ATOMENERGOPROM

ROSATOM

2021 ANNUAL REPