IN RUSSIA SUPPORTS THE USE OF NUCLEAR ENERGY;**
- **OVER 400,000 PEOPLE VISITED NUCLEAR ENERGY INFORMATION CENTRES;**
- **VIEWERSHIP OF CHANNELS BROADCASTING THE STRANA ROSATOM TV PROGRAMME IN VARIOUS REGIONS OF RUSSIA TOTALS 7.2 MILLION PEOPLE.**

7.4.1.

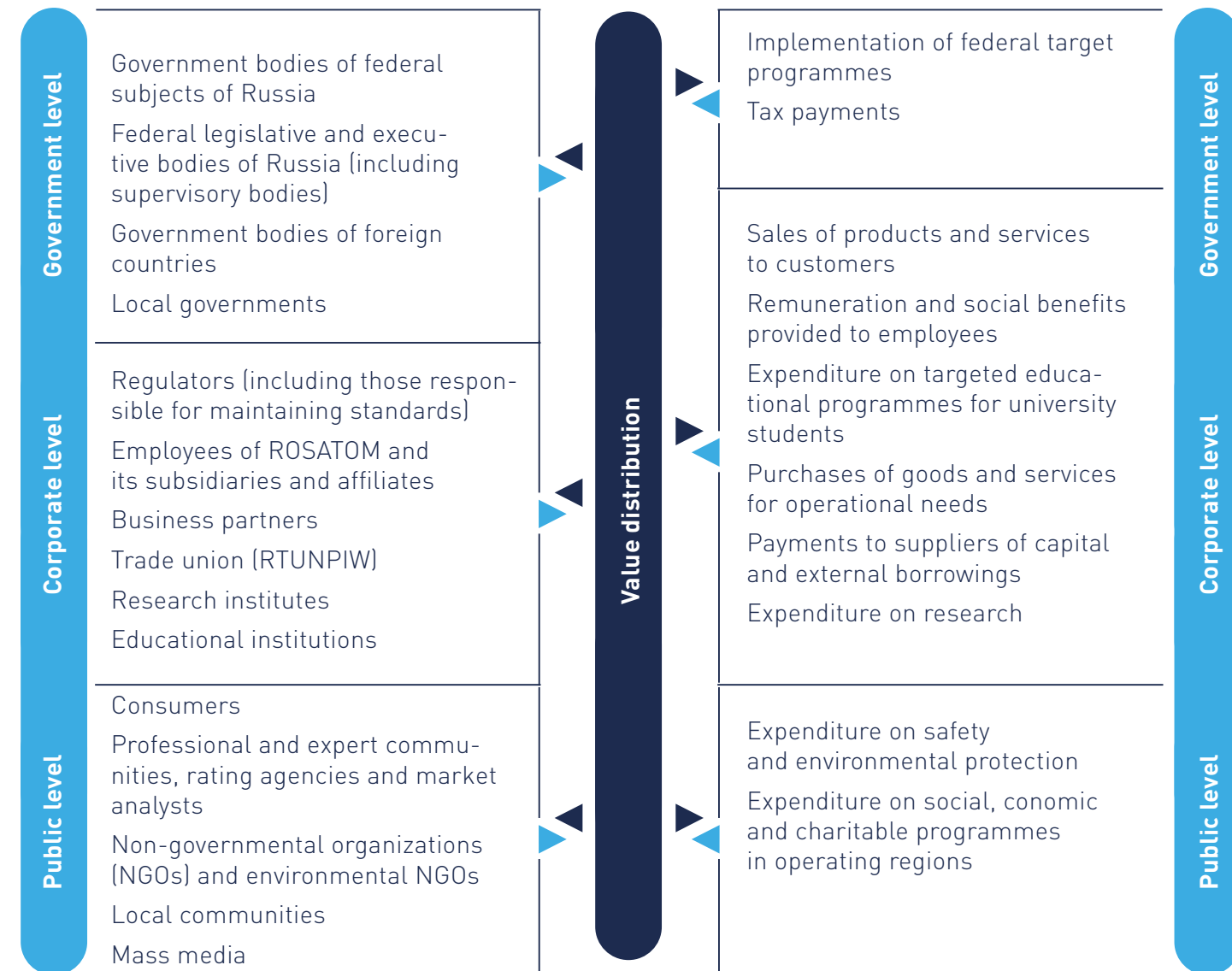
APPROACHES TO STAKEHOLDER ENGAGEMENT

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 work with stakeholders is aimed at achieving strategic objectives and getting the public on board for developing nuclear energy. The Corporation fosters systematic and constructive stakeholder engagement in each area of its business and communicates with society as a whole.

Fundamental principles of stakeholder engagement are as follows:

- **Respect and accommodation of the interests of all participants;**
- **Open efficient cooperation;**
- **Timely and exhaustive information on the Corporation's activities;**
- **Striving to provide specific benefits to all participants;**
- **Fulfilment of obligations.**

STAKEHOLDER MAP



INTERESTS AND TYPES OF STAKEHOLDER ENGAGEMENT

Government bodies of the Russian Federation	1–16, B, C, E, F, G, P, Q	Professional associations	6, 14, 16, F, D, K, O, P, Q
Government regulators (supervisory bodies)	1, 2, 4, 6, 7, 10, B, C, N, P, Q	Non-governmental organizations, including environmental NGOs	2, 10, 11, 15, C, E, G, K, O, P, Q
Regional governments	2, 6, 10, 15, B, C, E, F, G, P, Q	Employees of the Corporation and its organizations, as well as organizations representing their interests	6, 10, 14, 16, F, D, I, E, O, P, Q
Local governments in operating regions	2, 11, 15, C, E, F, G, K, P, Q	Local communities in operating regions	11, 15, C, E, F, G, H, K, O, P, Q
International organizations, including those in the nuclear sector	1, 2, 6, 7, 10, A, K, P, Q	Educational institutions	3, 14, 16, D, J, P, Q
Organizations forming part of ROSATOM	3, 5, 6, 13, 16, D, K, P, Q	Financial institutions	3, 5, 8, 10, K, P, Q
Manufacturers and suppliers of equipment and services	5, 7, 10, K, L, P, Q	Rating agencies, market analysts, experts	5, 10, 13, K, P, Q
Consumers of technologies, products and services	3, 5, 6, 7, 8, 9, 12, K, H, P, Q	Citizens of the Russian Federation	1, 2, 4, 6, 10, 11, 12, 15, H, O, P, Q
Business partners	5, 6, 7, 8, 9, 12, K, M, P, Q	Research institutes	3, 11, K, O, P, Q

Stakeholder interests

1	Ensuring non-proliferation of nuclear materials and technologies
2	Nuclear, radiation and environmental safety
3	Technological modernization in the nuclear industry
4	Efficient use of budget funds
5	Economic efficiency of ROSATOM's organizations
6	Compliance with international and Russian legislation
7	Fair competition and responsible behaviour in the market
8	Competitiveness in global markets
9	Improvement of product and service quality
10	Transparency of ROSATOM's operations, including transparency of procurement activities
11	Dealing with the legacy of past business operations and defence efforts in the industry
12	Reliable electricity supply
13	Adoption of international management norms and standards
14	Adequate remuneration to employees; support for professional development of employees; safe working conditions
15	Improvement of the quality of life in operating regions
16	Development of human resources in ROSATOM and its organizations

Types of stakeholder engagement

A	Cooperation with specialized international organizations, 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	Participation in the development of operating regions
G	Charity work
H	Opinion polls, customer satisfaction surveys
I	Hotlines
J	Programmes of cooperation with specialized 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 communication
Q	Public reports

7.4.2. NUCLEAR ENERGY INFOR- MATION CENTRES

Since 2008, ROSATOM has been implementing a project to build a network of nuclear energy information centres (NEICs) in its operating regions. The first centre was opened in 2008. As of December 31, 2016, the NEIC network comprised 17 centres in Russia and 6 centres abroad. In eight years, over 2.4 million people have visited the centres, including over 400,000 people in 2016.

In addition to daily demonstrations of special video programmes, the NEIC network conducts educational events in various formats:

- Lecture tours by scientists; contests, adventure games, talk shows, guided tours, etc. as part of the Kstati (By the Way) Festival of Science International Project. During the reporting period, the festivals were held in Minsk, Murmansk, Saratov, Novosibirsk and Voronezh; they were attended by more than 20,000 people;
- Science shows: *Down to Atoms*, *Scientific Battles*, *The Trial of Superheroes*, *Fairy-Tale Science*, which provide a vivid illustration of the basic laws of physics, chemistry and mathematics. An event titled *Scientific Battles: U-ROUND* was held in Chelyabinsk and Nizhny Novgorod. During the event, atomic workers presented their research studies to a wide audience;

- The Energy of Science project, which introduces a wide audience to the latest scientific discoveries and ideas. In 2016, sessions were held in 11 NEICs and at the main educational venues of the regions;
- The Formula of Intelligence intellectual games championship. In 2016, 393 teams from 14 regions of Russia took part in the championship;
- The Nationwide School Week of High Technology and Technopreneurship. In 2016, this event was traditionally held with the support of ROSATOM, the Fund for Infrastructure and Educational Programmes of RUSNANO and State Space Corporation ROSCOSMOS. Events conducted by the NEIC network were attended by more than 11,000 people.

7.4.3 PROJECTS ON FEDERAL TV CHANNELS

What? Where? When? game show

In 2016, ROSATOM continued its cooperation with the *What? Where? When?* TV game show on Channel One, which promotes ROSATOM among the target audience as the Knowledge Corporation: an area of activities and a business which is underpinned by people's knowledge, innovations and high technologies.

NUCLEAR ENERGY INFORMATION CENTRES



The ROSATOM team, which comprises nuclear specialists from various industry organizations, participated in a series of games in the 41st season of *What? Where? When?*, demonstrating the human and intellectual potential of the nuclear industry to the Russian TV audience.

We and Science. Science and Us science TV show

In 2016, a science TV show titled *We and Science. Science and Us* was launched on the NTV channel with the support of ROSATOM. The hosts and guests of the show discuss innovative discoveries and their impact on people's daily lives. During the year, 10 issues were broadcast. They examined 'atomic' batteries, controlled thermonuclear reactions, cancer treatment, gravity management and other subjects related to ROSATOM's innovative activities.

Horizons of the Atom

The Russia 24 channel continued to broadcast the *Horizons of the Atom* programme, which examines various aspects of operations and innovative developments of enterprises in the nuclear industry. In the reporting year, the programme celebrated the five-year anniversary of its launch, with more than 130 shows broadcast during this time (including 26 regular shows and five special broadcasts to celebrate the Nuclear Worker's Day in 2016).

7.4.4. INDUSTRY MEDIA

To inform employees and other stakeholders of the news and key events in ROSATOM and its organizations, a range of corporate media outlets under the common brand name *Strana ROSATOM* (The Country of ROSATOM) are used in the industry:

- A newspaper (published weekly in 61 organizations, as well as in the Central Office of the Corporation, members of the Consortium of Core Universities of ROSATOM and the branches of NRNU MEPhI, with a circulation of 59,000 copies and a readership of over 250,000 people);
- A radio programme (it is broadcast three times a week in 30 of the Corporation's organizations and has an audience of 50,000 people);
- A television programme (it is aired weekly in 20 cities where ROSATOM operates; the viewership of the channels that broadcast the programme totals 7.2 million people).

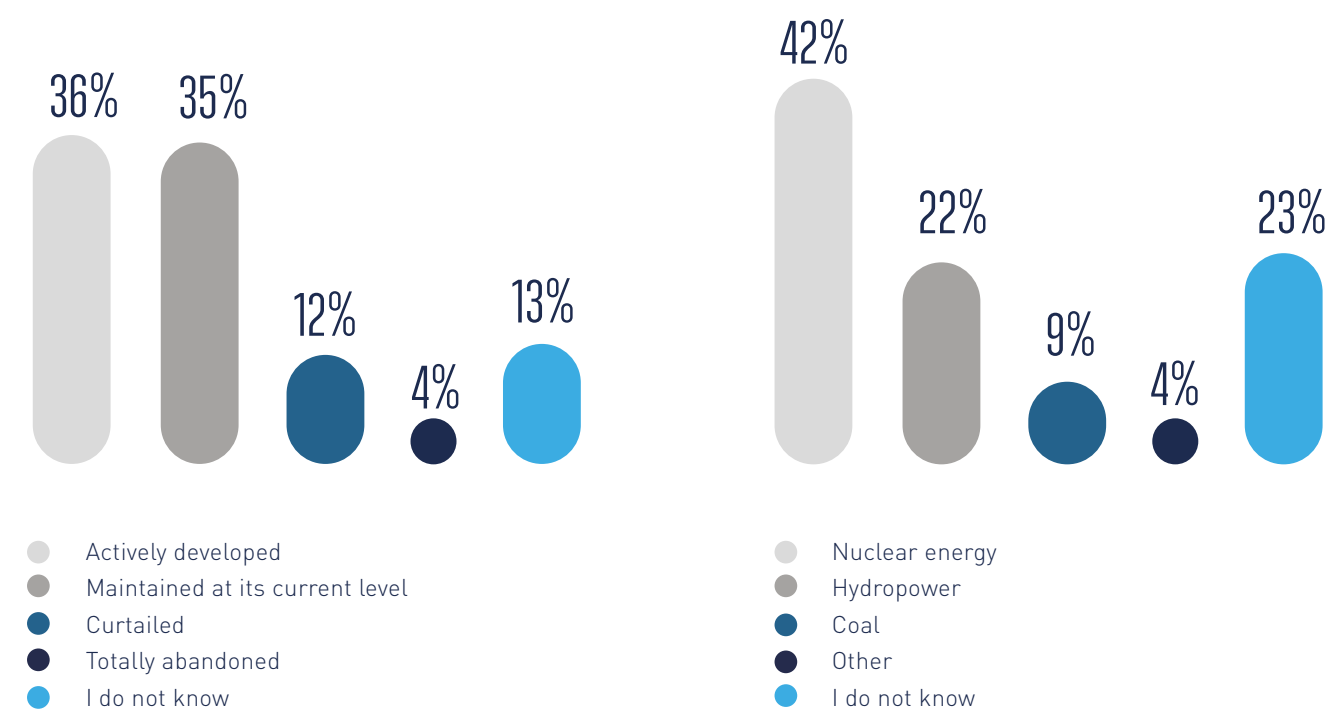
7.4.5. OPINION POLLS

ROSATOM analyses the public perception of the development of nuclear power in Russia on a yearly basis and adjusts its communication with stakeholders accordingly.

According to an independent opinion survey by Levada-Centre⁵¹, 71% of the Russian population supported the use of nuclear power (over the past five years, this figure has ranged between 66.5% and 75.5%). Thus, the result of 2016 is consistent with the general trend seen in recent years and confirms that the level of support for nuclear energy development programmes among the Russian population is consistently high.

— Do you think that the nuclear power industry should be actively developed, maintained at its current level, curtailed or totally abandoned?

— They say Russia will run out of oil and gas in 20 years. What do you think could replace them as a source of energy?



⁵¹ The survey was conducted from February 3 to February 6, 2017 across a representative sample of Russian citizens consisting of 1,602 people aged 18 and above.



NUCLEAR POWER PROVIDES
A RELIABLE AND ACCESSIBLE
FOUNDATION FOR A CARBON-FREE
WORLD IN THE 21ST CENTURY

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8.1. NUCLEAR AND RADIATION SAFETY, OCCUPATIONAL SAFETY AND HEALTH

ROSATOM FOCUSES ON THE EFFECTIVE EXERCISE OF POWERS AND PERFORMANCE OF FUNCTIONS IN THE AREA OF NUCLEAR POWER MANAGEMENT STIPULATED BY THE LEGISLATION, THE FOREMOST OF WHICH IS TO ENSURE SAFETY AND PROTECT THE ENVIRONMENT.

KEY RESULTS IN 2016:

- NO EVENTS RATED AT LEVEL 2 OR HIGHER ON THE INES SCALE WERE DETECTED;
- THE INJURY FREQUENCY RATE AND THE LOST TIME INJURY FREQUENCY RATE (LTIFR) STOOD AT 0.38 AND 0.19 RESPECTIVELY;
- INDIVIDUAL RADIATION RISK WAS CALCULATED FOR 64,611 PEOPLE USING THE IRAW SYSTEM.

8.1.1. NUCLEAR AND RADIATION SAFETY MANAGEMENT



Safety is a fundamental principle underlying ROSATOM's operations; it is one of the corporate values:

'In our work, we give priority to ensuring the full safety of people and the environment. In the field of safety, everything is important; we know safety rules and comply with them to prevent violations.'

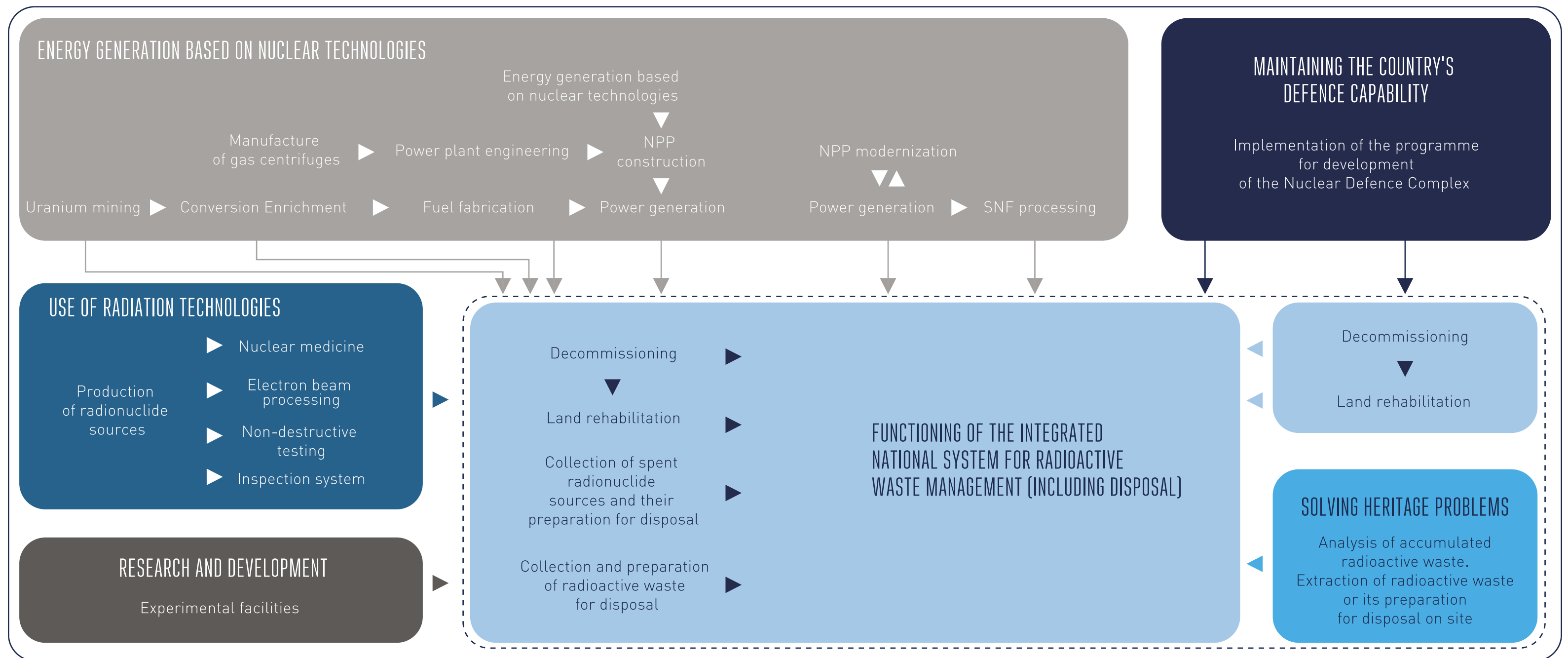
ROSATOM focuses on the effective exercise of powers and performance of functions in the area of nuclear power management stipulated by the legislation, the foremost of which is to ensure safety and protect the environment during the use of nuclear power. This task is addressed by various business units and organizations of ROSATOM using all principal governmental and non-governmental management mechanisms.

The following business units of ROSATOM perform the nuclear and radiation safety management functions:

- The General Inspectorate participates in the preparation of proposals for the formulation of state policy on nuclear and radiation safety, takes measures to ensure the safety of nuclear facilities and monitors the safety in ROSATOM's organizations;
- The Nuclear and Radiation Safety, Licensing and Permitting Department is responsible for ensuring that the personnel and equipment are ready to deal with emergency situations at nuclear facilities and for monitoring the implementation of preventive measures;



NUCLEAR AND RADIATION SAFETY MANAGEMENT



— Nuclear and radiation safety circuit I. Safe operation of nuclear facilities.

- - - Nuclear and radiation safety circuit II. Completion of final stages of process cycles.

- The Directorate for Public Policy on Radioactive Waste and Spent Nuclear Fuel Management and Nuclear Decommissioning plays a crucial role in the system for the management of state programmes related to dealing with ‘nuclear legacy’ issues;
- The Technical Regulation Department updates the system of technical safety requirements in the area of the use of nuclear power.

8.1.2. NUCLEAR AND RADIATION SAFETY AT NUCLEAR FACIL- ITIES



The safety status of nuclear facilities is assessed based on the number and scale of recorded deviations in their operation that are benchmarked against the IAEA international Nuclear and Radiological Event Scale (INES). Events on the Scale are rated at 7 levels; the upper levels (4-7) are termed ‘accidents’, while the lower levels are ‘incidents’ (2-3) and ‘anomalies’ (1). Events which have no safety significance are classified as ‘below scale’ at level 0. Events which have no safety relevance are characterized as ‘out of scale’.

In 2016, ROSATOM ensured safe and steady operation of enterprises in the nuclear industry. In 2016, there were no incidents involving radiation leaks. Limits on employee radiation exposure were not exceeded.

Nuclear power plants

As in recent years, in 2016, no events rated at level 2 or higher on the international INES scale were detected at Russian nuclear power plants (level 1 and 0 deviations do not pose a risk to employees operating the facilities, local residents or the environment).

The increase in the number of deviations in the operation of NPPs rated at level 0 on the INES scale and out of scale compared to previous years is due primarily to a large number of equipment failures at Kalinin NPP: 14 deviations (including eight deviations that occurred due to failures of the turbine regulation system (power unit No. 4) caused by deficiencies in design and engineering solutions).

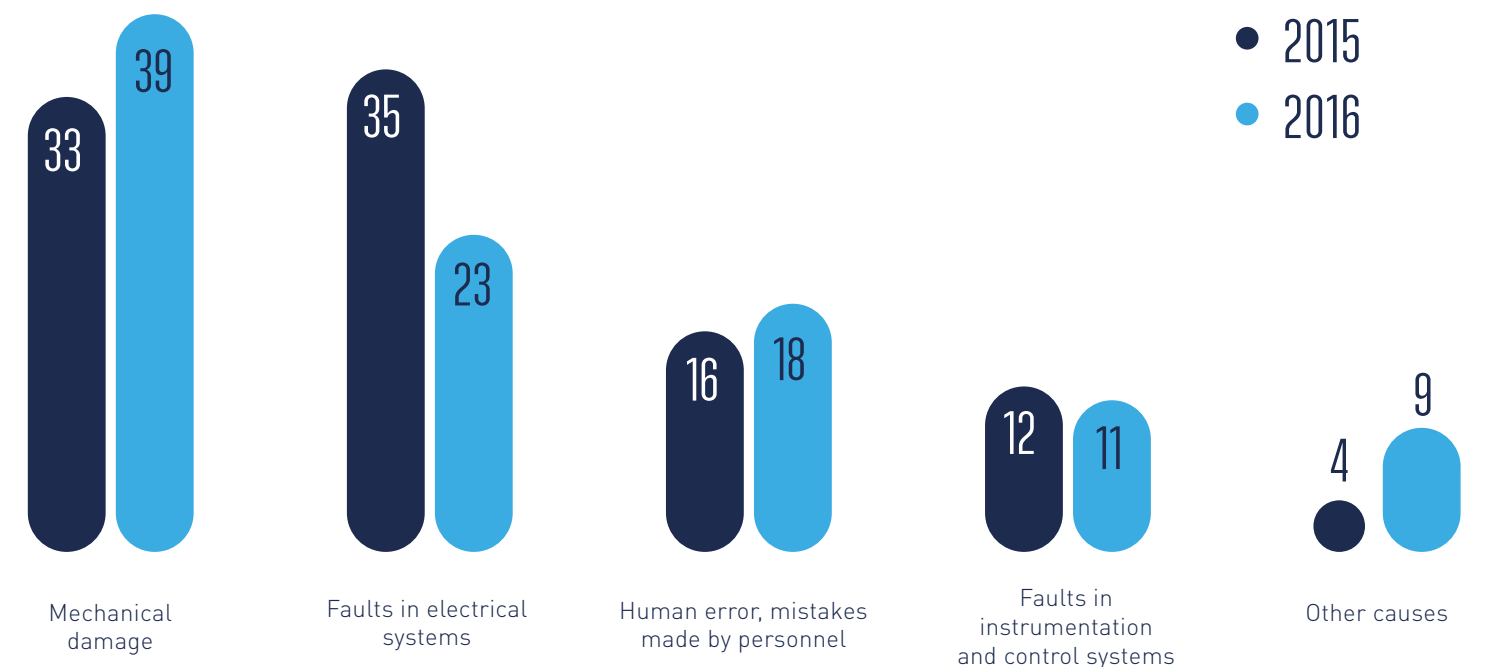
CHANGES IN THE NUMBER OF DEVIATIONS IN THE OPERATION OF NPPS ON THE INES SCALE⁵²

	2014	2015	2016
Total, including:	38	34	46
Level 0 and out of scale	38	31	44
Level 1	0	3	2

Level 1 events on the INES scale in 2016:

- The requirements for safe operation during power generation were violated at power unit No. 1 of Kalinin NPP, as both gaskets of the main reactor joint were loose;
- The requirements for safe operation during the start-up of the power unit and power generation were violated at power unit No. 2 of Smolensk NPP, as there was a leak in an unattended room.

CAUSES OF DEVIATIONS IN THE OPERATION OF NPPS, %



⁵² Excluding deviations at power units that were in pilot operation or at the commissioning stage.

Nuclear fuel cycle enterprises

In 2016, 3 events were recorded at nuclear operators (FSUE Mayak Production Association, FSUE Mining and Chemical Plant and JSC Siberian Chemical Combine):

- In 2 instances, employees suffered injuries and damage to the skin;
- 1 event involved a failure of equipment during routine work with spent nuclear fuel.

These events were classified as having no safety significance and were rated at level 0 on the INES scale.

Research reactor units

JSC SSC RIAR

On August 28, 2016, the SM-3 research reactor was shut down by the emergency protection system following a false alarm (there was a signal of a decreasing level in the degasser). There were no violations of the limits and requirements for safe operation.

JSC IRM

On July 22, 2016, the IVV-2M research reactor unit was shut down by the emergency protection system. The protection system responded to an increase in the reactor power in two out of four measurement channels as the displacer was removed too rapidly from the reactor core. Safe operating limits were not exceeded during the event; it was rated at level 0 on the INES scale.

JSC Afrikantov OKBM

On September 23, 2016, during the preparation of the critical test facility for 'hot' tests of the core of a universal nuclear icebreaker, a compensating grid was unintentionally lifted above the launch position. This resulted in a short-term uncontrollable increase in power, which stopped due to the neutron and physical characteristics of the reactor core. The exposure of personnel (7 persons) to radiation did not exceed the basic radiation dose limits, and no clinical consequences of radiation exposure were detected during in-patient examination at the A.I. Burnazyan Federal Medical and Biophysical Centre. This event was rated at level 1 on the INES scale.

The main causes of the accident included inefficient organization and control of operations posing nuclear hazards, as well as shortcomings in operating instructions. The management of ROSATOM and of JSC Afrikantov OKBM have taken steps to prevent such violations in the future.

8.1.3.

PHYSICAL PROTECTION OF NUCLEAR FACILITIES

The security and physical protection of ROSATOM's facilities posing nuclear and radiation hazards and nuclear and radioactive materials used and stored by ROSATOM (including during their transportation) complies with the Russian legislation. Furthermore, Russian regulatory requirements are fully consistent with the IAEA recommendations on physical protection and in some respects even exceed them.

In 2016, ROSATOM's facilities (premises) were categorized and the relevant data sheets were prepared in accordance with the requirements of Russian anti-terrorism legislation.

In accordance with the instructions of the Government of the Russian Federation, in 2016, a special commission inspected the protection and security status of facilities posing nuclear and radiation hazards, as well as ROSATOM's infrastructure facilities, including those under construction. As part of departmental monitoring, 12 scheduled checks of physical protection in ROSATOM's organizations were carried out, including an assessment of their compliance with anti-terrorist security requirements.

ROSTATOM continued to improve the information system for monitoring the condition of the physical protection system of ROSATOM's facilities posing nuclear and radiation hazards. In 2016, the system was deployed at 14 nuclear facilities. The system software installed earlier at 10 nuclear facilities was updated. To date, about 130 workstations forming part of the monitoring information system have been set up in the industry organizations, including over 50 workstations in 2016. In the same year, 5 holding companies within ROSATOM were connected to the information system.

In addition, in 2016:

- ROSATOM upgraded and replaced security equipment along more than 28 kilometres of the perimeters of protected areas of facilities posing nuclear and radiation hazards, including 52 checkpoints for people and vehicles;



In 2016, there were no violations of access control and internal security requirements at ROSATOM's facilities resulting in the theft of nuclear materials, terrorist acts or sabotage at nuclear facilities.

- Over 4,700 items of equipment were installed in protected areas as part of equipment systems for physical protection;
- More than 120 km of cable routes of physical protection systems were laid;
- Equipment for physical protection was upgraded in more than 49 buildings;
- 12 special vehicles were manufactured; 57 complexes of the automated safety system for the transportation of nuclear materials and radioactive substances (ASST) for railway cars, 25 ASST complexes for special vehicles and 9 ASST complexes in control centres of enterprises underwent maintenance;
- ASST equipment was installed on 41 vehicles, 50 railway cars and in 2 control centres of industry organizations.

8.1.4. EMERGENCY PREPAREDNESS⁵³

In order to ensure the safe operation of the nuclear industry and protect employees, local population and areas against the possible effects of accidents (emergencies), ROSATOM operates an emergency prevention and response system (EPRS), which is a functional subsystem forming part of the integrated state system for emergency prevention and response (ISSEPR).

As of December 31, 2016, 14 professional emergency response teams (ERT) and 55 volunteer ERTs were in a state of readiness in the nuclear industry. They comprise a total of 2,378 emergency response workers. In 2016, the certification commissions of ROSATOM and its organizations certificated 30 emergency response teams and 736 emergency response workers.

In 2016, the emergency response teams participated in 382 emergency, tactical and command post exercises and drills, including jointly with the governing bodies and the teams of functional ISSEPR

subsystems of various ministries and departments (Molniya ('Flash') and Atom series of exercises, etc.).

As part of the development of international cooperation in the area of emergency preparedness and response, ROSATOM participated in a number of international projects and events related to emergency preparedness and response (the initiatives of the IAEA and of the OECD Nuclear Energy Agency, events forming part of cooperation between Russia and Scandinavia and cooperation with the Republic of Belarus).

Industry-wide automated radiation monitoring system (IARMS)

The IARMS is a functional subsystem of the Integrated State Automated Radiation Monitoring System (ISARMS). Its main function is to monitor the radiation level in areas where facilities posing nuclear and radiation hazards are located. The IARMS is one of the tools for alarm notification and providing information for decisions on accident response.

As of December 31, 2016, on-site ARMSs integrated into the IARMS operated in the locations of 31 facilities of ROSATOM posing nuclear and radiation hazards, including all 10 NPPs. The total number of fixed monitoring stations amounted to 440 (with 304 stations located outside industrial sites and 136 ARMS stations located at industrial sites of ROSATOM's organizations).

These include:

- 409 stations monitoring only the gamma radiation dose rate;

- 9 stations monitoring the gamma radiation dose rate and meteorological parameters;
- 4 stations monitoring the gamma radiation dose rate and hydrogen fluoride concentration in the atmosphere;
- 2 stations monitoring the gamma radiation dose rate and volumetric activity of radioactive gases and aerosols;
- 1 station monitoring the gamma radiation dose rate, the volumetric activity of radioactive gases and aerosols and meteorological parameters;
- 7 stations monitoring only the volumetric activity of aerosols;
- 8 stations monitoring only meteorological parameters.

Real-time data from radiation monitoring stations operated by the Corporation's organizations are available on the website at www.russianatom.ru.

8.1.5. INDUSTRIAL SAFETY

As of December 31, 2016, 113 of ROSATOM's organizations operated 775 hazardous industrial facilities (773 facilities in 2015), including 8 hazard class 1 facilities, 31 hazard class 2 facilities, 298 hazard class 3 facilities and 438 hazard class 4 facilities.

⁵³ Detailed information on the operation of the emergency prevention and response system is available at <http://www.skc.ru>, <http://www.nwatom.ru>, and on the official websites of ROSATOM and industry organizations.

In the reporting year, there were no events classified as 'accidents at a hazardous industrial facility' at ROSATOM's industrial facilities.

In 2016, the General Inspectorate of ROSATOM informed the subordinate organizations that new federal rules and regulations on industrial safety and amendments to them had come into force. ROSATOM's organizations that operate hazardous industrial facilities are implementing the federal rules and regulations on industrial safety. Comprehensive surveys of the actual condition of process facilities are carried out to assess their compliance with the requirements of the federal rules and regulations on industrial safety, and sets of measures are being developed to ensure the safe operation of such facilities.

All equipment operated at the facilities managed by ROSATOM undergoes timely technical inspection and industrial safety assessment. Employees operating hazardous industrial

facilities are provided with all the required special clothing and personal protective equipment of proper quality.

8.1.6. OCCUPATIONAL SAFETY AND HEALTH

One of the fundamental priorities for ROSATOM is to protect the life and health of employees in the industry. In 2009, organizations in the industry introduced an Occupational Safety and Health

OCCUPATIONAL SAFETY AND HEALTH INDICATORS

Indicator	2014	2015	2016
Number of people injured in accidents	109	91	98
Number of fatalities	4	4	10
Injury frequency rate (FR) ⁵⁴	0.43	0.34	0.38
LTIFR ⁵⁵	0.29	0.20	0.19
Number of people newly diagnosed with an occupational disease	48	50	55

⁵⁴ FR stands for the number of industrial injuries per 1,000 employees during a given period of time, per year.

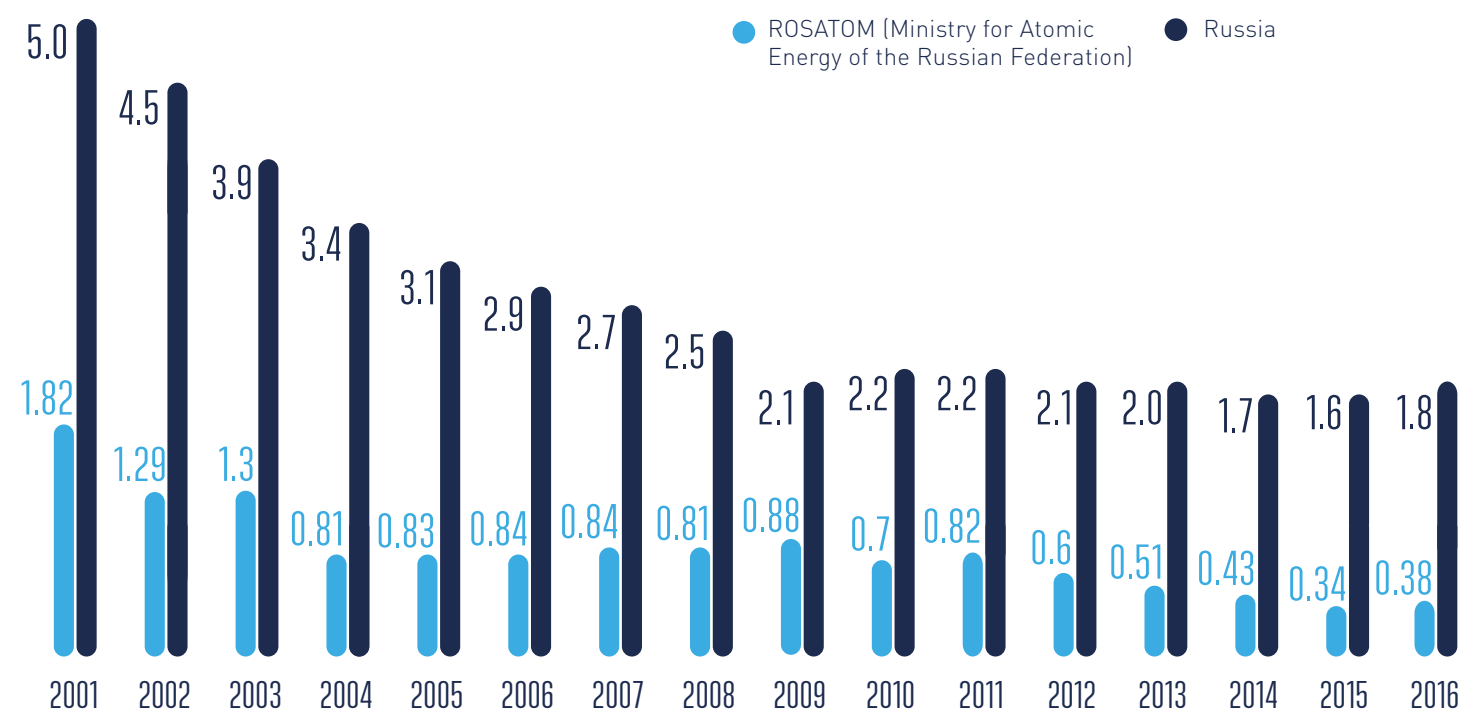
⁵⁵ LTIFR is the ratio of the total working hours lost as a result of injuries (1 million man-hours) to the total working hours

Management System, which is an important element of mutual obligations undertaken by ROSATOM, the Russian Union of Employers in the Nuclear Industry, Power and Science and the Russian Trade Union of Nuclear Power and Industry Workers in accordance with the Industry-Wide Agreement on Nuclear Power, Industry and Science (the current version of the agreement is in force for the period from 2015 through 2017).

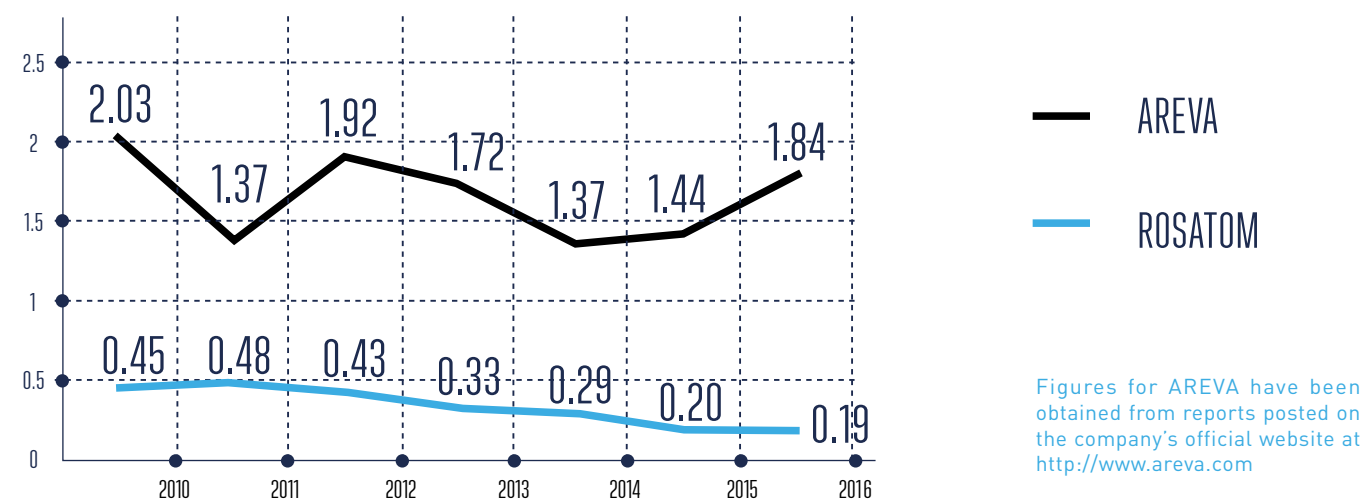
In 2016, organizations in the industry continued to work systematically towards increasing the level of safety, including efforts to reduce the number of occupational injuries and employee exposure to occupational hazards, as well as to ensure the safety of employees in contractor organizations.

Industrial injuries, accidents, occupational diseases

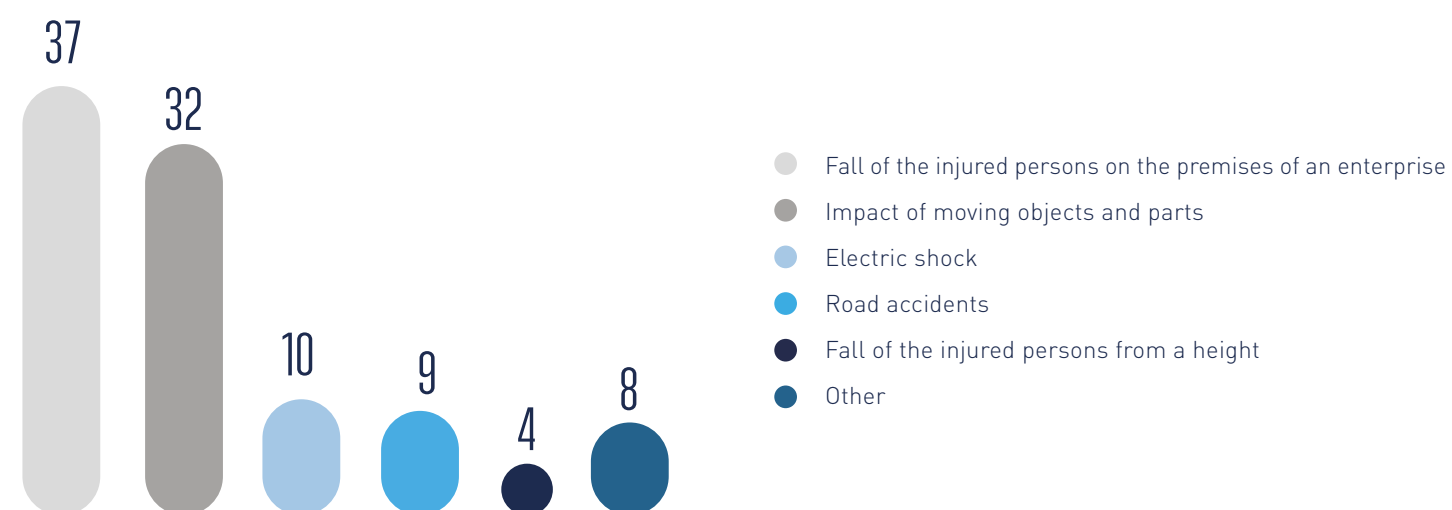
COMPARATIVE DATA ON INDUSTRIAL INJURIES IN RUSSIA AND ROSATOM (NUMBER OF INJURED PERSONS PER 1,000 EMPLOYEES)



LTIFR IN ROSATOM BENCHMARKED AGAINST THE FRENCH COMPANY AREVA



CAUSES OF INDUSTRIAL INJURIES IN 2016, %



CHANGES IN LTIFR

ROSATOM's divisions/complexes	2014	2015	2016
Nuclear Weapons Division	0.21	0.22	0.2
Mining Division	0.85	0.23	0.44
Fuel Division	0.08	0.14	0.09
Power Engineering Division	0.02	0.02	0.065
Engineering Division	0.14	0.16	0.21
Life Cycle Back-End Division	0.45	0.10	0.32
Innovation Management Unit	0.3	0.10	0.048
JSC ITPC	0	0	0.18
Mechanical Engineering Division	0.51	0.42	0.25
Total	0.29	0.2	0.19

In 2016, the injury frequency rate across the industry remained relatively low compared to major Russian and international companies. A total of 98 people were injured in workplace accidents. The injury frequency rate (FR) totalled 0.38.

In 2016, the lost time injury frequency rate (LTIFR) totalled 0.19. In the reporting year, the lowest injury frequency rate was recorded in organizations within the Innovation Management Unit. It should be noted that in 2016, the injury frequency rate declined in the Mechanical Engineering Division (as in 2015). The Mining Division also continued to implement measures to prevent accidents and increase the level of work discipline.

In the reporting year, 19 people were seriously injured in the workplace, and 10 people died under various circumstances. The main cause of injuries in serious and fatal accidents is electric shock as a result of a short circuit.

In 2016, 55 employees were newly diagnosed with occupational diseases, including 52 employees of PJSC PIMCU, 1 employee of JSC RUSBURMASH, 1 employee of Uralatomenergoremont (a branch of JSC Atomenergoremont) and 1 employee of LLC Petrozavodskmash Foundry.

8.1.7.

RADIATION EXPOSURE OF EMPLOYEES

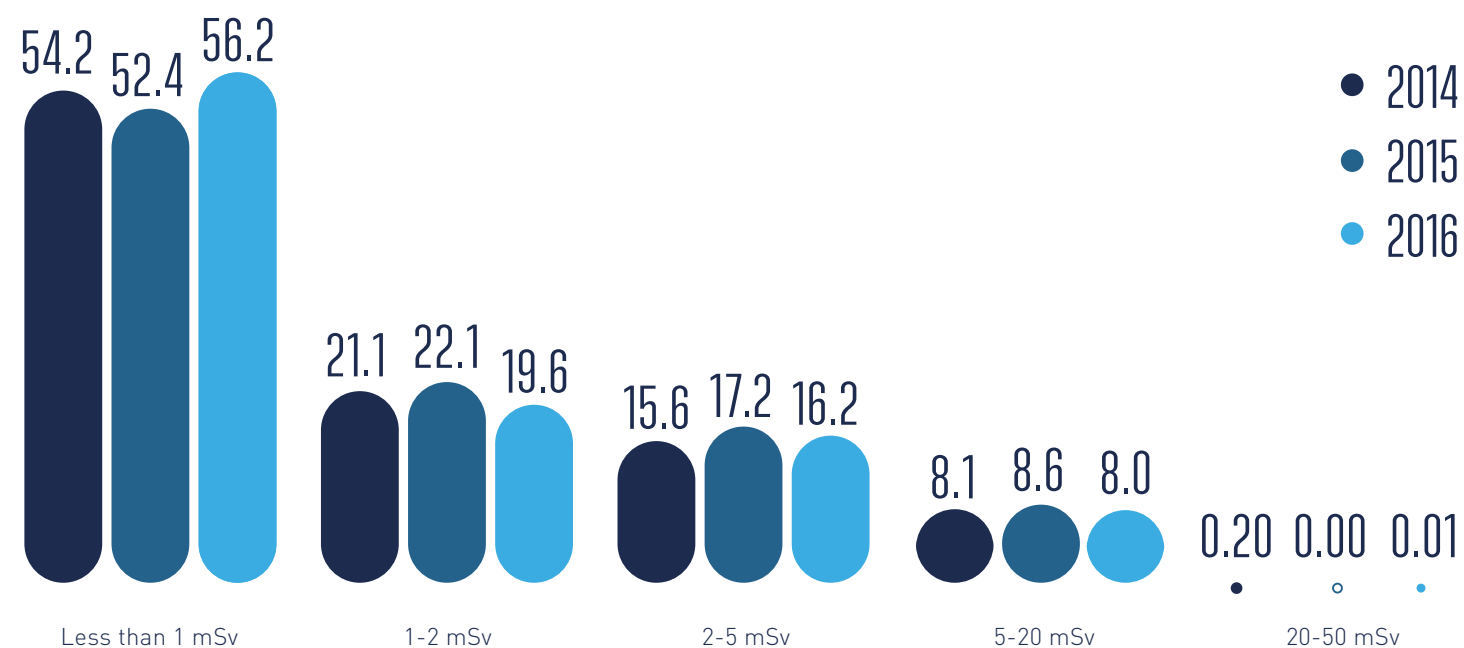
Ionizing radiation is an occupational hazard specific to ROSATOM's enterprises. The criteria of employee radiation safety are laid down in the Radiation Safety Standards (NRB-99/2009), the Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010) and other regulations. Most enterprises in the industry provide workplace conditions that fully comply with the requirements set out in these documents.

Average annual effective radiation dose of the personnel

As of December 31, 2016, 65,988 people (group A personnel) were under individual radiation exposure monitoring in ROSATOM's organizations. This number decreased by 0.5% compared to 2015.

In 2016, the average annual effective radiation dose of the Company's personnel totalled 1.65 mSv. Over the past eight years, average effective employee radiation exposure and the number of people exposed to radiation have been varying insignificantly and remain low.

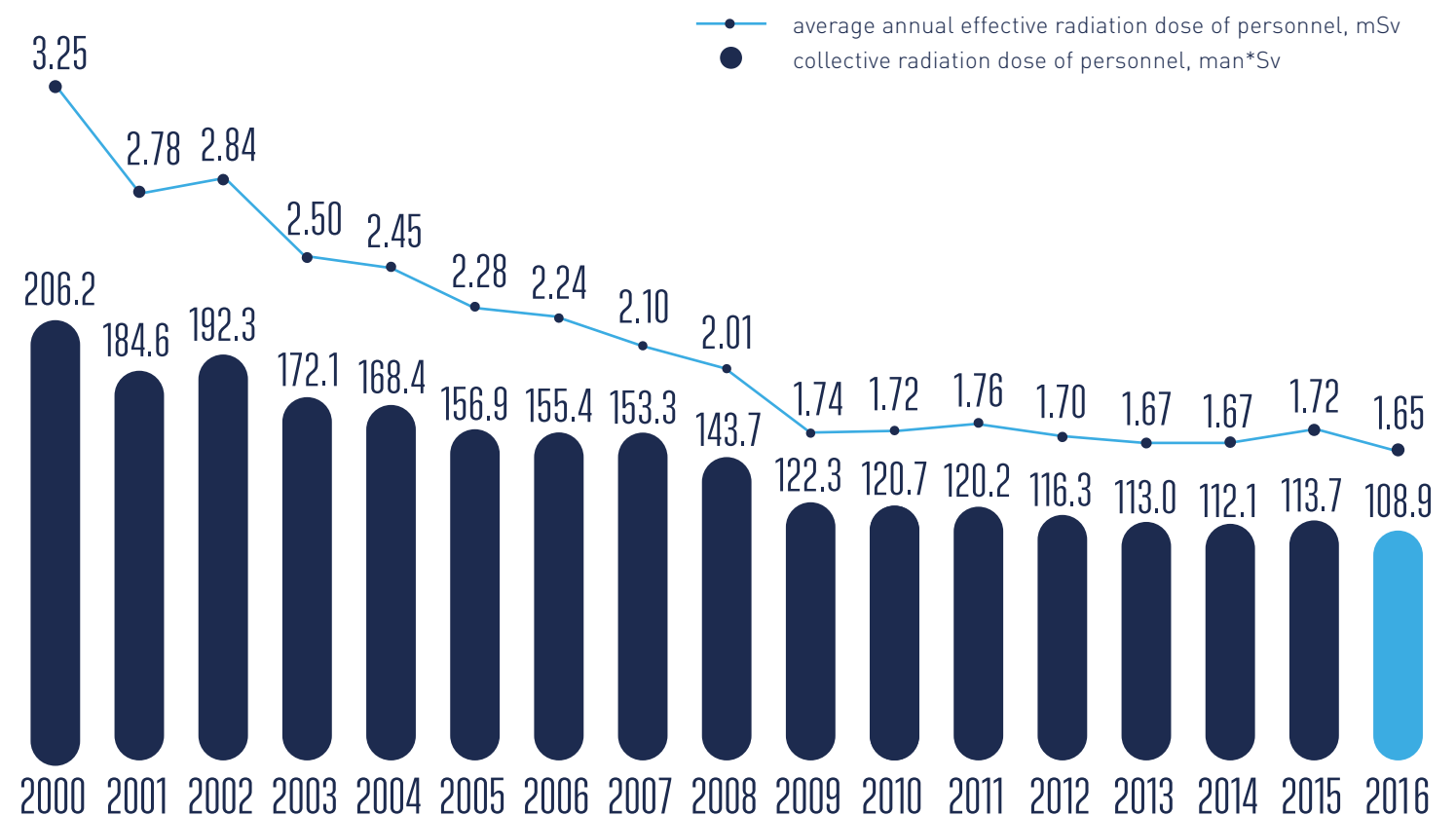
DISTRIBUTION OF GROUP A PERSONNEL BY DOSE RANGES, %



In 2016, employee radiation exposure did not exceed regulatory limits. The total effective dose for any employee did not exceed 100 mSv over

five consecutive years. The annual dose limit of 50 mSv was not exceeded.

AVERAGE ANNUAL EFFECTIVE RADIATION DOSE OF THE PERSONNEL



Individual radiation risks of personnel

In 2016, ROSATOM continued to monitor radiation risks for group A personnel using the IRAW occupational radiation risk assessment system. Individual risk was calculated for 64,611 people, or 97.9% of the total number of group A employees. The absolute majority of group A employees work in conditions of acceptable occupational risk. For 787 people (1.22% of the number of employees included in the IRAW system), individual risk exceeded the regulatory level of 10^{-3} . The high-risk group comprises mainly veterans of the industry, whose average age is more than 60 years.

Over the last three years, the average individual radiation risk across ROSATOM did not exceed 8% of the regulatory limit, while the maximum individual risk has been decreasing steadily.

CHANGES IN KEY INDICATORS OF THE IRAW SYSTEM

	2014	2015	2016
Share of employees in the negligible and acceptable occupational risk areas	98.74 %	98.64 %	98.78 %
Share of employees in the high risk area	1.26 %	1.36 %	1.22 %
Share of employees in the industry undergoing individual radiation exposure monitoring and included in the IRAW system	91.0 %	94.3 %	97.9 %

Assessment of the overall risk of potential exposure

In 2016, the overall risk of potential exposure was assessed in 55 organizations. The results of radiation risk monitoring form the basis for management decisions on the optimization of the radiation protection of personnel in order to prevent an increase in the size of the group characterized by high occupational risk.

The safety index of potential exposure (SIPE) obtained as a result of the monitoring takes

into account the limit on the overall risk (no more than $2 \cdot 10^{-4}$ per year) and makes it possible to monitor the potential exposure level and predict the radiation protection status in an organization. The state of radiation protection against potential exposure in an enterprise is considered optimized if the index value exceeds 50% and does not decrease over time. None of ROSATOM's organizations reported an SIPE value below the acceptable limit. In the reporting year, the average SIPE across the Corporation stood at 79.7%.

RESULTS OF RADIATION RISK MONITORING

ROSATOM's divisions/complexes	Average individual risk	Average safety index of potential exposure, %
Power Engineering Division	$1.2 \cdot 10^{-4}$	79.1
Fuel Division	$2.8 \cdot 10^{-5}$	85.2
Nuclear Weapons Division	$4.4 \cdot 10^{-5}$	79.3
Mining Division	$2.0 \cdot 10^{-5}$	65.9
Life Cycle Back-End Division	$4.3 \cdot 10^{-5}$	87
Innovation Management Unit	$9.2 \cdot 10^{-4}$	79.8
Mechanical Engineering Division	$6.2 \cdot 10^{-5}$	82.5
Engineering Division	$6.0 \cdot 10^{-6}$	77.6
Total	$7.0 \cdot 10^{-5}$	79.7

8.2. RAW AND SNF MANAGEMENT AND DECOMMISSIONING OF FACILITIES POSING NUCLEAR AND RADIATION HAZARDS



OLEG KRYUKOV

DIRECTOR FOR PUBLIC POLICY ON RADIOACTIVE WASTE,
SPENT NUCLEAR FUEL AND NUCLEAR DECOMMISSIONING



KEY RESULTS IN 2016:

- **POWER UNIT NO. 3 OF NOVovoronezh NPP WAS SHUT DOWN FOR SUBSEQUENT DECOMMISSIONING (THIS IS THE FIRST POWER UNIT WITH A VVER-440 REACTOR TO BE DECOMMISSIONED);**
- **FSUE MAYAK PRODUCTION ASSOCIATION IMPLEMENTED TECHNOLOGIES FOR THE RECYCLING OF SPENT NUCLEAR FUEL FROM ALL TYPES OF REACTORS, WHICH WILL HELP TO REDUCE THE VOLUME OF SNF ACCUMULATED IN THE INDUSTRY;**
- **1 NUCLEAR SUBMARINE AND 3 NUCLEAR MAINTENANCE SHIPS WERE DISMANTLED; 27 REACTOR COMPARTMENTS OF DISMANTLED NUCLEAR SUBMARINES WERE PUT IN LONG-TERM ONSHORE STORAGE.**

— *The development of new and more efficient technologies is crucial for RAW and SNF management. What results were achieved in this area in 2016?*

— **In the field of spent nuclear fuel management, an important event in 2016 was the obtaining of a licence to operate the start-up facility of the pilot centre at FSUE Mining and Chemical Plant.**

The pilot centre will be an innovative radiochemical plant which will be distinguished from any of the existing plants by the fact that it will completely prevent the dumping of low-level waste. The pilot centre is being created to develop new, safe and cost-effective technologies for the reprocessing of spent nuclear fuel (SNF) from VVER-1000 reactors and to obtain data for the replication of the technology in the construction of a large-scale plant for the reprocessing of SNF from power reactors. The centre includes a 'basic' process chain for the reprocessing of 250 tonnes

of SNF per year, as well as a complex of research chambers where other technologies for high-level waste processing and separation will be developed (the design capacity of the complex of research chambers totals 5 tonnes of SNF per year). Construction of the centre is scheduled for completion by 2021.

As for radioactive waste management, the concept of safe management of liquid radioactive waste (LRW) has now been adopted in Russia. It involves a complete cessation of waste discharge into open water bodies. At the same time, it is necessary to ensure that the condition of LRW is suitable for long-term controlled storage or disposal and is also as safe as possible for the environment. As part of the Federal Target Programme on Nuclear and Radiation Safety for the Period from 2016 through 2020 and for the Period until 2030, which was launched in 2016, unique research studies on the properties of a mineral-like magnesium-phosphate matrix were conducted. Its distinctive feature is that it forms at

room temperature. The use of this matrix forms the basis for a new intermediate level waste (ILW) solidification technique that is currently under development. The work is relevant due to the fact that solidification of ILW with high sulphate, ammonium and alpha-emitting nuclide content using industrial cementing and vitrification methods is not permitted by the existing regulations. However, the use of the magnesium-phosphate matrix solves the problem of solidifying this type of LRW. In 2016, successful pilot tests of this technique were carried out at FSUE Mayak Production Association. In 2017, the aim is to explore the possibility of using the magnesium-phosphate matrix for solidification of high-level waste generated during SNF reprocessing as an alternative to the vitrification process.

I would like to point out that effective RAW and SNF management technology includes not only equipment and facilities, but also work organization and planning schemes, simulation software packages, including those using 3D modelling, and other recent developments.

— *In the reporting year, power unit No. 3 of Novovoronezh NPP was shut down for subsequent decommissioning. What are the implications of this event for the Russian nuclear power industry?*

— **It is the first NPP power unit with a VVER-440 reactor in Russia that has been permanently shut down.**

It was built in 1971 with a design life of 30 years. A unique set of works was performed on it, as well as on power unit No. 4, which was built one year later. This made it possible to extend their life for another 15 years.

This shutdown provides a unique opportunity for mastering decommissioning technologies for their subsequent roll-out to all NPP power units with this type of reactor. These technologies will then form the basis for preparing an integrated offer for the decommissioning of nuclear power plants with Russian-design reactors.

This task is very complex and ambitious, as some countries, such as Germany, launched similar activities much earlier and have already gained some experience. We need to address this challenge jointly with Rosenergoatom Concern, the divisions and organizations of the Life Cycle Back-End Division and leading research and design institutions in the industry. ●

8.2.1. OUTCOMES OF THE FEDERAL TARGET PROGRAMME ON NUCLEAR AND RADIATION SAFETY FOR THE PERIOD FROM 2016 THROUGH 2020 AND FOR THE PERIOD UNTIL 2030

In 2016, ROSATOM started to implement the Federal Target Programme (FTP) on Nuclear and Radiation Safety for the Period from 2016 through 2020 and for the Period until 2030. The Programme is a follow-up to the successfully completed FTP for the period from 2008 through 2015, which involved stabilizing the condition of nuclear legacy facilities and ensuring that it is controllable, as well as developing a legal framework for spent nuclear fuel and radioactive waste management and decommissioning of nuclear facilities.

The new FTP will enable a qualitative improvement in the nuclear legacy situation in Russia by ensuring the safety of nuclear legacy facilities and creating the infrastructure required for their subsequent elimination.

The objectives of the Programme are as follows:

- To ensure that the volume of spent nuclear fuel (SNF) recycling exceeds SNF accumulation;
- To ensure that the volume of radioactive waste (RAW) disposal exceeds RAW generation;

- To achieve a high rate of decommissioning, which will minimize the risks and costs associated with the elimination of 'nuclear legacy' facilities.

In the reporting year, decommissioning of facilities posing nuclear and radiation hazards started at 20 sites. This will help to prevent man-made accidents, natural disasters and acts of terrorism at the decommissioned facilities posing nuclear and radiation hazards. The decommissioning work included the following:

- The decommissioning of an open radioactive waste storage pool at FSUE Mining and Chemical Plant and the mothballing of storage pools at JSC SCC were started. This will completely eliminate the possibility of a leak of radioactive substances, including plutonium, from the pools into the environment;
- Dismantling of the Sibir nuclear icebreaker, which has reached the end of its service life, was started (preparation for the unloading of nuclear reactors, steam generators, supporting systems and equipment), and dismantling of the Lepse floating maintenance base was continued (the stern package

- was placed in the long-term reactor compartment storage facility in Sayda, and SNF was prepared for unloading from on-board storage);

 - FSUE Mayak Production Association mastered the reprocessing of spent nuclear fuel from all types of power and industrial reactors, propulsion units and research reactors; in the long term, this will help to reduce the amount of accumulated and newly generated spent nuclear fuel, significantly reduce the risks of nuclear accidents and the cost of safe storage of spent nuclear fuel;
 - The development of infrastructure for SNF and RAW management continued at Leningrad, Smolensk and Kursk NPPs;
- Removal of accumulated RAW from nuclear facilities and its transfer to FSUE National Operator for Radioactive Waste Management⁵⁶ was started; during 2016, 5,848 m³ of RAW were transferred;
 - The procedures for radiation monitoring and rehabilitation of areas with radiation anomalies in the Moscow Region were developed and agreed with the territorial departments of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor) and local governments; a total area of 658 m² was rehabilitated, and a total of 443 m³ of radioactively contaminated soil was removed and transported to the specialized organization, FSUE Radon.

8.2.2.

DEVELOPMENT OF AN INTEGRATED NATIONAL SYSTEM FOR RADIOACTIVE WASTE MANAGEMENT

The second stage of the project to create the Integrated National System for RAW Management continued in 2016. As of December 31, 2016, one radioactive waste disposal facility (RWDF) was in operation in Russia. It is situated in Novouralsk, Sverdlovsk Region, and is used for the disposal of class 3 and 4 solid RAW. The facility is an underground repository complying with legislative requirements and the IAEA international standards. It is designed to ensure the safe disposal of solid RAW for a period of up to 300 years. Once the storage facility is full, the site will be restored to the 'greenfield' condition. In the reporting year, the first batch of RAW from JSC Ural Electrochemical Integrated Plant (UEIP) totalling 47.5 m³ was received for disposal at the radioactive waste disposal facility.

ROSATOM also operated three deep geological repositories for class 5 liquid RAW in Dimitrograd (Ulyanovsk Region), in the CATF of Seversk (Tomsk Region), and in the CATF of Zheleznogorsk (Krasnoyarsk Territory).

The land use planning scheme of the Russian Federation in the power industry was approved. It reflects both existing radioactive waste disposal sites and planned facilities.

In 2016, a licence was obtained for the construction of an underground research laboratory (Krasnoyarsk Territory, Nizhnekansky Rock Massif).

The purpose of the laboratory is to conduct research and confirm the possibility of safe disposal of class 1 and 2 RAW.

RAW generation and storage

In 2016, 1.52·10⁶ m³ of RAW were generated in Russia, of which 5.96·10⁴ m³ were placed in long-term storage facilities.

The volume of RAW accumulated as of December 31, 2016 totalled 5.56·10⁸ m³, of which 5.53·10⁸ m³ were classified as 'nuclear legacy'.

RAW GENERATION IN 2016

	Very low-level waste	Low-level waste	Intermediate-level waste	High-level waste
Solid waste, m ³	7.16·10 ⁵	4.13·10 ³	1.04·10 ³	2.50·10 ²
Liquid waste, m ³	–	6.87·10 ⁵	9.48·10 ⁴	1.86·10 ⁴

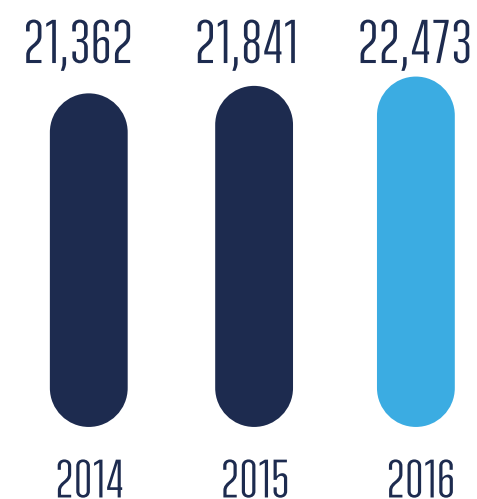
8.2.3.

SPENT NUCLEAR FUEL MANAGEMENT

As of December 31, 2016, the volume of accumulated SNF in Russia totalled 22,437 tonnes, including 596 tonnes accumulated in 2016. During the reporting year, 647.4 tonnes of SNF from Russian NPPs were put in long-term storage, and 233.22 tonnes of different types of SNF were reprocessed.

⁵⁶ Under the resolution of the Russian Government, Federal State Unitary Enterprise National Operator for Radioactive Waste Management has been appointed national operator for the management of radioactive waste; it is the only organization authorized to carry out permanent isolation of radioactive waste and other related functions. The enterprise addresses the issues of accumulated 'nuclear legacy' and newly generated RAW and is essentially a state-owned manufacturing and environmental enterprise whose key objective is to ensure permanent isolation of RAW taking into account any potential environmental risks.

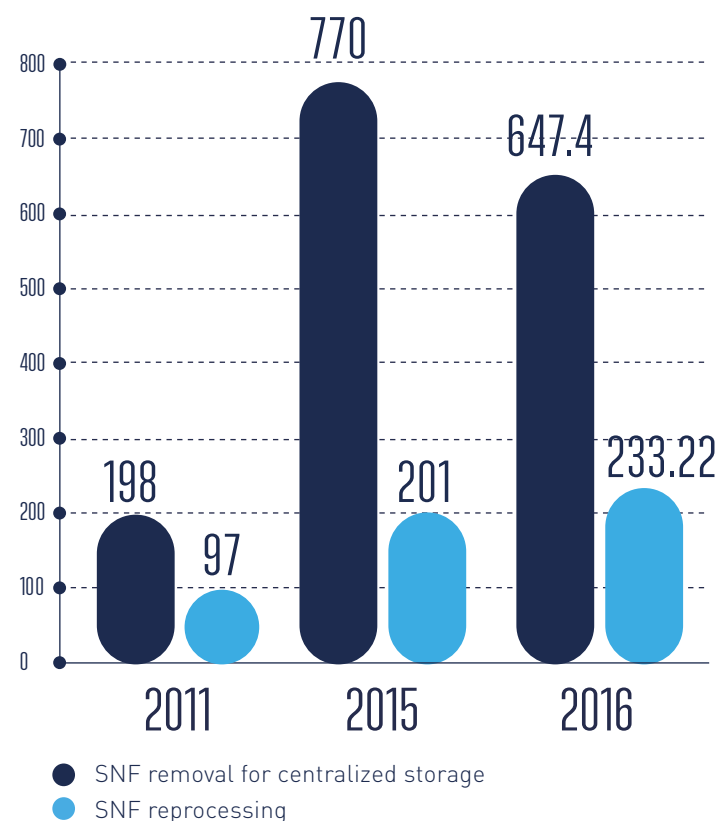
SNF ACCUMULATION IN RUSSIA, TONNES



In 2016, removal of spent fuel assemblies from Russian nuclear power plants continued:

- 4,608 spent fuel assemblies from RBMK-1000 reactors were removed and placed in 'dry' storage at FSUE Mining and Chemical Plant;
- 307 spent fuel assemblies from VVER-1000 reactors were removed and placed in temporary storage for subsequent reprocessing at FSUE Mining and Chemical Plant;
- 439 spent fuel assemblies from VVER-440 and BN-600 reactors were removed and transported to FSUE Mayak Production Association for reprocessing.

SNF REMOVAL FOR STORAGE AND REPROCESSING, TONNES



The manufacture of new TUK-1410 packaging designed for the transportation of spent fuel assemblies from VVER-1000 reactors was completed. TUK-1410 is characterized by expanded capacity, initial concentration of uranium-235 that has been increased to 5.0%, and fuel burnup of up to 70 GWd/Tu. Tests were conducted at Kalinin NPP and FSUE Mayak Production Association.

As part of the Russian-US RRRFR programme, in September 2016, 51 spent fuel assemblies from the Maria research reactor in the Republic of Poland were removed and transported to FSUE Mayak Production Association for reprocessing.



In the reporting year, a licence was obtained for the operation of an innovative pilot and demonstration facility for SNF reprocessing at FSUE Mining and Chemical Plant. The capacity of the start-up facility for developing new technologies totals 5 tonnes of SNF per year.

8.2.4. DEVELOPMENT OF A SYSTEM FOR DECOMMISSIONING OF FACILITIES POSING NUCLEAR AND RADIATION HAZARDS

After 45 years of successful operation, on December 26, 2016, power unit No. 3 of Novovoronezh NPP was permanently shut down. It will become a pilot unit for the development of technologies for the decommissioning of VVER-440 reactors in Russia and will contribute to the development of ROSATOM's competencies to enable it to enter the international market for decommissioning of nuclear facilities⁵⁷.

In addition, four facilities posing nuclear and radiation hazards were decommissioned:

- A radiation source in the durability testing laboratory of JSC Afrikantov OKBM (Nizhny Novgorod);
- A critical test facility at the A.I. Leypunsky Institute for Physics and Power Engineering (Obninsk);
- A nuclear unit of a prototype test facility and a set of test facilities for the reprocessing of liquid radioactive waste at FSUE Alexandrov Research Institute of Technology (NITI) (the town of Sosnovy Bor).

⁵⁷ Information on the shutdown of power units of nuclear power plants for decommissioning is also presented in the annual report of JSC Rosenergoatom Concern for 2016.

8.2.5. DISMANTLING OF NUCLEAR SUBMARINES

In 2016, 1 nuclear submarine and 3 nuclear maintenance ships were dismantled.



In 2016, there was a significant reduction in the lead time for the dismantling of reactor units of nuclear submarines. ROSATOM's enterprises started to dismantle 24 compartments of nuclear submarines per year instead of 8.

In addition, in the reporting year:

- 27 reactor compartments of nuclear submarines (16 in the North-Western Region and 11 in the Primorsky Territory) were prepared and put in long-term onshore storage;
- SNF was unloaded from the reactors of nuclear submarine No. 657, which had been removed from active service;
- Dismantling of the Ural large nuclear reconnaissance vessel and the PM-124 nuclear maintenance ship, which had been removed from active service, was started;
- Floating units from the reactor compartments of dismantled nuclear submarines were removed from the harbours of shipbuilding enterprises.

Using international funding for technical assistance (in 2016, a total of RUB 6.61 billion was received):

- The Itarus floating dock for the transportation of reactor compartments of dismantled nuclear submarines was built, delivered and commissioned;
- The dismantling of nuclear submarine No. 393 was completed;
- SNF was unloaded from the reactors of the Admiral Ushakov nuclear-powered cruiser, which had been removed from active service;
- The development of the SNF and RAW management systems continued in Andreev Bay.

8.2.6. PLANS FOR 2017 AND FOR THE MEDIUM TERM

In 2017, ROSATOM will continue to implement the Federal Target Programme (FTP) on Nuclear and Radiation Safety for the Period from 2016 through 2020 and for the Period until 2030, including:

- Establishment of a pilot and demonstration centre (second start-up facility) for SNF reprocessing based on innovative technologies at FSUE Mining and Chemical Plant;
- Construction of facilities for permanent isolation of class 3 and 4 solid radioactive waste;
- Preparation for the removal of accumulated SNF from reactor units from storage facilities (dismantling, on-site container storage) and removal of SNF from nuclear power plants for reprocessing;
- Decommissioning of Site 2 (building No. 802) and Site 4 (building No. 804) at JSC Angarsk Electrolysis Chemical Complex;
- Removal of RAW from storage sites, preparation for disposal, transportation to the disposal site and disposal.

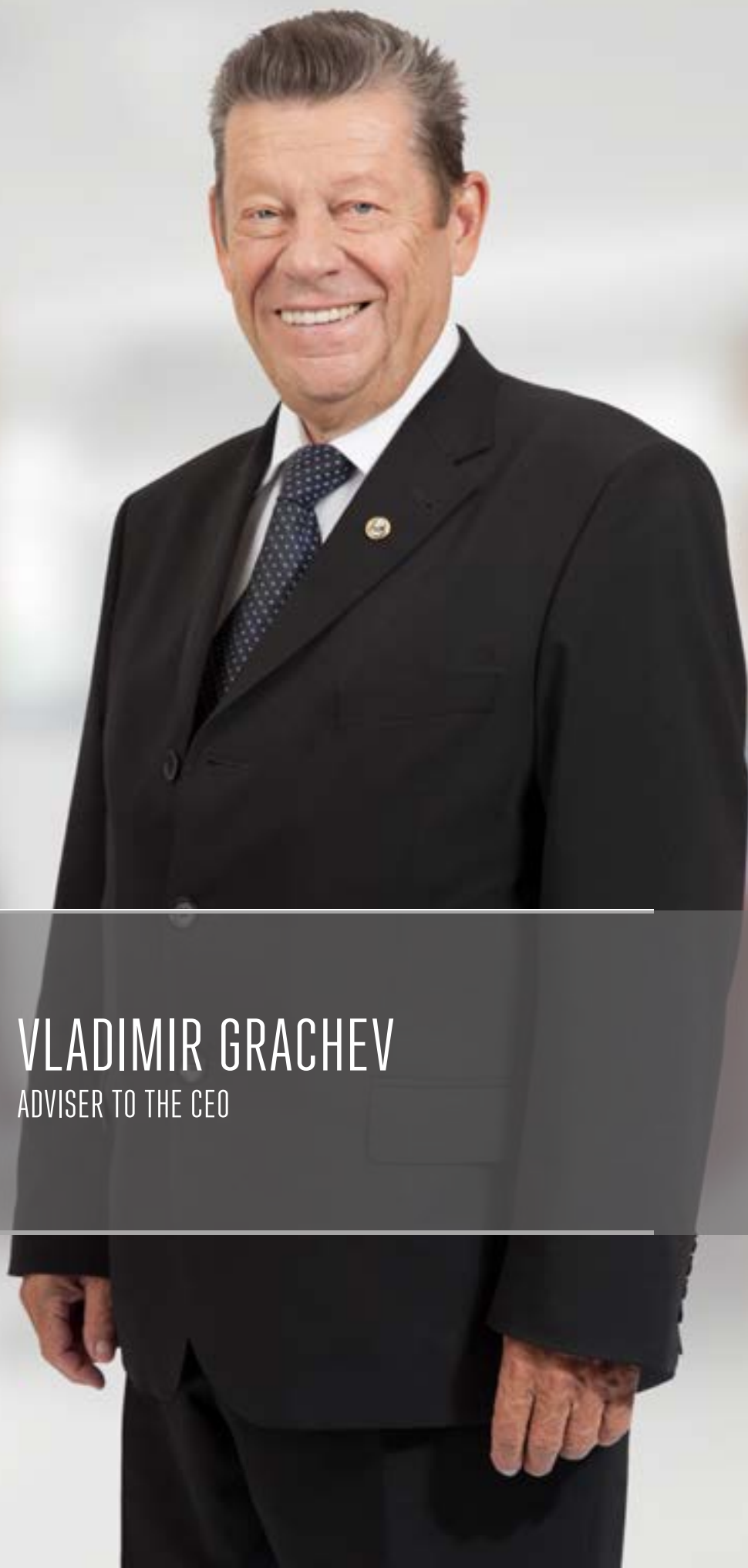
As part of the implementation of a subprogramme titled 'Industrial Dismantling of Nuclear Submarines', in 2017, it is planned to complete the dismantling of two nuclear submarines, to put 21 reactor compartments in long-term storage and to reprocess 2.3 tonnes of SNF from dismantled nuclear submarines.

It is also planned to complete the dismantling of the steam generating unit of the Sibir nuclear icebreaker.

8.3. ENVIRONMENTAL SAFETY



VLADIMIR GRACHEV
ADVISER TO THE CEO



KEY RESULTS IN 2016:

- EXPENDITURE ON ENVIRONMENTAL PROTECTION TOTALLED RUB 26.7 BILLION;
- ENERGY COSTS WERE SIGNIFICANTLY REDUCED COMPARED TO 2015; THE REDUCTION TOTALLED 6.6%;
- GENERATION OF HAZARD CLASS 1 TO 4 WASTE WAS REDUCED BY 12%.

— *What were the most important achievements in 2016 in terms of ensuring the environmental safety of ROSATOM's operations?*

— **This year, as in all previous years, ROSATOM has ensured safe and steady operation of enterprises in the nuclear industry and their compliance with international and Russian requirements.**

There were no incidents or accidents that could have had a negative impact on the environment.

The planned measures in the area of environmental safety were fully implemented, which produced positive results and helped to reduce the impact on the environment. Generation of hazard class 1 to 4 waste was reduced by 12%. Energy costs were reduced by 6.6% compared to 2015. In addition, emissions of atmospheric pollutants were reduced; what is more, ROSATOM accounts

for a mere 0.3% of the total volume of emissions in Russia.

— *2017 has been declared the Year of the Environment in Russia. What measures does ROSATOM plan to take in this regard?*

— The main purpose of the Year of the Environment is to increase public awareness of environmental issues and to implement practical environmental measures.

As part of the Year of the Environment, ROSATOM plans to carry out over 1,700 organizational, operational, technical, public awareness, information and research initiatives.

As environmental legislation is becoming increasingly tough, we need to respond quickly to changes and adapt to new requirements. All of ROSATOM's organizations are required to enter the facilities

that have a negative impact on the environment in the state register before January 1, 2017. ►

In 2017, ROSATOM plans to update its Environmental Policy and the guidelines on its implementation. In addition, industry regulations will be prepared taking into account changes in environmental legislation. ●

8.3.1. ENVIRONMENTAL SAFETY AND ENVIRONMENTAL PRO- TECTION MANAGEMENT

ROSATOM attaches great importance to environmental safety and environmental protection. One of its major priorities is to minimize the negative environmental impact of nuclear facilities. The Fundamental Principles of the Environmental Policy of ROSATOM and Its Organizations are the main regulatory document on environmental safety and environmental protection.

ROSATOM compiles a list of environmentally relevant organizations on an annual basis (48 organizations in 2016). Such organizations include industrial enterprises that may have a negative impact on the environment and the health of the population. ROSATOM's management pays particular attention to the operations of environmentally relevant organizations; on an annual basis, these organizations issue public environmental reports.

To improve environmental safety and the efficiency of environmental protection measures, ROSATOM's organizations that make a considerable impact on the environment introduce environmental

Outcomes of initiatives aimed at reducing the environmental impact in 2016:

- **Sorbent in gas scrubbers at JSC Novosibirsk Chemical Concentrate Plant was replaced, which reduced mercury and lithium chloride emissions by 20% and 47.3% respectively;**
- **Pumps at Novovoronezh NPP were upgraded, which helped to reduce water withdrawal from the Don River by 8.5 million m³ (5.5%);**
- **A frequency control device was installed at the industrial pumping station at JSC Production Association Electrochemical Plant, resulting in a reduction of water withdrawal by 10.5 million m³ (12.1%);**
- **On-site wastewater treatment facilities at FSUE Instrumentation Factory were put into operation; as a result, the discharge of pollutants decreased by 304.35 tonnes (29.7%).**

management, quality management, occupational health and safety management and energy management systems.

In 2016, integrated management systems were in place in nine enterprises in the industry. They comprise:

- Environmental management systems compliant with the ISO 14001 standard;
- Quality management systems compliant with the ISO 9001 standard;
- Occupational health and safety management systems compliant with the OHSAS 18001 standard, and energy management systems compliant with the ISO 50001 standard.

19 organizations were issued with certificates of compliance with the requirements of the ISO 14001 standard for environmental management systems, and 37 enterprises were issued with certificates of compliance with the requirements of the ISO 9001 standard for quality management systems.

21 organizations in the nuclear industry continued to implement environmental management systems and subsequently transitioned to an integrated management system. In addition, as new versions of the ISO 9001 and ISO 14001 standards were published in 2016, organizations in the nuclear industry developed plans for a switchover to the new versions of the standards.

8.3.2. ENVIRONMENTAL IMPACT ASSESSMENTS

When planning their operations involving the use of nuclear power, ROSATOM's organizations undergo state environmental impact assessments in accordance with Russian law. In 2016, ROSATOM's organizations received 7 positive opinions (no negative opinions were received) based on the findings of the state environmental impact assessment for:

- Construction of a radiation source at Smolensk NPP and management of radioactive waste during its storage, reprocessing and transportation;
- Construction of the first stage of a storage facility for solid radioactive waste at FSUE RADON;
- The use of nuclear materials for research and development at FSUE Mayak Production Association;
- Operation of power units No. 1 and 2 of Leningrad NPP-2;
- Construction of a storage facility for solid radioactive waste at Kursk NPP and management of radioactive waste during its storage, reprocessing and transportation;

- Construction of a landfill for the disposal of non-radioactive industrial waste and construction waste at Smolensk NPP.

location of nuclear facilities). In 2016, GEIPs were developed for JSC Angarsk Electrolysis Chemical Complex; in 2017, ROSATOM plans to develop geoenvironmental packages for JSC SSC RF-IPPE and JSC Ural Electrochemical Integrated Plant (UEIP).

8.3.3. INDUSTRY-WIDE SYSTEM FOR ON-SITE SUBSOIL CONDITION MONITORING (IS OSCM)

The IS OSCM is ROSATOM's basic system that ensures continuous radiation and chemical monitoring of groundwater, surface water and aquifers. The system covers 55 of ROSATOM's enterprises, including all 48 environmentally relevant organizations. A total of 3,774 observation wells are used for monitoring the condition of the subsoil.

To provide information support for the decommissioning of facilities posing nuclear and radiation hazards and nuclear legacy facilities, 28 industry organizations have been selected, for which geoenvironmental information packages (GEIPs) will be developed based on the data from OSCM systems (a GEIP is a set of data on the natural and man-made environment and the radiation and environmental conditions at the

8.3.4. IMPROVED ENERGY EFFICIENCY

Objectives for 2016:

- To develop energy efficiency improvement targets for the state programme 'Development of the Nuclear Power and Industry Complex' for the period from 2017 through 2020;
- To operate an Automated Energy Efficiency Management System in organizations in the nuclear industry on an industrial scale;
- To use 2015 instead of 2009 as a new base year for measuring energy efficiency improvements in the industry between 2016 and 2020 (in connection with follow-up energy audits to be conducted in accordance with the Federal Law on Energy Conservation and Improvement of Energy Efficiency);
- To reduce energy consumption on a comparable basis by 3% compared to 2015 as the new base year.

ENERGY CONSUMPTION IN 2016

Division/Complex/Organization	Electricity		Heat		Water	
	'000 kWh	%	'000 Gcal	%	'000 m ³	%
Fuel Division	2,937,450	48.2	2,300	34.4	498,367	27.3
Power Engineering Division ⁵⁸	902,139	14.8	334	5.0	1,205,155	66.0
Mechanical Engineering Division	176,350	2.9	87	1.3	3,515	0.2
Mining Division	507,381	8.3	696	10.4	3,984	0.2
Nuclear Weapons Division	957,885	15.7	2,211	33.1	69,352	3.8
JSC Federal Centre for Nuclear and Radiation Safety	369,438	6.1	724	10.8	37,553	2.1
Innovation Management Unit	203,168	3.3	291	4.3	6,507	0.4
Other	44,486	0.7	47	0.7	240	0.0
Total for ROSATOM	6,098,298	100	6,691	100	1,824,673	100

In 2016, energy costs in ROSATOM (on a comparable basis) totalled RUB 23.26 billion (excluding the costs of JSC Rosenergoatom Concern associated with energy consumption which ensures safe and reliable power generation at NPPs), with RUB 12.97 billion spent on electricity, RUB 6.41 billion spent on heat, RUB 2.00 billion spent on water and RUB 1.88 billion spent on other resources. In the reporting year, the costs were reduced by 6.6% against 2015 as the new

base year. The reduction exceeded the target (3%) more than twofold.

The savings were achieved through:

- Implementation of investment initiatives;
- Improved culture of managing a reduction in energy costs;

⁵⁸ In 2015, a new energy consumption base was established in the Power Engineering Division, excluding energy consumption which ensures the safe operation of reactor units and power generation at rated capacity. This resulted in a significant decrease in heat consumption in the Division in 2016 compared with 2015.

At the same time, given the special status of Kola NPP, in 2016, water consumption for operational needs of Kola NPP was added to the energy consumption base due to restrictions on NPP operation imposed by the control centre (suboptimal mode of operation of power units). This resulted in a significant increase in water consumption in 2016 compared with 2015.

- Higher efficiency of monitoring of energy consumption achieved through the introduction of technical metering systems and an automated reporting process.

To improve the efficiency of its cost-cutting efforts, in 2016, ROSATOM focused on implementing

zero-cost initiatives and projects with payback periods of up to five years.

Between 2010 and 2015, reduction in energy consumption against 2009 as the base year exceeded 29%, or RUB 23.9 billion in monetary terms.

ENERGY SAVINGS AND ENERGY COST REDUCTION ACHIEVED BETWEEN 2010 AND 2015

	2010	2011	2012	2013	2014	2015
Savings against 2009, %	6.5	12.3	17.6	22.2	26.3	29.03
Total savings between 2010 and 2015, RUB billion	1.6	4.6	8.8	14.0	18.8	23.9

REDUCTION IN ENERGY CONSUMPTION IN THE DIVISIONS/UNITS/COMPLEXES (ON A COMPARABLE BASIS) AGAINST 2015 AS THE BASE YEAR (IN MONETARY TERMS), %

Operational Management Unit, including:	6.4
JSC TVEL	5.8
JSC Rosenergoatom Concern	6.3
JSC Atomenergomash	4.7
JSC Atomredmetzoloto	12.7
Innovation Management Unit	4.2
Nuclear Weapons Division	5.3
JSC Federal Centre for Nuclear and Radiation Safety	11.4
Total for ROSATOM	6.6

Implementation of energy efficiency management and energy management systems in ROSATOM's organizations

In 2016, performance targets for the reduction of energy costs were set for senior executives (at the level of the Deputy CEO or Vice President or higher) of ROSATOM's Divisions and organizations that they manage.



The energy management system compliant with the ISO 50001 standard has been implemented in the Power Engineering Division (JSC Rosenergoatom Concern) and the Fuel Division (JSC TVEL) of ROSATOM

Incentive tools were introduced to encourage employee involvement in energy conservation and energy efficiency initiatives (the tools were developed during the introduction of a pilot incentive system at the enterprises of JSC Atomredmetzoloto). The set of these tools (KPIs, infrastructure, measures aimed at improving the culture and effectiveness of day-to-day operations) should ensure that the targets for reducing energy consumption in the medium term are achieved.

Plans for 2017

- To conduct energy audits of organizations in the nuclear industry in accordance with the requirements of the Federal Law on Energy Conservation and Improvement of Energy Efficiency;
- To develop energy conservation programmes and individual targets for the improvement of energy efficiency using 2015 as a new base year (depending on the type of organizations and measures to be implemented).

TARGETS FOR ENERGY COST REDUCTION SET IN THE STATE PROGRAMME 'DEVELOPMENT OF THE NUCLEAR POWER AND INDUSTRY COMPLEX', %

	2017	2018	2019	2020
Reduction of energy consumption in the nuclear industry (on a comparable basis) against 2015 (annually)	4	5	6	7

8.3.5.

FINANCING OF ENVIRONMENTAL MEASURES

In 2016, expenditure on environmental protection totalled RUB 26.71 billion, including operating expenses totalling RUB 13.10 billion and fixed asset investment totalling RUB 13.61 billion.

DISTRIBUTION OF ENVIRONMENTAL PROTECTION COSTS			
	Amount, RUB billion		
	2014	2015	2016
Operating expenses related to environmental protection	12.74	12.84	13.10
Fixed asset investment related to environmental protection	20.5	18.6	13.61
Total	33.24	31.44	26.71

Operating expenses related to environmental protection are aimed at ensuring radiation safety (46.8%), collection and treatment of wastewater (24.2%), management of industrial and consumer waste (9.2%), protection of the atmosphere and climate change prevention (7.8%), protection and rehabilitation of land, surface water and groundwater (3.5%).

76.1% of fixed asset investment related to environmental protection was allocated for air protection, 18.6% for protection and efficient use of water resources and 2.0% for protection and efficient use of land.

The overall reduction in environmental protection costs in 2016 was due to a decline in fixed asset investment by RUB 5.0 billion. This was mainly due to a decrease in investments at Leningrad NPP (a decrease of RUB 2.8 billion due to the completion of the radioactive waste storage and

reprocessing facility) and Rostov NPP (a decrease of RUB 1.8 billion due to the completion of the main construction work at power unit No. 4).

8.3.6.

ENVIRONMENTAL CHARGES

In 2016, charges for the negative environmental impact totalled RUB 136.5 million, including charges for allowable emissions and discharges of pollutants, disposal of industrial and consumer waste totalling RUB 77.5 million (56.8%), and charges for excess emissions and discharges totalling RUB 59.0 million (43.2%).

The total amount of charges increased by RUB 12.2 million compared to 2015. This was mainly due to an increase in the indexation rate used for the calculation of charges pursuant to Decree No. 913 of the Russian Government on the Rates of Charges for the Negative Environmental Impact and Additional Coefficients dated September 13, 2016.

CHARGES FOR THE NEGATIVE ENVIRONMENTAL IMPACT (ENVIRONMENTAL CHARGES) PAID BY ROSATOM'S ORGANIZATIONS, RUB MILLION			
	Actual payment amount		
	2014	2015	2016
Charges for allowable emissions (discharges) of pollutants (disposal of industrial and consumer waste), total	57.7	49.8	77.5
including:			
into water bodies	3.9	5.3	6.7
into the atmosphere	6.4	6.3	5.2
for disposal of industrial and consumer waste	45.3	34.9	65.6
underground formations	2.1	3.3	0.0
Charges for excess emissions (discharges) of pollutants (disposal of industrial and consumer waste), total	53.1	74.5	59.0
including:			
into water bodies	23.2	34.0	40.1
into the atmosphere	14.6	5.0	2.1
for disposal of industrial and consumer waste	15.2	35.5	16.8
underground formations	0.1	0.008	0.0
Charges for allowable and excess emissions (discharges) of pollutants (disposal of industrial and consumer waste), total	110.8	124.3	136.5

Compliance with regulatory limits on the environmental impact remains a priority for all organizations in the nuclear industry. In 2016, charges for excess emissions (discharges) of pollutants (disposal of industrial and consumer waste) decreased by 20.8% year on year due to a reduction in excess waste charges at JSC Zheleznogorsk CHPP (by 99.8%).

In 2016, the increase in charges for allowable emissions (discharges) of pollutants (disposal of industrial and consumer waste) was related mainly to charges paid by FSUE Elektrokhimpribor Integrated Plant (RUB 19.8 million), which had not been included previously in the total amount of charges paid by ROSATOM.

Compensation (claims) and fines for damage caused by violation of environmental legislation

In 2016, fines for damage caused by violation of environmental legislation totalled RUB 2.26 million (1.7% of total charges paid by ROSATOM). Administrative offences detected by environmental regulators in the reporting year did not cause significant damage to the environment.

FINES FOR DAMAGE CAUSED BY VIOLATION OF ENVIRONMENTAL LEGISLATION				
	2014	2015	2016	
Compensation (claims) and fines for damage caused by violation of environmental legislation, RUB million	1.50	1.85	2.26	

8.3.7. WATER USE

The nuclear industry is a large user of water. In 2016, water withdrawal from natural sources by ROSATOM's organizations made up 11.3% of the total water withdrawal in Russia. The main

consumers of water among ROSATOM's organizations and enterprises are Leningrad NPP, Kola NPP and JSC SCC (86.75% of the total water withdrawal).

In the reporting year, water consumption by ROSATOM's organizations totalled 7,753.8 million m³, which was 121.7 million m³ more than in 2015. Withdrawal of sea water increased by 79.4 million m³, while withdrawal of fresh water increased by 53.8 million m³.

TOTAL WATER WITHDRAWAL

Source	Volume, million m ³		
	2014	2015	2016
Sea water	4,737.4	5,237.6	5,317.0
Fresh surface water, including rivers, marshes and lakes	2,477.3	2,247.8	2,301.6
Groundwater	92.6	100.4	92.2
Rainwater	1.9	2.5	2.1
Water from third-party organizations	20.6	43.8	40.9
Total	7,329.8	7,632.1	7,753.8

VOLUME OF RECYCLED AND REUSED WATER

	Volume, million m ³		
	2014	2015	2016
Total volume of recycled and reused water, million m ³	30,980.9	32,807.3	34,122.2
Water withdrawal, million m ³ (% of the volume of recycled and reused water)	7,329.8 (23.7%)	7,632.1 (23.2%)	7,753.8 (22.7%)
Total, million m ³	38,310.7	40,439.4	41,876.0
Share of recycled and reused water in water withdrawal, %	422.7	429.9	440.1

In 2016, the volume of water used by organizations in the nuclear industry for operational needs totalled 7,503.5 million m³, which is 93.7 million m³ more than in the previous year. The use of water

for drinking and sanitary purposes increased by 50.0 million m³ year on year due to the inclusion of new organizations in ROSATOM's scope of consolidation in 2016.

WATER CONSUMPTION BY ROSATOM FOR ITS OWN NEEDS

	Volume, million m³		
	2014	2015	2016
Drinking and sanitary purposes	48.9	39.5	89.5
Operational needs	7,113.5	7,356.4	7,403.0
Other types	14.7	13.9	11.0
Total	7,177.1	7,409.8	7,503.5

Water discharge

In 2016, ROSATOM’s organizations accounted for 16.4% of the total wastewater discharge in Russia. The share of contaminated wastewater discharge by ROSATOM’s organizations in the total contaminated wastewater discharge in Russia in 2016 totalled 0.67%.

Wastewater discharge totalled 7,035.7 million m³, with clean water compliant with regulatory requirements accounting for 98.11% of the total amount, while treated wastewater compliant with regulatory requirements and contaminated wastewater made up 0.52% and 1.37% of the total amount respectively⁵⁹.

VOLUME OF WASTEWATER DISCHARGE

Water category	Volume, million m³		
	2014	2015	2016
Clean water compliant with regulatory requirements	6,523.8	6,775.7	6,902.6
Treated wastewater compliant with regulatory requirements	28.8	31.6	36.6
Contaminated	89.4	112.8	96.5
Total	6,642.0	6,920.1	7,035.7

⁵⁹ Wastewater categories are determined based on statistical reporting form 2-tp (Vodkhoz).

The main wastewater discharge destinations are seas (74.3%), lakes (17%) and rivers (8.3%).

In 2016, total wastewater discharge in the nuclear industry increased by 115.6 million m³ year on year due to an increase in power generation at Leningrad and Kola NPPs; at the same time, discharge of contaminated wastewater decreased by 16.3 million m³.

8.3.8.
POLLUTANT EMISSIONS INTO THE ATMOSPHERE

In 2016, pollutant emissions into the atmosphere totalled 45,600 tonnes; the pollutant capture rate reached 85.2%. In 2016, actual pollutant emissions into the atmosphere by ROSATOM’s organizations totalled 35% of the permitted amount. In 2016, ROSATOM’s organizations accounted for 0.3% of the total emissions in the Russian Federation.

POLLUTANT EMISSIONS INTO THE ATMOSPHERE⁶⁰, KT

	2014	2015	2016
Total (excluding CO ₂), including:	50.7	46.4	45.6
NO _x emissions	12.8	11.1	11.1
SO ₂ emissions	13.7	12.6	11.4
emissions of solid particles	17.1	15.7	16.1
CO emissions	4.5	4.6	4.5
carbon emissions	2.6	2.4	2.2
including: methane emissions	0.3	0.3	0.3

⁶⁰ Emissions of pollutants are estimated by ROSATOM’s organizations using chemical methods of analysis or automatic gas analysers.

Pollutant emissions into the atmosphere were reduced by 800 tonnes compared to 2015. The reduction in emissions was due to a 14.9% decrease in emissions at JSC SCC (fuel combustion at CHPPs was reduced, and underground fuel storage tanks were decommissioned). However, in the reporting year, there was a 19.2% increase in

emissions of solid particles at PJSC PIMCU due to an increase in the ash content of coal used by the company.

In 2016, emissions of Freon-12 into the atmosphere were reduced by 6.3 tonnes year on year due to a change in the process at FSUE Ural Electromechanical Plant.

EMISSIONS OF MAJOR OZONE-DEPLETING SUBSTANCES

Substance	Tonnes of chlorofluorocarbon-11 equivalent		
	2014	2015	2016
Dichlorodifluoromethane (Freon-12)	83.75	83.40	77.10
Chlorodifluoromethane (Freon-22)	0.98	0.85	0.74
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	3.95	3.38	3.25
Chlorotrifluoromethane (Freon-13)	164.21	164.21	164.21
Total	252.89	251.84	251.24 ⁶¹

⁶¹ The total amount of emissions of major ozone-depleting substances reported for 2016 includes 5.94 tonnes of tetrachloromethane (carbon tetrachloride) in chlorofluorocarbon-11 equivalent.

8.3.9.
INDUSTRIAL AND
CONSUMER WASTE⁶²

In 2016, organizations in the nuclear industry produced 28.4 million tonnes of industrial and consumer waste, which is 809,000 tonnes more than in 2015 (27.6 million tonnes). 99.98% of generated waste is hazard class 4 and 5 waste (low-hazard and practically non-hazardous

waste). In 2016, industrial and consumer waste generated by ROSATOM's organizations accounted for 0.56% of the total waste generation in Russia (5,060.0 million tonnes).

Most of the waste was generated by PJSC PIMCU, an enterprise in the Mining Division (24.3 million tonnes, or 85.52%; most of this waste is hazard class 5 waste, which is the least hazardous class).

The weight of waste from all of ROSATOM's organizations transferred to third-party organizations for recycling and processing totalled 239,700 tonnes. 95.67% of the total amount of waste generated in ROSATOM's organizations and received from third-party organizations was used and treated.

INDUSTRIAL AND CONSUMER WASTE MANAGEMENT, KT

Year	Amount as of January 1, 2016	Waste generated and received during the year	Use and treatment of generated and received waste		Transfer to third-party organizations	Storage at enterprises	Amount as of December 31, 2016
			Weight	%			
2014	398,917.9	25,439.0	24,439.4	96.07	552.3	416.2	399,086.4
2015	399,256.8	27,601.0	26,187.6	94.88	1,070.2	400.3	399,401.5
2016	399,885.6	28,412.2	27,181.6	95.67	239.7	392.7	400,708.8

⁶² Information on the generation, use, treatment and disposal of industrial and consumer waste in ROSATOM's organizations is recorded in accordance with the requirements of Russian legislation (waste hazard classes are determined in accordance with the Federal Classification Catalogue of Waste approved by Order No. 445 on Approval of the Federal Classification Catalogue of Waste dated July 18, 2014).

INDUSTRIAL AND CONSUMER WASTE MANAGEMENT BY HAZARD CLASS, KT

Waste hazard class	Amount of waste at enterprises as of January 1, 2016	Generated and received waste	Use of generated and received waste		Treatment of generated and received waste		Transfer of waste to third-party organizations	Storage of waste at facilities operated by ROSATOM		Amount of waste at enterprises as of December 31, 2016
			kt	%	kt	%		Total	Disposal	
Class 1	0.027	0.244	0.0001	0.04	0.013	5.33	0.237	0.002	0.000	0.021
Class 2	0.043	1.349	0.00003	0.002	0.002	0.15	1.357	0.005	0.004	0.028
Class 3	7.094	4.767	0.087	1.83	0.057	1.20	4.573	4.588	0.157	6.989
Class 4	18.796	89.997	8.266	9.18	2.224	2.47	61.747	6.977	4.166	32.390
Class 5	399,859.591	28,315.846	27,170.951	95.96	0.000	0.00	171.773	381.164	163.292	400,669.421
Total	399,885.551	28,412.203	27,179.304	95.67	2.296	0.01	239.687	392.736	167.619	400,708.849

8.3.10.
DISTURBED AND RESTORED AREAS

By December 31, 2016, the area of land disturbed by ROSATOM’s organizations totalled 5,600 ha. This included land disturbed during the following operations:

- mining: 3,300 ha;
- construction: 2,200 ha;
- survey work: 6.6 ha;
- disposal of industrial waste (including construction waste) and solid household waste, 1.4 ha;
- other operations: 70.4 ha.

AREA OF DISTURBED LANDS, '000 HA

2014	2015	2016
5.1	5.5	5.6

In 2016, ROSATOM’s organizations implemented a set of measures to restore the productivity and economic value of disturbed land and improve the environment. In the reporting year, the area of restored land totalled 93.47 ha. In the coming years, ROSATOM plans to gradually increase the scope of land rehabilitation measures.

AREA OF RESTORED LANDS

Organization	ha/year		
	2014	2015	2016
PJSC PIMCU	73.40	0.038	0.00
JSC SCC	37.16	52.60	12.75
PJSC NCCP	0.00	0.68	0.00
Rostov NPP (branch of JSC Rosenergoatom Concern)	0.00	15.5	0.00
JSC SSC RIAR	0.13	0.00	0.00
JSC ASE EC	0.00	29.42	0.00
JSC Lunnoe	0.00	0.00	80.60
Siberian Territorial District Branch of FSUE RosRAO	0.00	20.15	0.00
FSUE Elektrokhimpribor Plant	0.17	4.26	0.12
FSUE Zababakhin All-Russian Scientific Research Institute of Technical Physics (RFNC – VNIITF)	48.19	0.00	0.00
FSUE M.V. Protsenko FRDC Start PA	0.02	0.43	0.00
Total	159.07	123.08	93.47

8.3.11.
REHABILITATION OF CONTAMINATED AREAS

As of December 31, 2016, 19 of ROSATOM’s organizations had areas contaminated with radionuclides with a total area of 114.48 km², including:

- 24.75 km² at industrial sites;

- 89.31 km² in buffer areas;
- 0.42 km² in monitored areas.

The main sources of radioactive contamination include nuclides of caesium-137, strontium-90 and natural uranium and its decay products. About 77% (88.57 km²) of areas contaminated with radio-nuclides are located in the vicinity of FSUE Mayak Production Association (they were contaminated during the accident in 1957).

AREA OF REHABILITATED LANDS, KM²

2014	2015	2016
0.4·10 ⁻³ km²	1.57·10 ⁻⁴ km²	1.31·10 ⁻² km²

8.3.12.
EMISSIONS AND DISCHARGES OF RADIONUCLIDES

In 2016, radiation burden on the environment was almost unchanged compared to the previous year. The total activity of radionuclides emitted into the atmosphere by ROSATOM’s enterprises reached 4.7·10¹⁶ Bq, which totals 24.77% of the statutory limit for alpha-emitting nuclides and 4.23% of the limit for beta-emitting nuclides. Permitted levels of radionuclide emissions were not exceeded.

RATIO BETWEEN ACTUAL AND PERMITTED EMISSION OF RADIONUCLIDES, BQ

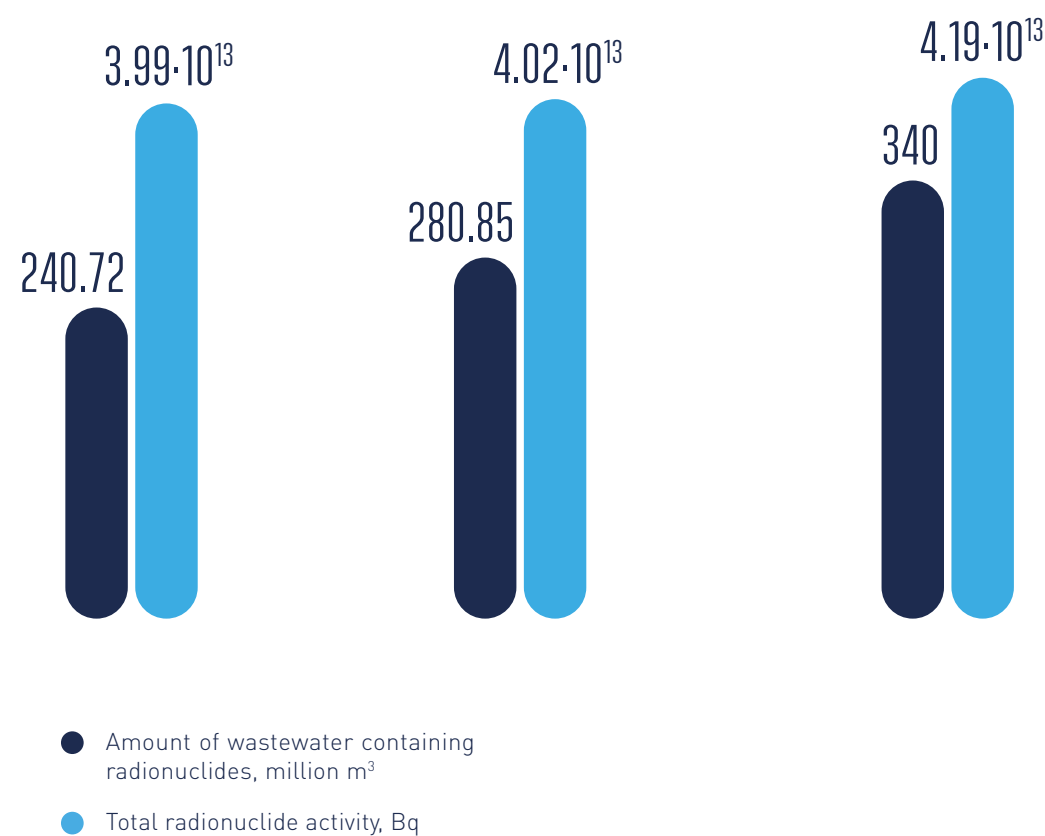
Type of radionuclides	Permitted emission	Actual emission
Alpha-emitting	2.07·10 ¹⁵	5.12·10 ¹⁴
Beta-emitting	1.1·10 ¹⁸	4.65·10 ¹⁶

Enterprises in the industry discharged 340.28 million m³ of wastewater with the activity of $4.19 \cdot 10^{13}$ Bq into surface water bodies. The volume of wastewater discharges increased by 21.16% compared to 2015, while the total activity increased by 4.23%. This was caused by an increase in discharges from FSUE Mayak Production Association due to an increase in water flow in the left-bank channel as a result of a high water level in drinking water reservoirs and fisheries (Lake Irtyash and Lake Bolshiye Kasli). At the same time, the amount of radionuclides discharged with wastewater into an open drainage system totalled about 19.14% of the statutory limit for alpha-emitting nuclides and 0.81% of the limit for beta-emitting nuclides.

RATIO BETWEEN ACTUAL AND PERMITTED DISCHARGE OF RADIONUCLIDES, BQ

Type of radionuclides	Permitted discharge	Actual discharge
Alpha-emitting	$1.08 \cdot 10^{11}$	$2.60 \cdot 10^{10}$
Beta-emitting	$5.17 \cdot 10^{15}$	$4.19 \cdot 10^{13}$

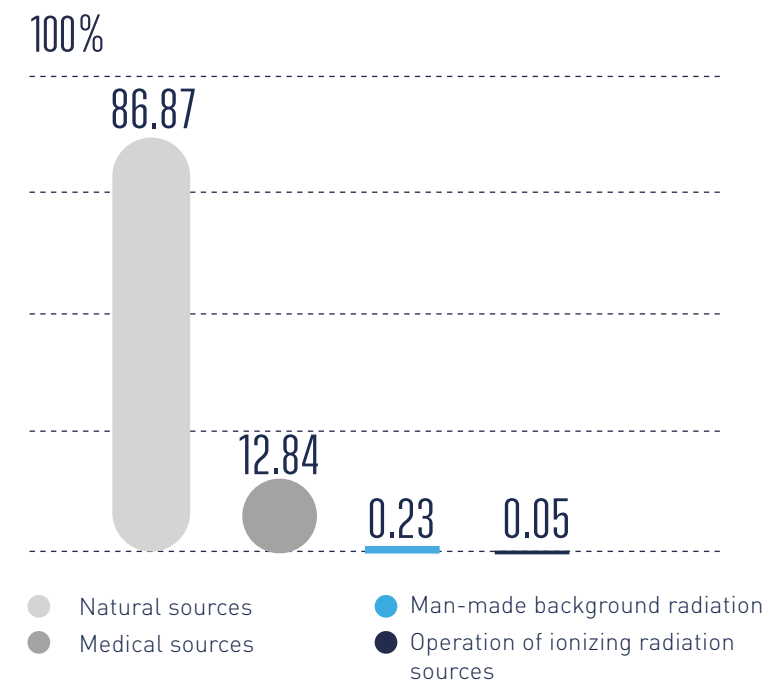
DISCHARGE OF RADIONUCLIDES WITH WASTEWATER INTO SURFACE WATER BODIES



8.3.13. RADIATION IMPACT ON THE POPULATION AND THE ENVIRONMENT

According to the Rospotrebnadzor⁶³, the main sources of exposure of the Russian population to radiation include natural and medical sources of ionizing radiation. The regional average contribution of natural and medical sources of ionizing radiation to the collective radiation exposure of the population totals 86.9% and 12.8% respectively. The contribution of enterprises using nuclear technologies totals only several basis points (it is estimated at 0.05%). This structure of radiation exposure of the population has remained unchanged for many years in all regions where ROSATOM's facilities posing nuclear and radiation hazards are situated.

SOURCES OF EXPOSURE OF THE RUSSIAN POPULATION TO RADIATION



According to the findings of radiation and hygienic certification in Russia for 2015⁶⁴, additional radiation exposure of the population in the locations of nuclear enterprises related to their day-to-day operation averaged 0.003 mSv per person per year. The average individual exposure related to the operation of NPPs does not exceed the minimum significant dose equal to 0.01 mSv per year.

The analysis of radiation monitoring data shows that the gamma radiation doses in buffer and protected areas of NPPs range from 0.06 μSv/h to 0.15 μSv/h⁶⁵; they are within the limits of natural background radiation which was formed before the start-up of the nuclear power plants and correspond to the levels at monitoring stations.

⁶³ State Report on the Level of Sanitary and Epidemiological Well-Being of the Population in Russia in 2016. – M.: Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor), 2017 – 220 pages.

⁶⁴ The results of radiation and hygienic certification of organizations and territories are presented by the Federal State Institution A.I. Burnazyan Federal Medical and Biophysical Centre of the Russian Federal Biomedical Agency.

⁶⁵ 1 mSv = 1,000 μSv

The maximum values (0.11-0.22 mSv per year) were recorded for residents of the CATF of Ozersk (Chelyabinsk Region) and residential areas located in the monitored area of FSUE Mayak Production Association. This level is 5 to 10 times lower than the dose limit for the population set in the NRB-99/2009 Radiation Safety Standards (1 mSv per year); it is the result of radioactive contamination in the 1950s and 1960s, when the enterprise started its operation. The contribution of current emissions of radioactive substances to the total exposure dose does not exceed 1%. These figures are similar to those for 2013 and 2014.

We regularly monitor radionuclide content in local agricultural products, in wild-growing foods (berries, mushrooms, etc.) and fodder in the monitored areas around facilities posing nuclear and radiation hazards, as well as in fish and other aquatic organisms living in cooling ponds of NPPs. We monitor the specific activity of dose-forming radionuclides in food products.

Regional offices of the Russian Federal Biomedical Agency (FMBA) carry out independent radiation monitoring of the environment and locally produced food products. Radiation monitoring of abiotic components of the environment is carried out by the Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet). According to the annual fact sheet published by Roshydromet, in 2016, the radiation level in Russia remained stable; the content of man-made radionuclides in the air, soil, precipitation and rivers remained at the level recorded between 2010 and 2015.

The results of many years of radiation monitoring indicate that the content of radioactive substances in different types of crops corresponds to the background radiation level. This suggests that nuclear technologies and enterprises do not have a negative impact on the environment in terms of radiation levels.

The man-made impact of NPP operation is felt mostly by natural ecosystems of cooling ponds. The discharge of warm water affects the life of aquatic organisms and may cause changes in species composition. According to the findings of observations and research, the diversity of aquatic organisms living in the area where warm water is discharged from an NPP may either decrease (e.g. in the Koporye Bay in the Gulf of Finland) or increase (as in the Beloyarsk Reservoir through the relocation of fish species that prefer warmer temperatures, such as bream and zander). Such changes can be observed at existing nuclear power plants using once-through and recycled technical water supply systems with a cooling pond, which require large amounts of recycled water. In order to minimize this impact and maintain a stable and sustainable condition of ecosystems in the area where they are located, NPPs spend considerable sums of money on environmental measures every year. The designs of new nuclear power plants include modern closed-circuit cooling systems with evaporative cooling towers, which can significantly reduce the impact of nuclear power plants on water bodies in their vicinity.

8.3.14. FORECAST FOR THE ENVIRONMENTAL IMPACT OF ROSATOM AND ITS ORGANIZATIONS AND PLANS FOR CHANGING THE IMPACT AND ENSURING ENVIRONMENTAL SAFETY IN 2017 AND THE MEDIUM TERM

The implementation of ROSATOM's Environmental Policy is aimed at maintaining a favourable environment, minimizing negative impacts and ensuring environmental safety at nuclear facilities.

CONTRIBUTION TO THE CONSERVATION OF BIODIVERSITY

JSC TENEX, an organization of ROSATOM, is involved in a programme implemented under the patronage of the President of the Russian Federation to preserve rare and endangered species of animals. Funds are allocated annually for projects to upgrade the infrastructure of national reserves and parks, develop protected areas and conduct research on the genetics and behaviour of unique animals.

In 2016, JSC TENEX financed projects to study and preserve the Amur leopard and Siberian tiger populations. A total of RUB 16 million was allocated for this purpose. This made it possible to:

- **Improve the facilities and equipment in the Land of the Leopard National Park and ensure a steady food supply for the Amur leopard as part of the project to support environmental initiatives aimed at the conservation of Amur leopards and the creation of an international molecular genetics database;**
- **To upgrade the infrastructure of the Lazovsky Nature Reserve, the Zov Tigra National Park and the Sikhote-Alin Nature Reserve, including developing nature trails and building observation decks.**

ROSATOM's organizations carry out large-scale upgrades and overhaul of gas scrubbing and wastewater treatment equipment every year; reused and recycled water supply systems are commissioned. The implementation of the Environmental Policy and the introduction of innovative environmental technologies at nuclear facilities have made it possible to achieve a high level of environmental safety in the industry.

In the medium term, water consumption is expected to increase as a result of increased power generation at Kola NPP; at the same time, the discharge of clean wastewater compliant with regulatory requirements will increase. The introduction of reused and recycled water supply systems will reduce the amount of discharges, and the discharge of contaminated wastewater will be reduced through the upgrading and commissioning of wastewater treatment plants.

If production volumes remain at the current level, the weight of emissions of air pollutants from stationary sources in the nuclear industry will be reduced through the overhaul of existing and installation of new gas scrubbers and the decommissioning of process equipment. The decommissioning of a boiler unit at JSC SCC is expected to reduce fly ash emissions by 5.7 tonnes in 2017. A decrease in the number of refrigerating machines at JSC Production Association Electrochemical Plant in the reporting year will contribute to reducing emissions of ozone-depleting substances (Freon-12).

Generation of industrial and consumer waste by organizations in the industry is driven by production cycles and the manufacture of new products. In the medium term, generation of industrial and consumer waste is expected to remain at the current levels.

In the coming years, ROSATOM plans to increase the area of restored lands in accordance with action plans of nuclear organizations.

In 2017, the amount of charges for the negative environmental impact is expected to increase across ROSATOM due to changes in the rates and coefficients pursuant to Decree No. 913 of the Russian Government dated September 13, 2016.

In 2017, ROSATOM's organizations plan to implement the following measures as part of the Year of the Environment:

- To carry out over 1,700 organizational, operational, technical, public awareness, information and research initiatives;
- To update ROSATOM's Environmental Policy and the guidelines for its implementation and prepare industry regulations taking into account changes in environmental legislation;
- To reduce the negative impact on the environment by upgrading and introducing the best available technologies in enterprises.

Further implementation of environmental measures in ROSATOM's organizations will enhance the protection of the environment against potential negative impacts and threats.

OPENNESS AND
TRANSPARENCY

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ROSATOM ADHERES TO THE PRINCIPLE
OF OPENNESS AND SEEKS TO MAXIMIZE
THE TRANSPARENCY OF ITS BUSINESS
BY PROVIDING STAKEHOLDERS WITH
ACCURATE AND RELEVANT INFORMATION

9.1. PUBLIC REPORTING SYSTEM

IN ORDER TO IMPROVE TRANSPARENCY AND FACILITATE CONSTRUCTIVE COMMUNICATION WITH STAKEHOLDERS, ROSATOM HAS BEEN VOLUNTARILY PUBLISHING INTEGRATED REPORTS SINCE 2010. THE REPORTS ARE DESIGNED TO GIVE STAKEHOLDERS A COMPREHENSIVE PICTURE OF THE CORPORATION'S BUSINESS.

KEY RESULTS IN 2016:

- 15 INTEGRATED ANNUAL REPORTS WERE PREPARED (FOR 2015);
- ALL REPORTS OF KEY ORGANIZATIONS (FOR PUBLIC REPORTING PURPOSES) OF ROSATOM WERE PREPARED IN ACCORDANCE WITH THE GRI G4 GUIDELINES;
- 7 AND 41 AWARDS WERE WON IN RUSSIAN AND INTERNATIONAL REPORT CONTESTS RESPECTIVELY.

In order to improve transparency and facilitate constructive communication with stakeholders, ROSATOM has been voluntarily publishing integrated reports since 2010. The reports are designed to give stakeholders a comprehensive picture of the Corporation's strategy, business sustainability, operating, financial and economic results of the reporting year, initiatives in the sphere of nuclear and radiation safety, environmental safety, contribution to the development of ROSATOM's regions of operation and other socially important aspects of its business. In addition, the Corporation annually submits a report to the Russian Government. Some of ROSATOM's

organizations and enterprises prepare environmental reports.

Results in 2016

In 2016, 15 integrated annual reports were published in the industry. Their preparation included a set of stakeholder engagement measures (opinion polls, questionnaire surveys, dialogues and public assurance procedures) aimed at identifying material aspects to be disclosed in the reports and increasing their usefulness for users.

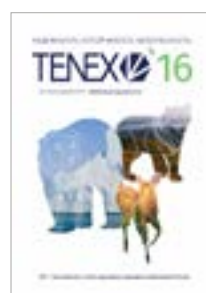
REPORTING STRUCTURE OF ROSATOM AND ITS ORGANIZATIONS

ROSATOM

Report to the Russian
GovernmentPublic report for a wide range
of stakeholders

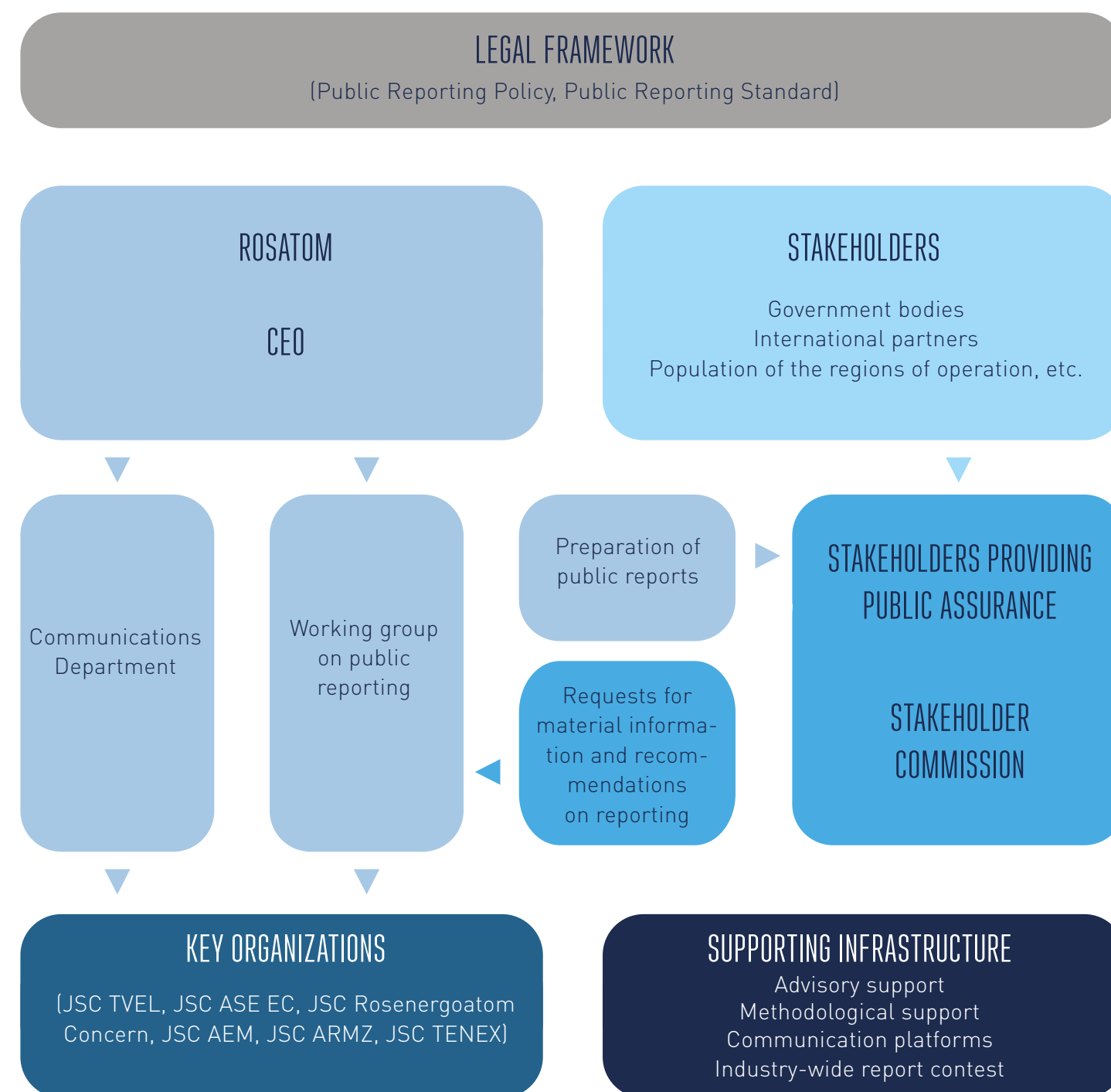
Reports of organizations and enterprises

Reports of JSCs (including key organizations)



Environmental reports

PUBLIC REPORTING SYSTEM



CHANGES IN THE NUMBER OF PUBLIC REPORTS ISSUED BY ROSATOM AND ITS ORGANIZATIONS

	2014 ⁶⁶	2015	2016
Number of integrated reports	21, 5 of which were prepared in accordance with the Core option of GRI G4, 11 in accordance with GRI G 3.1, with 1 report qualifying for application level A+, 3 for level A, 1 for level B+, 5 for level B and 1 for level C	18, 3 of which were prepared in accordance with the Comprehensive option of GRI G4, 6 in accordance with the Core option of GRI G4, 8 in accordance with GRI G 3.1	15, 3 of which were prepared in accordance with the Comprehensive option of GRI G4, 10 in accordance with the Core option of GRI G4; 1 report included individual components of GRI G4
Number of reports that underwent the public assurance procedure	19	13	14
Number of reports in English	10	10	8
Number of dialogues with stakeholders during the preparation of the reports	37	27 ⁶⁷	22
Number of interactive (online) reports	6	6	5
Number of summary reports	–	4	5

⁶⁶ Each year reports are published for the previous reporting year.

⁶⁷ The reduction in the number of dialogues in 2015 and 2016 was due to the development of communication by correspondence and interactive communication with stakeholders.

Awards in national and international rankings and contests

In 2016, the reports of 6 companies in the nuclear industry, including ROSATOM, were awarded 5 stars (the highest quality of annual reports) in the ranking of annual reports compiled by RAEX Agency (Expert RA).

In addition, 6 companies, including ROSATOM were ranked in the top 10 in the annual corporate transparency ranking of the largest Russian companies compiled by the Russian Regional Integrated Reporting Network.

In 2016, the reports of the Corporation and its organizations won 7 awards in national annual report contests and 41 awards in international contests. The report of JSC Atomredmetzoloto won a prize in the Best Presentation of the Business Model in the Report of a Non-Public Company category in the contest held by the Moscow Exchange. The report of ASE Group won a special prize in the Best Corporate Social Responsibility and Sustainability Report category.

Overall, since the introduction of the public reporting system in the industry, 140 awards have been won in various Russian and international contests.

Industry-wide contest of public reports of ROSATOM's organizations

The annual contest of annual reports is an important mechanism for ensuring the quality of reporting in the industry. It covers ~100 organizations divided into several groups with different assessment criteria. The reports are assessed by an independent panel comprising experts in reporting and sustainable development (including ecology).

In 2016, the 7th industry-wide contest was held. The following companies won in the main categories:

- JSC Rosenergoatom Concern in the Best Public Annual Report of ROSATOM's Division category;
- JSC SSC RIAR in the Best Public Annual Report of an Organization of Divisions and ROSATOM category;
- JSC Atomtrans in the Best Public Annual Report of ROSATOM's Enterprise category;
- ASE Group in the Public Reporting and Stakeholder Engagement Efficiency category.

In addition, two special categories were introduced in 2016:

- Quality of the Russian Language and Functional Layout of Text in a Public Annual Report (the winner was JSC Atomenergomash);
- An 'audience award': the Best Public Annual Report according to Stakeholders (the winner was JSC Rosenergoatom Concern).

Plans for improving the public reporting system in 2017 and in the medium term

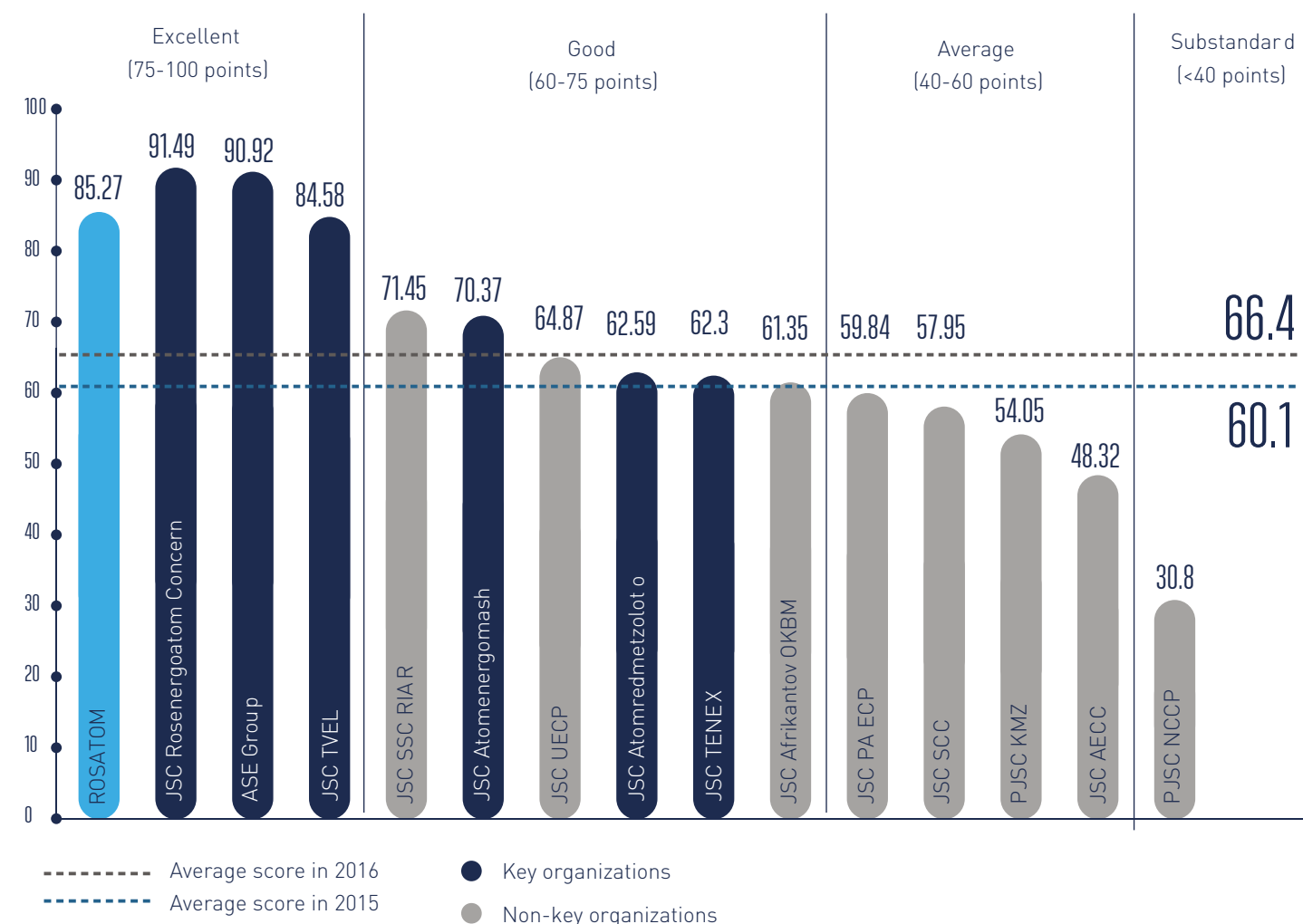
On the national and international scale:

- To participate in the work of the International Integrated Reporting Council and the Russian Regional Integrated Reporting Network;
- To continue to implement the requirements of the International Integrated Reporting Framework and the GRI Sustainability Reporting Standards (Core/Comprehensive option);
- To enter national and international report contests.

On the industry scale:

- To update the regulatory framework and guidelines taking into account new international standards;
- To monitor reporting quality (to review report concepts and draft reports of the Corporation's organizations; to hold an industry-wide contest of public reports);
- To provide training and methodological support to organizations (guidelines, workshops);
- To improve the quality of stakeholder engagement, including as part of sustainable development, using new forms of reporting and communication (summary reports, online reports and electronic platforms);
- To increase the functional usefulness of reports for readers.

RANKING OF ANNUAL REPORTS FOR 2015



9.2. DIALOGUES WITH STAKEHOLDERS DURING THE PREPARATION OF THE REPORT

IN ORDER TO IMPROVE
TRANSPARENCY AND
ACCOUNTABILITY AT ROS-
ATOM, REPRESENTATIVES
OF KEY STAKEHOLDERS
ARE ENGAGED IN THE
PREPARATION OF THE
REPORT THROUGH
PARTICIPATION IN
DISCUSSIONS OF SOCIALLY
IMPORTANT ASPECTS
OF THE CORPORATION'S
BUSINESS.

In order to improve transparency and accountability at ROSATOM, representatives of key stakeholders are engaged in the preparation of the Report through participation in discussions of socially important aspects of the Corporation's business and their reflection in the Report to be prepared. In addition, stakeholder representatives also participate in public assurance of the Report. Stakeholder engagement is one of the key requirements of international standards such as the AccountAbility AA1000SES standard, the Global Reporting Initiative Sustainability Reporting Standards (GRI SRS) and the International <IR> Framework. When preparing the previous report, ROSATOM assumed a number of obligations that were later fulfilled in the 2016 report.

In order to improve the transparency and accountability at ROSATOM and to meet the requirements of international standards, during the preparation of the Report, ROSATOM held two dialogues with

stakeholders (a discussion on the priority subject of the Report, ROSATOM's Business Strategy until 2030 and the Contribution of the Corporation's Performance in 2016 to the Achievement of Long-Term Strategic Goals, on March 31, 2017 in Moscow and Public Consultations on the Draft Report on May 30, 2017 in Moscow). In addition, ROSATOM conducted a special questionnaire survey to identify material aspects of the Corporation's business to be reflected in the Report ([see Appendix 1 'Report Profile and the Process of Determining the Report Content and Materiality of Information'](#)).

In the course of discussion, stakeholder representatives voiced their requests and provided recommendations as to what information should be disclosed in the annual report, and put forward proposals for developing the public reporting system ([minutes of the dialogues are included in the interactive version of the Report](#)).

9.3.
INCORPORATION
OF STAKEHOLDERS'
PROPOSALS

IN THE COURSE OF
DISCUSSION, STAKEHOLDER
REPRESENTATIVES
VOICED THEIR REQUESTS
AND PROVIDED
RECOMMENDATIONS AS
TO WHAT INFORMATION
SHOULD BE DISCLOSED IN
THE ANNUAL REPORT, AND
PUT FORWARD PROPOSALS
FOR DEVELOPING THE
PUBLIC REPORTING
SYSTEM.

FULFILMENT OF OBLIGATIONS ASSUMED BY ROSATOM DURING THE PREPARATION OF THE 2015 REPORT

Stakeholders' requests and proposals	Fulfilment of obligations by ROSATOM
To supplement the report with information on the activities of the working group of ROSATOM's Public Council on public control in the nuclear industry.	The information has been disclosed in the report of the Public Council; it is impracticable to duplicate it in the Report of the Corporation.

INCORPORATION OF KEY PROPOSALS VOICED BY STAKEHOLDERS
DURING THE PREPARATION OF THE 2016 REPORT

Stakeholders' requests and proposals	Response to stakeholders' requests and proposals
To include the information on assessing the prospects for new businesses in the Report	Incorporated in the section 'Business Diversification'
To use the internationally accepted term 'sustainability' in the description of ROSATOM's strategy	Incorporated in the section 'Business Strategy until 2030'
To disclose information on the performance of selected new businesses in the Report (who assesses it and how it is assessed)	Incorporated in the section 'Business Diversification'
To disclose the impact on biodiversity in the Report	Incorporated in the section 'Environmental Safety'

Stakeholders' requests and proposals**Response to stakeholders' requests and proposals**

To disclose the personnel turnover and active personnel turnover rates in the Report	Partly incorporated in the section 'Personnel Management'
To provide an explanation for the reduction in the number of overseas NPP construction projects and the reduction in foreign revenue in 2016 in the Report	Partly incorporated in the section 'International Business'
To comment on the reduction in the number of jobs over the last three years and provide a forecast for changes in the number of jobs in the coming years	Partly incorporated in the section 'Personnel Management'
To provide an explanation of the increase in output from fixed assets amid a decrease in the capacity factor	Incorporated in the section 'Value Creation and Business Model'
To specify the percentage of purchases from small and medium-sized enterprises in the Report	Incorporated in the section 'Procurement Management'
To specify the standard in accordance with which energy efficiency management and energy management systems have been implemented	Incorporated in the section 'Environmental Safety'
To explain the term 'contaminated water' in the Report	Incorporated in the section 'Environmental Safety'
To outline global challenges and risks which ROSATOM will face during expansion into foreign markets	Incorporated in the sections 'Business Strategy until 2030', 'Risk Management' and 'International Business'

ROSATOM'S OBLIGATIONS TO INCORPORATE PROPOSALS VOICED DURING THE PREPARATION OF THE 2016 REPORT (TO BE EXAMINED DURING THE PREPARATION OF THE 2017 REPORT)**Stakeholders' requests and proposals**

To align the wording of ROSATOM's strategic goals with the UN Sustainable Development Goals

To disclose the information on how ROSATOM is going to optimize and control the duration of NPP construction abroad

To revise the typology of products shown on the 'map of new products'

To calculate the reduction in the Corporation's impact on the climate ('carbon footprint') and disclose it in the report

To disclose information on the reduction of carbon dioxide emissions in the report

To disclose information on personnel development programmes in the report

To disclose information on ROSATOM's demand for experts in specific areas of training with a forecast for 5 to 10 years in the report

To disclose information on international and governmental awards and prizes received by ROSATOM's employees in the reporting year

To disclose information on ROSATOM's involvement in investment in external research and development projects, including university projects

9.4. STATEMENT OF PUBLIC ASSURANCE

OUR ANALYSIS AND EVALUATION DURING THE PUBLIC ASSURANCE PROCESS FOCUSED ON THE MATERIALITY AND COMPLETENESS OF INFORMATION DISCLOSED IN THE REPORT AND ON THE CORPORATION'S RESPONSE TO STAKEHOLDERS' REQUESTS AND PROPOSALS.

Background

ROSATOM has suggested that we assess the report on the performance of State Atomic Energy Corporation Rosatom in 2016 (the Report). To do so, we and our representatives were offered the possibility to participate in a dialogue with stakeholders on the priority subject of the Report, ROSATOM's Business Strategy until 2030 and the Contribution of the Corporation's Performance in 2016 to the Achievement of Long-Term Strategic Goals (Moscow, March 31, 2017), and in public consultations on the draft Report (Moscow, May 30, 2017). We also participated in the determination of material topics to be disclosed in the Report.

Our analysis and evaluation during the public assurance process focused on the materiality and completeness of information disclosed in the Report and on the Corporation's response to stakeholders' requests and proposals. Our conclusion is based on a comparative analysis of two versions of the Report (the draft Report for public consultations and the final version of the Report), materials provided to us following the dialogues (minutes of the dialogues and tables reflecting the incorporation of stakeholders' proposals) and the feedback provided by ROSATOM's management and employees during public assurance of the Report.

We received no remuneration from the Corporation for our participation in the public assurance procedure.

Assessments, comments and recommendations

We are unanimous in the opinion that the 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 strategy for improving the transparency and accountability of its business. 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 Report provides comprehensive information on all major aspects of the Corporation's operations, including those related to sustainable business development. Through a detailed examination of the Corporation's business model, the Report clearly presents the complex value chain, the Corporation's governance system, strategic goals and management approaches, its social, environmental and economic impacts, challenges and plans for the medium and long term. Thus, the readers of the Report can obtain a complete picture of ROSATOM's operations, including their socially important aspects.

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 Sustainability Reporting Standards of the Global Reporting Initiative (the Core option): ROSATOM is one of the first companies in Russia and in the world to prepare a report in accordance with the new version of the GRI Standards. In addition, during the preparation of the Report, the Corporation traditionally used the International Integrated Reporting Framework, the AA1000 AccountAbility Principles Standard, the Basic Performance Indicators of the Russian Union of Industrialists and Entrepreneurs (RSPP) and ROSATOM's uniform industry-wide public reporting policy.

It should also be noted that in 2017, the Russian Government approved the Conceptual Framework

for the Development of Public Non-Financial Reporting, which is largely based on the above standards. We expect that, given its extensive experience in non-financial reporting, ROSATOM will be a leader in the implementation of the Conceptual Framework.

Materiality of information

To incorporate stakeholders' requests as fully as possible, ROSATOM conducted a questionnaire survey among stakeholders to identify material topics to be disclosed in the Report (the information received was compared with the results of a questionnaire survey conducted among the Corporation's managers). We highly appreciate this initiative and recommend that ROSATOM should continue active collaboration with stakeholder representatives on this matter in the future as they represent the target audiences for the Corporation's public reports.

We believe that the priority subject of the Report, ROSATOM's Business Strategy until 2030 and the Contribution of the Corporation's Performance in 2016 to the Achievement of Long-Term Strategic Goals, was selected appropriately since this topic was of the greatest interest to stakeholders in the reporting year, including due to the release of the public version of the Corporation's strategy.

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.

Responding to stakeholders' requests and proposals

At the request of stakeholders' representatives, the final version of the Report was updated and supplemented with additional information (or substantiated explanations were provided as to why the requested information could not be disclosed). Chapter 9 of the Report provides information on the incorporation of stakeholders' main proposals voiced during the preparation of the 2016 report.

To summarize, we would like to point out that ROSATOM has made significant progress in public reporting over the past eight years and continues to improve its transparency and, consequently, the confidence in its business. We hope that ROSATOM will continue to consistently implement the principles of responsible business conduct in the future by developing the public reporting and stakeholder engagement system.

Persons who took part in the public assurance of ROSATOM's public annual report for 2016

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 Organization Green Cross

Alexey Mayorov

First Deputy Chairman of the Council of the Federation Committee on Economic Policy

Denis Moskvvin

Deputy of the State Duma of the Russian Federation, member of the Committee on Economic Policy, Industry, Innovative Development and Entrepreneurship

Alexander Makarenko

Executive Director of the Association of CATFs in the Nuclear Industry

Gennady Sklyar

Deputy of the State Duma of the Russian Federation, member of the Committee on Energy

Vladimir Ognev

Chairman of the Interregional Social Movement of Veterans of Nuclear Power and Industry

Igor Fomichev

Chairman of the Russian Trade Union of Nuclear Power and Industry Workers

APPENDIX 1. REPORT PROFILE AND THE PROCESS OF DETERMINING THE REPORT CONTENT AND MATERIALITY OF INFORMATION

THE PUBLIC REPORT OF STATE ATOMIC ENERGY CORPORATION ROSATOM FOR 2016 (THE REPORT) IS THE EIGHTH REPORT PUBLISHED BY THE CORPORATION ON A VOLUNTARY BASIS. IT IS INTENDED FOR A BROAD RANGE OF STAKEHOLDERS.

The 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 in the reporting year, 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 the regions of operation, implementation of social policy and other aspects of sustainable development;
- The economic, environmental and social impact on the external environment;
- The approach of ROSATOM's executives to managing various business aspects.

The Report focuses on ROSATOM's business strategy until 2030 and the contribution of the Corporation's performance in 2016 to the achievement of long-term strategic goals; this topic has been selected by the top management and representatives of key stakeholders. Information on the selection of material topics to be disclosed in the Report is provided below in the sections 'Process

for determining the Report content' and 'Ranking map of material aspects (topics) to be disclosed in the Report'.

ROSATOM's internal regulations stipulate an annual reporting cycle; the previous annual report was published in July 2016. The Report covers the Corporation's operations during the period from January 1, 2016 through December 31, 2016.

Standards and regulatory requirements

The Report has been prepared in accordance with:

- The Public Reporting Policy and the Public Reporting Standard of ROSATOM and its organizations;
- The International Integrated Reporting Framework (International <IR> Framework);
- The Global Reporting Initiative Sustainability Reporting Standards (GRI SRS, Core option⁶⁸);
- The AA1000 AccountAbility Principles Standard;
- The Recommendations of the Russian Union of Industrialists and Entrepreneurs (RSPP) for Use in Governance Practice and Corporate Non-Financial Reporting (basic performance indicators).

⁶⁸ The GRI content index and information on correspondence to the RSPP basic performance indicators are provided in the online version of the Report.

Stakeholder engagement

To improve transparency and accountability and to determine the materiality of information to be disclosed, the Report was prepared in cooperation with stakeholders in accordance with the AA1000SES international standard. To identify material aspects to be disclosed in the Report, a poll was carried out and two dialogues with stakeholders were held, including public consultations on the draft Report. The Report incorporates key requests voiced by stakeholder representatives during these dialogues [\[see the section ‘Incorporation of Stakeholders’ Proposals’\]](#).

Verification of reporting information

The reporting information was certified as reliable by:

- The Auditing Commission of ROSATOM [\[see Appendix 2\]](#);
- An independent auditing organization which certifies IFRS financial statements;
- An independent auditing organization which certified the Report’s compliance with the GRI Standards (the Core option) and ROSATOM’s compliance with the AA1000 APS principles [\[see Appendix 4\]](#).

The Internal Audit Office of ROSATOM conducted an internal audit of public reporting processes and assessed their compliance with the requirements of ROSATOM’s Public Reporting Policy and the Corporation’s local regulations on public reporting [\[see Appendix 3\]](#).

Representatives of key stakeholders provided public assurance of the Report in accordance with the AA1000SES standard, which confirmed the materiality and completeness of the disclosed

information and the Corporation’s responsiveness to stakeholders’ requests when preparing the Report [\[see the section ‘Statement of Public Assurance’\]](#).

Report boundaries

The Report covers the operations of ROSATOM and its organizations in Russia and abroad. Information on the operations of the Nuclear Weapons Division is not disclosed in full due to the special nature of ROSATOM’s business and its obligation to keep the state secret.

The Report covers several scopes of consolidation [\[the list of organizations within various scopes of consolidation is provided in the online version of the Report\]](#). Integrated performance indicators are disclosed for the Corporation’s organizations within the scope of budget consolidation as of December 31, 2016 (165 organizations)⁶⁹. GRI disclosures that belong to the Social Category are reported for organizations within the scope of budget consolidation; GRI disclosures that belong to the Environmental Category are reported for all significant organizations within ROSATOM which provide information on environmental protection in statistical reporting forms (126 organizations). Financial and economic indicators in the section ‘Financial and Economic Results’ and information on revenue, assets and intangible assets in the section ‘Key Results’ are disclosed for organizations included in the consolidated IFRS financial statements of ROSATOM (184 organizations).

In accordance with international standards, some disclosures in the Report and related performance indicators (international cooperation, ROSATOM’s activities in its regions of operation, environmental protection, etc.) include information on the operations of ROSATOM’s key partners, counterparties and other stakeholders.

Process for determining the Report content

ROSATOM traditionally attaches great importance to determining the materiality of information to be disclosed in a public report. The 2016 Report was prepared in accordance with international reporting standards: the Global Reporting Initiative Sustainability Reporting Standards (GRI SRS) and the International Integrated Reporting Framework. Both standards require that material aspects (topics) to be disclosed in the Report should be determined.

The materiality of information was determined through the following process:

- A working group compiled a list of material topics related to ROSATOM’s operations;

- The Corporation’s management, members of the working group preparing the Report and representatives of major stakeholder groups prioritized material topics (based on the assessment of materiality of each of the proposed aspects);
- Following the ‘two-stage filtering’, a list of material topics to be disclosed in the Report was compiled.

As a result, a ranking map of material topics to be disclosed in the Report was prepared. The decision to include various GRI performance indicators and performance indicators stipulated in ROSATOM’s Public Reporting Standard was based on the materiality of the aspects to which the indicators are related. The boundaries of information disclosure on various aspects were determined by the working group.

RANKING MAP OF MATERIAL TOPICS TO BE DISCLOSED IN THE REPORT⁷⁰

Highest materiality (a score of 2.5 points or higher)	High materiality (a score of 2 points or higher)	Medium materiality (a score of 1.5 points or higher)	Low materiality (a score lower than 1.5 points)
Outcomes of implementation of ROSATOM’s strategy and contribution of performance in the reporting year to the achievement of strategic goals	ROSATOM’s performance in the sphere of international business and international cooperation	Performance of the nuclear-powered icebreaker fleet	Communication projects (nuclear energy information centres, online communication, the Forsazh forum, etc.)

⁷⁰ The map has been prepared based on the findings of a questionnaire survey conducted among representatives of internal and external stakeholders of ROSATOM in December 2016. During the survey, stakeholders were asked to assess the materiality of topics provisionally selected by the working group preparing the Report using the following scale:

0 – disclosure of this information in the Report is immaterial (the information should not be disclosed in the Report).

1 – it is recommended that this information should be disclosed in the Report (the Report should contain key information on the topic or references to other sources of information, such as the online version of the Report, the corporate website, reports of ROSATOM’s organizations, etc.).

2 – it is important to disclose this information in the Report (the information should be disclosed in the Report in detail).

3 – it is very important to disclose this information in the Report (the information should be disclosed in a separate section/presented at the beginning (in the first chapter) of the Report).

There have been changes in the list of material topics compared to 2015, including due to the transition to the GRI Sustainability Reporting Standards: the Biodiversity topic has been recognized as significant; in addition, the list of topics specific to ROSATOM has been updated.

⁶⁹ Hereinafter, not including State Atomic Energy Corporation Rosatom.

Highest materiality (a score of 2.5 points or higher)	High materiality (a score of 2 points or higher)	Medium materiality (a score of 1.5 points or higher)	Low materiality (a score lower than 1.5 points)
ROSATOM's presence on the markets for nuclear technologies and services (markets for natural uranium, uranium conversion and enrichment, nuclear fuel, NPP construction, etc.) and the markets for new non-nuclear businesses, and the development prospects of these markets	Key business risks and opportunities	Prevention of corruption and other offences (GRI 205: Anti-corruption)	Labour/management relations (including the ability of employees to influence managerial decision-making, measures to safeguard the legal rights of employees, the collective agreement) (GRI 402: Labour/Management Relations)
Prospects for the development of the nuclear power industry in Russia and globally. Forecasts for the needs of the energy system in Russia and the energy systems of foreign countries	Radiation impact on the environment (including on biodiversity) (GRI 304: Biodiversity, GRI 305: Emissions, GRI 306: Effluents and Waste)	Performance of the Nuclear Weapons Division	Communication projects aimed at increasing employee engagement, recognition and motivation
Ensuring nuclear and radiation safety during the operation of nuclear facilities (including international cooperation in this sphere) (GRI 416: Customer Health and Safety) ⁷¹	Performance of ROSATOM's core Divisions	Occupational health and safety (including injury rates) (GRI 403: Occupational Health and Safety)	Industry media coverage
Financial and economic performance of ROSATOM (GRI 201: Economic Performance)	ROSATOM's performance in the sphere of business diversification (nuclear medicine, environmental protection, inspection systems and irradiation centres; non-nuclear mechanical engineering; NPP servicing, etc.)	Management of disturbed and contaminated areas	

Highest materiality (a score of 2.5 points or higher)	High materiality (a score of 2 points or higher)	Medium materiality (a score of 1.5 points or higher)	Low materiality (a score lower than 1.5 points)
	Contribution to the economic development of the regions of operation (contribution to economic value creation and distribution in the regions of operation, contribution to the energy security of Russian regions, tax payments to the budgets of various levels, investments in infrastructure, job creation, etc.) (GRI 203: Indirect Economic Impacts)	Key personnel characteristics (including staff costs)	
	Implementation of ROS-ATOM's Innovative Development Programme	Implementation of the social policy with regard to employees (GRI 401: Employment), as well as personal charity work and volunteering	
	Compliance of ROSATOM's organizations with national and international environmental and technical standards (GRI 307: Environmental Compliance)	Implementation of international research and innovative projects (ITER, INPRO, etc.)	
	Implementation of the Proryv project and the outcomes of the development of a new technological platform and transition to a closed nuclear fuel cycle in the nuclear power industry	Procurement management (including sustainability requirements for suppliers and contractors and measures to prevent unfair competition) (GRI 204: Procurement Practices)	

⁷¹ Hereinafter, the corresponding topics from the GRI Sustainability Reporting Standards are specified in brackets in italics. At the time of development of the Report concept, there was no official translation of the Standards into Russian; consequently, the wordings are provided in English.

Highest materiality (a score of 2.5 points or higher)	High materiality (a score of 2 points or higher)	Medium materiality (a score of 1.5 points or higher)	Low materiality (a score lower than 1.5 points)
	Emergency preparedness	Information security in ROSATOM ⁷²	
	RAW and SNF management (including the development of an integrated national system for radioactive waste management) and addressing 'nuclear legacy' issues	Performance of government functions by ROSATOM: law drafting, implementation of federal target programmes and government programmes, provision of public services (GRI 415: Public Policy)	
	Emissions, waste and effluents (GRI 305: Emissions, GRI 306: Effluents and Waste)	Performance of ROSATOM's Production System (RPS)	
	ROSATOM's impact on local communities (social programmes, philanthropy) (GRI 413: Local Communities)	Environmental stewardship (energy efficiency) (GRI 302: Energy, GRI 303: Water)	
	Outcomes of import substitution initiatives	Environmental measures and expenses and their efficiency (GRI 307: Environmental Compliance)	
	Development of closed administrative and territorial formations (CATFs) and areas where NPPs are located	ROSATOM's knowledge management system and protection of ROSATOM's intellectual property	
		Financial management and implementation of ROSATOM's investment programme	

Highest materiality (a score of 2.5 points or higher)	High materiality (a score of 2 points or higher)	Medium materiality (a score of 1.5 points or higher)	Low materiality (a score lower than 1.5 points)
		Improvement of corporate governance mechanisms, including the implementation of the Corporate Governance Code recommended by the Bank of Russia	
		Cooperation with universities and recruitment of young professionals	
		Career and performance management (equal opportunities, training and development, talent pool, assessment systems) (GRI 404: Training and Education)	
		Work of ROSATOM's Public Council	

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; 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.

⁷² The working group preparing the report has decided that information on this topic will be presented in the report for 2017.

APPENDIX 2.

EXTRACT FROM THE REPORT OF THE AUDITING COMMISSION ON FINANCIAL AND BUSINESS OPERATIONS OF STATE ATOMIC ENERGY CORPORATION ROSATOM AND ITS ORGANIZATIONS FOR 2016

Выписка из заключения Ревизионной комиссии по результатам проверки финансово-хозяйственной деятельности Государственной корпорации по атомной энергии «Росатом» и ее организаций за 2016 год

г. Москва

« 28 » апреля 2017 г.

Ревизионная комиссия в составе: председателя комиссии Р .Е. Артюхина — руководителя Федерального казначейства, членов комиссии: А.А. Липаева заместителя директора Департамента бюджетной политики в сфере государственной военной и правоохранительной службы и государственного оборонного заказа Министерства финансов Российской Федерации, В.С. Катренко — аудитора Счетной палаты Российской Федерации, А.В. Рожнова — заместителя начальника 12 Главного управления Министерства обороны Российской Федерации, В.К. Уткина - начальника отдела Департамента оборонной промышленности Правительства Российской Федерации осуществила проверку финансово-хозяйственной деятельности и достоверности сведений, содержащихся в годовом отчете Государственной корпорации по атомной энергии «Росатом» (далее также Корпорация и ГК «Росатом») за период с 1 января по 31 декабря 2016 года.

Ревизионная комиссия пришла к заключению:

1. Фактов нецелевого использования бюджетных средств, имущества Корпорации и ее организаций, средств специальных резервных фондов Корпорации по результатам проверки не установлено.

2. Нарушения Федерального закона от 1 декабря 2007 г. № 317-ФЗ «О Государственной корпорации по атомной энергии «Росатом», иных нормативных правовых актов Российской Федерации при принятии решений Наблюдательным советом, Генеральным директором и Правлением Корпорации по вопросам финансово-хозяйственной деятельности не установлены.

3. Рекомендации ревизионной комиссии, сформулированные в заключении от 29 апреля 2016 г., в целом учтены, при этом особо отмечается положительная динамика в организации претензионно-исковой работы Корпорации с ее контрагентами. Вместе с тем продолжают иметь место отдельные недостатки, на необходимость устранения которых указывалось по результатам предыдущих проверок.

4. Ревизионная комиссия подтверждает достоверность сведений, представленных в Годовом отчете Госкорпорации «Росатом» за 2016 год.

Рекомендации Наблюдательному совету и Правлению Госкорпорации «Росатом»:

1. Принять меры по минимизации сроков перечисления средств с лицевого счета получателя средств федерального бюджета на счета ГК «Росатом» в коммерческих банках в целях покупки иностранной валюты для проведения расчетов в рамках принятых международноправовых обязательств Российской Федерации.

2. Продолжить работу по мониторингу состояния дебиторской задолженности по заключенным государственным контрактам и своевременному предъявлению штрафных санкций к исполнителям (поставщикам) по государственным контрактам, обязательства по которым выполняются не своевременно и/или ненадлежащим образом.

3. Внести изменения в Учетную политику по Международным стандартам финансовой отчетности с целью детализации порядка пересчета показателей иностранных компаний в валюту представления в случае существенных колебаний валютного курса, а также в части уточнения подхода по классификации затрат на разведку и разработку месторождений минеральных ресурсов.

4. В целях обеспечения соответствия отчета об исполнении сметы Корпорации за 2016 год с данными бухгалтерской (финансовой) отчетности обеспечить внесение дополнений в Порядок формирования и корректировки финансового плана деятельности Госкорпорации «Росатом» и отчета о его исполнении, утвержденного приказом Корпорации от 21 ноября 2013 г. № 1/1244-п, с целью определения критериев существенности для повторного в течение года вынесения на утверждение Наблюдательного совета уточненного финансового плана Корпорации.

5. В рамках совершенствования системы внутреннего контроля и аудита ГК «Росатом» рассмотреть вопрос о поручениях Директору по внутреннему контролю и аудиту- главному контролеру ГК «Росатом»:

— инициировать дополнительную проработку порядка применения положений пункта 56 постановления Правительства Российской Федерации от 17 марта 2014 г. № 193 «Об утверждении Правил осуществления главными распорядителями (распорядителями) средств федерального бюджета (бюджета государственного внебюджетного фонда Российской Федерации), главными администраторами (администраторами) доходов федерального бюджета (бюджета государственного внебюджетного фонда Российской Федерации), главными администраторами (администраторами) источников финансирования дефицита федерального бюджета (бюджета государственного внебюджетного фонда Российской Федерации) внутреннего финансового контроля и внутреннего финансового аудита», в части требований о подтверждении выводов о достоверности сводной бюджетной отчетности с учетом положений Федерального закона от 1 декабря 2007 г. №317-ФЗ;

— обеспечить разработку программы гарантий и повышения качества внутреннего аудита, охватывающей все аспекты деятельности службы внутреннего контроля и аудита, а также обеспечить постоянный контроль за эффективностью ее реализации.

Председатель
Ревизионной комиссии

 Р.Е. Артюхин

Члены ревизионной комиссии:

 А.А. Липаев

 В.С. Катренко

 А.В. Рожнов

 В.К. Уткин

TRANSLATION

EXTRACT FROM THE REPORT OF THE AUDITING COMMISSION ON THE FINDINGS OF THE AUDIT OF FINANCIAL AND BUSINESS OPERATIONS OF STATE ATOMIC ENERGY CORPORATION ROSATOM AND ITS ORGANIZATIONS FOR 2016

Moscow

April 28, 2017

The Auditing Commission comprising the following persons: R.E. Artyukhin, Chairman of the Commission, Head of the Federal Treasury; members of the Commission: A.A. Lipaev, Deputy Director of the Department for Budgetary Policy in the Sphere of State Military and Law Enforcement Services and the State Defence Order of the Ministry of Finance of the Russian Federation; V.S. Katrenko, Auditor of the Accounts Chamber of the Russian Federation; A.V. Rozhnov, Deputy Head of the 12th Main Department of the Ministry of Defence of the Russian Federation; V.K. Utkin, Office Head of the Department of Defence Industry of the Government of the Russian Federation, has audited financial and business operations and the accuracy of information disclosed in the Annual Report of State Atomic Energy Corporation Rosatom (hereinafter referred to as the Corporation and ROSATOM) for the period from January 1 through December 31, 2016.

The Auditing Commission has come to the following conclusion:

1. The audit has not revealed any instances of misuse of budget funds, property of the Corporation or its organizations or special reserve funds of the Corporation.
2. No instances of non-compliance of resolutions on financial and business operations of the Corporation adopted by the Supervisory Board, the CEO or the Management Board of the Corporation with Federal Law No. 317-FZ on State Atomic Energy Corporation Rosatom dated December 1, 2007 or other laws and regulations of the Russian Federation have been detected.
3. On the whole, recommendations of the Auditing Commission made in the report dated April 29, 2016 have been taken into account; furthermore, the Auditing Commission would like to highlight an improvement in the administration of the Corporation's claims against its counterparties. However, there remain certain shortcomings that need to be eliminated, as has been pointed out based on the findings of previous audits.
4. The Auditing Commission confirms the accuracy of information provided in the Annual Report of ROSATOM for 2016.

Recommendations to the Supervisory Board and the Management Board of ROSATOM:

1. To minimize the amount of time required for money transfer from the current account of a recipient of funds from the federal budget to ROSATOM's accounts at commercial banks for the purpose of foreign currency purchases for settlement as part of international legal obligations assumed by the Russian Federation.
2. To continue to monitor the status of accounts receivable under government contracts and impose penalties in a timely manner on contractors (suppliers) under government contracts if contractual obligations are not fulfilled on time and/or properly.
3. To amend the Accounting Policy under International Financial Reporting Standards in order to establish a detailed procedure for recalculating the indicators of foreign companies in the presentation currency in the event of major exchange rate fluctuations and to revise the approach to classifying mineral exploration and development expenses.
4. In order to ensure that the report on budget execution of the Corporation for 2016 is consistent with information provided in financial statements, amendments should be made to the Procedure for Developing and Adjusting the Financial Plan of ROSATOM's Operations and the Report on Its Implementation, as approved by Order No. 1/1244-p of the Corporation dated November 21, 2013, to establish materiality criteria for submitting the revised financial plan of the Corporation to the Supervisory Board for approval during the year.
5. As part of measures to improve ROSATOM's internal control and audit system, it is necessary to consider instructing the Director for Internal Control and Audit and Chief Controller of ROSATOM:
 - To initiate further development of the procedure for applying the provisions of paragraph 56 of Decree No. 193 of the Russian Government on Approval of the Rules for Internal Financial Control and Internal Financial Audit Conducted by Chief Administrators (Administrators) of Federal Budget Funds (Budget Funds of the State Extrabudgetary Fund of Russia), Chief Administrators (Administrators) of Federal Budget Revenue (Budget Revenue of the State Extrabudgetary Fund of Russia) and Chief Administrators (Administrators) of Sources of Financing for the Federal Budget Deficit (Budget Deficit of the State Extrabudgetary Fund of Russia) dated March 17, 2014 with regard to requirements for confirming the accuracy of consolidated budget reports taking into account the provisions of Federal Law No. 317-FZ dated December 1, 2007;
 - To arrange the development of a guarantee and internal audit quality improvement programme covering all aspects of the work of the internal control and audit function and to monitor the efficiency of its implementation on an ongoing basis.

Chairman of the Auditing Commission

R.E. Artyukhin

Members of the Auditing Commission

A.A. Lipaev

V.S. Katrenko

A.V. Rozhnov

V.K. Utkin

APPENDIX 3. REPORT OF THE INTERNAL AUDIT OFFICE OF STATE ATOMIC ENERGY CORPORATION ROSATOM

ЗАКЛЮЧЕНИЕ

Управления внутреннего аудита Госкорпорации «Росатом» по результатам
внутреннего аудита бизнес-процесса
«Порядок формирования публичной отчетности
Госкорпорации «Росатом»»

Внутренний аудит бизнес-процесса «Порядок формирования публичной отчетности Госкорпорации «Росатом»» проведен на основании Сводного плана контрольных мероприятий специализированных органов внутреннего контроля Госкорпорации «Росатом» на второе полугодие 2017 года.

В ходе аудита:

- проведена оценка эффективности системы внутреннего контроля процесса формирования публичной отчетности;
- проведена оценка соответствия порядка формирования публичной отчетности действующему законодательству, международным стандартам и внутренним нормативным требованиям по формированию публичной отчетности;
- разработаны рекомендации по совершенствованию системы внутренних контролей при формировании публичной отчетности и повышению эффективности данного процесса.

В целом, бизнес-процесс «Порядок формирования публичной отчетности Госкорпорации «Росатом»» осуществляется в соответствии с действующим законодательством, международными стандартами и внутренними нормативными требованиями по формированию публичной отчетности. Вместе с тем, аудиторы отмечают необходимость совершенствования и повышения эффективности системы контроля за качеством данных, раскрываемых в публичном годовом отчете, за счет использования информационных систем ГК «Росатом».

Руководитель аудиторской
группы



И.С. Савушкина

Член аудиторской группы



А.Ю. Борисоглебская

TRANSLATION

REPORT OF THE INTERNAL AUDIT OFFICE OF 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 Specialized Internal Control Bodies of ROSATOM for the Second Half of 2017.

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.

On the whole, the business process 'Public Reporting Procedure in ROSATOM' complies with applicable legislation, international standards and internal regulatory requirements for public reporting. At the same time, the auditors would like to point out that the system for monitoring the quality of information disclosed in the public annual report needs to be improved and its performance needs to be enhanced by using the information systems of ROSATOM.

Head of the Auditors' Group

I.S. Savushkina

Member of the Auditors' Group

A.Yu. Borisoglebskaya

APPENDIX 4.

INDEPENDENT AUDITOR'S REPORT ON NON-FINANCIAL REPORTS OF STATE ATOMIC ENERGY CORPORATION ROSATOM

INDEPENDENT ASSURANCE REPORT ON PUBLIC ANNUAL REPORT OF

THE STATE ATOMIC ENERGY CORPORATION ROSATOM FOR 2016

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Introduction

The Independent Assurance Report is addressed to the Management of the State Atomic Energy Corporation Rosatom (hereinafter referred to as ROSATOM). The subject of assurance is the Public Annual Report of ROSATOM (hereinafter referred to as the Report) for 2015 (hereinafter referred to as the Report), as well as sustainability activities of ROSATOM.

Responsibilities

The management of ROSATOM bears full responsibility for the preparation and accuracy of the Report. We are responsible for the results of independent assurance of the Report only to ROSATOM within the engagement and do not assume any responsibility to any third party.

Scope, criteria and level of assurance

Sustainability activities of ROSATOM was evaluated considering the following criterion:

- Nature and level of ROSATOM compliance with the principles of the AA1000 Accountability Principle Standard 2008 – inclusivity, materiality, responsiveness.

The Report was evaluated considering the following criteria:

- Compliance with the requirements of GRI Sustainability Reporting Standards (Core option).

The engagement was planned and performed in accordance with AA1000 Assurance Standard 2008 (moderate level of assurance) and International Standard on Assurance Engagement ISAE 3000 (revised) "Assurance engagements other than audits or reviews of historical financial information" (limited level of assurance). The statement corresponds to type 2, as defined by AA1000AS 2008, in accordance with the limitations specified in section "Limitations of the engagement" of the present statement.

The selective verification of information in the Report performed under aforementioned levels of assurance does not claim to provide a high level of assurance. The work was based on the supporting materials provided by the management and employees of ROSATOM, publicly available information and analytical methods of confirmation. In relation to the quantitative information contained in the Report the work performed cannot be considered sufficient for identification of all possible deficiencies and misstatements. However, the collected evidence is sufficient for expressing our conclusion in accordance with the above levels of assurance.

Methodology of assurance

In our engagement, we have performed the following procedures:

- Study and selective testing of systems and processes implemented by ROSATOM to ensure and analyze the compliance of the activities with AA1000APS 2008 principles; collection of evidence confirming practical implementation of these principles.
- Interviewing the management and employees of ROSATOM and obtaining documentary evidence.
- Participation in the dialogues and public presentation of the Report, study of minutes of public dialogues.
- Study of information available on the ROSATOM's website related to its activities in the context of sustainable development.
- Study of public statements of third parties concerning economic, environmental and social aspects of activities of ROSATOM in order to check validity of the declarations made in the Report.
- Analysis of non-financial reports of foreign companies working in the similar market segment.
- Analysis of the current system of internal audit of public annual reporting in ROSATOM.
- Study of the existing processes of collection, processing, documenting, verification, analysis and selection of data to be included into the Report.
- Selective review of documents in order to confirm information disclosed in the Report regarding efficiency of the management systems of economic, environmental and social aspects of sustainable development in ROSATOM.
- Analysis of information in the Report for compliance with the aforementioned criteria.

Limitations of the engagement

The engagement was performed only in relation to data for the year ended 31 December 2016.

The evaluation of reliability of the information on performance in the Report was conducted in relation to compliance with the criteria to be applied to prepare sustainability report 'in accordance' with the GRI Standards (Core option) and information referred to in the GRI Content Index. In respect to the quantitative performance indicators the conformity assessment to external and internal reporting documents provided to us was performed.

Assurance does not apply to forward-looking statements, as well as statements expressing the opinions,

beliefs and intentions of ROSATOM to take any action relating to the future. The assurance on the statements which are based on expert opinion was not performed. The statement refers only to the English version of the Report which includes information to be published in a hard-copy form as well as in digital form on the ROSATOM website.

Conclusions

The following conclusions are based on the assurance work performed within the limitations of the engagement specified above.

Nature and extent of compliance of ROSATOM with AA1000 APS 2008 principles

As a result and within the scope of our work, we did not identify material non-compliance with criteria of AA1000APS 2008 in respect to adherence of ROSATOM to the principles (Inclusivity, Materiality, and Responsiveness).

Compliance of the Report with the GRI Sustainability Reporting Standards (Core option)

Analysis of compliance to the GRI Standards requirements

In order to form a position on this issue, we have performed analysis of compliance to the GRI Standards requirements concerning principles and disclosures for the chosen 'in accordance' option.

- General disclosures are reported mainly in compliance with the requirements of the standard GRI 102 (2016) for the chosen 'in accordance' option. Disclosure 102-8 is reported with omissions (breakdown of total number of employees by gender, contract and employment type as well as region is not reported).
- Management approach disclosures are reported mainly in compliance with the requirements of the standard GRI 103 (2016): explanations of why the topic is material and of how the organization manages the topics are reported for material topics as well as explanations of how the organization evaluates the management approach for a number of material topics.
- Topic-specific disclosures required for the Core option are reported in compliance with requirements of GRI Standards. If it is not possible to disclose required information, the Report identifies the information that has been omitted and explains reason for omissions.

Overall assessment of the Report

- As a result and within the scope of our work, we did not identify material non-compliance to the re-

quirements to the report prepared 'in accordance' with the Core option of the GRI Standards. The conclusion is stated taken into account abovementioned analysis of compliance to the GRI Standards requirements.

Recommendations

1. Increase the extent of disclosure of indicators in relation to which GRI requirements is not fully taken into account (disclosures with omissions).
2. It is reasonable to disclose GRI indicators in relation to planned values for reporting period as well as for future.
3. Make changes in the reporting systems to make it possible to disclose information on personnel by gender in the following reporting periods.
4. In case of disclosure with omissions due to absence of a recording system provide more specific information about plans to obtain data in future.
5. Take into account remarks in the foregoing sections of the statement.

Statement of competence and independence

"NP Consult" LLC is an independent audit firm, professionally rendering assurance services, a licensed provider of assurance services in accordance with AA1000 Assurance Standard. "NP Consult" LLC is a member of Self-regulatory organization of auditors Association "Sodruzhestvo". "NP Consult" LLC complies with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Standard Board for Accountants, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior. "NP Consult" LLC applies International Standard on Quality Control 1 and, accordingly, maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

"NP Consult" LLC states that the present assurance report is an independent auditor's position on the Report. "NP Consult" LLC and its staff have no relations with ROSATOM and its subsidiary companies that could result in the conflict of interest related to the independent assurance of the Report.



AA1000
Licensed Assurance Provider
000-99

General Director
"NP Consult" LLC

Moscow, September 21, 2017



N.Yu.Khrenov

LIST OF
ABBREVIATIONS

ARMS	automated radiation monitoring system
CATF	closed administrative and territorial formation
CIS	Commonwealth of Independent States
CNFC	closed nuclear fuel cycle
CRMS	corporate risk management system
EUP	enriched uranium product
EurAsEC	Eurasian Economic Community
FAIR	Facility for Antiproton and Ion Research (FAIR)
FMBA	Federal Biomedical Agency
FTP	federal target programme
FTS	Federal Tariff Service
GC	gas centrifuge
HCS	harmful chemical substances
HEU	highly enriched uranium
HLW	high-level waste
IAEA	International Atomic Energy Agency
IGA	intergovernmental agreement
ILW	intermediate level waste
INES	International Nuclear Event Scale (INES)

INPRO	International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO)
INS RAW	Integrated National System for Radioactive Waste Management
INS SNF	Integrated National System for Spent Nuclear Fuel Management
IP	intellectual property
IRAW	individual risk assessment workstation
ISRS	Integrated Standardized Remuneration System
ITER	International Thermonuclear Experimental Reactor (ITER)
IUEC	International Uranium Enrichment Centre
JV	joint venture
KPI	key performance indicator
LC	life cycle
LCBE	life cycle back-end
LEU	low-enriched uranium
LLW	low-level waste
LRW	liquid radioactive waste
LTOP	Long-Term Operational Programme of ROSATOM
NF	nuclear facilities
NFA	nuclear fuel assembly
NFC	nuclear fuel cycle
NFE	nuclear fuel element

NPP	nuclear power plant
NRS	nuclear and radiation safety
NS	nuclear submarine
NWD	Nuclear Weapons Division
OECD NEA	Nuclear Energy Agency of the Organization for Economic Cooperation and Development
R&D	research and development
RAW	radioactive waste
RBMK	high-power channel-type reactor
ROSATOM, Corporation	State Atomic Energy Corporation Rosatom
Rostekh-nadzor	Federal Service for Environmental, Technological and Nuclear Supervision
RR	research reactor
RSPP	Russian Union of Industrialists and Entrepreneurs
RTG	radioisotope thermoelectric generator
SNF	spent nuclear fuel
SRW	solid radioactive waste
SWU	separative work unit
UN	United Nations
WANO	World Association of Nuclear Operators

GLOSSARY

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 organizations
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 the organization to create and maintain its value in the short, medium and long term
Corporate social responsibility	a concept whereby an organization takes into account stakeholder requests. It is a set of obligations voluntarily assumed by the organization’s executives to take into account the interests of employees, shareholders, local communities in the organization’s operating regions, government bodies and municipal governments and other stakeholders. These obligations are funded mainly from the organization’s own funds and are aimed at implementing significant internal and external social (in a broad sense) programmes whose outcomes help develop the organization, 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 standards to facilitate communication between the organization and representatives of key stakeholders when preparing and promoting its public reports

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 the engineering, procurement and construction of a facility. Unlike a BOO contract, it does not provide for ownership of a 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 a facility to be built
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 first 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 Guidelines

Global Reporting Initiative (GRI) Sustainability Reporting Guidelines	The Guidelines outline the Principles for defining report content and ensuring the appropriate quality of reporting information; Standard Disclosures comprising performance indicators related to an organization's economic, environmental and social impacts, approaches to managing these impacts and other characteristics
HEU Agreement	the Agreement between the Government of the Russian Federation and the Government of the United States of America Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons, under which Russia undertook to supply the US over 20 years (until the end of 2013) with low-enriched uranium (LEU) produced from 500 tonnes of highly enriched uranium (HEU) extracted from nuclear warheads and deemed by Russia to be excessive for defence purposes
IAEA safeguards	a verification system established as part of the international nuclear non-proliferation policy which is applied to the peaceful use of nuclear energy; the IAEA is responsible for the implementation of this policy
IEPRS	a functional subsystem for emergency prevention and response in organizations within the jurisdiction of ROSATOM
Integrated report	a report consolidating all material data on the organization'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 organization at present and in the future
International Integrated Reporting Council (IIRC)	an international organization responsible for promoting and updating the International Integrated Reporting Framework. The objective of the IIRC is to develop universal approaches to corporate reporting in order to promote sustainable development of the global economy

ISAE 3000 standard (International Standard on Assurance Engagements)	an international standard for the audit of non-financial reports
Key organizations (for the purpose of public reporting)	organizations whose operations have major social and political importance and/or considerable importance for the positioning of ROSATOM on the Russian or international markets
Key performance indicators (KPIs)	key performance indicators consistent with the goals of the Corporation and reflecting the efficiency and performance of organizations, divisions and the individual performance of employees
Natural background radiation	ionizing radiation including cosmic radiation and ionizing 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 organization on its performance beyond its core operational and financial activities (and 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	an NPP characteristic that ensures 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	a sequence of manufacturing processes aimed at ensuring the operation of nuclear reactors, ranging from uranium production to radioactive waste disposal
Nuclear fuel pellet	a pellet of compressed uranium dioxide contained inside fuel elements. It forms the basis of nuclear fuel

Nuclear power	a branch of power engineering that uses nuclear energy for electricity and heat generation
Nuclear safety	the ability of nuclear facilities to prevent nuclear accidents and radioactive leaks
Operator	an organization 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 organization and in the environment and on human exposure to radiation (including dosimetry and radiometric monitoring)
Radiation safety	protection of the current and future generations and the environment against the harmful impact of ionizing 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 a radionuclide content above prescribed levels
Radioactive waste disposal	safe disposition of radioactive waste in repositories or any places that rules out waste withdrawal or a possibility of radioactive releases 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 their 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 organizations (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 organized in accordance with the AA1000SES 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 organization 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 that make an impact on the organization's operations through their actions and/or are affected by the organization. An organization may have different stakeholders (national and international regulatory (supervisory) authorities, shareholders, consumers of goods and services, business partners, suppliers and contractors, civil society organizations, local communities, trade unions, etc.) with differing and conflicting interests
Sustainable development	development meeting the needs of the present without compromising the ability of future generations to meet their own needs
Treaty on the Non-Proliferation of Nuclear Weapons	an international treaty aimed at limiting the arms race; its objective is to prevent the emergence of new states possessing nuclear weapons. The treaty imposes an obligation on states possessing nuclear weapons, requiring them not to transfer nuclear weapons or control over such weapons to any party, while non-nuclear weapon states are obliged not to manufacture or acquire nuclear weapons or other nuclear explosive devices
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 53°C, 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 the production of enriched uranium
Uranium ore enrichment	a combination of processes for the 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 moderator. Russian NPPs typically use two versions of VVER reactors: VVER-440 and VVER-1000

FEEDBACK FORM

Dear reader,

You have read the public annual report of ROSATOM, which is intended for a wide range of stakeholders. We attach great importance to the opinion of the readers of our report. We would appreciate it if you helped improve the quality of the Corporation's reports by completing the questionnaire below.

Please return the completed form by mail to the Communications Department at 24 Bolshaya Ordynka Street, Moscow, 119017 and/or by email (EAMamy@rosatom.ru).

1. Please assess the report using the following criteria:

Accuracy and objectivity

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Poor

Was your opinion influenced by independent auditors' reports and the statement of public assurance included in the report?

- ☐ Yes
- ☐ No

Completeness and relevance of information

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Poor

Report structure, ease of reference, wording

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Poor

2. Please specify which sections of the report you have found to be relevant and useful.

3. Which topics do you think should be covered in the next report?

4. Your recommendations and additional comments:

5. Please specify which stakeholder group you represent:

- ☐ Employee of ROSATOM
- ☐ Representative of a customer/consumer of goods and services
- ☐ Employee of an organization of ROSATOM
- ☐ Representative of a business partner
- ☐ Representative of the federal government
- ☐ Representative of a non-governmental organization
- ☐ Representative of a regional government
- ☐ Representative of the media
- ☐ Representative of a local government
- ☐ Representative of the expert community
- ☐ Representative of a contractor/supplier
- ☐ Other (please specify)

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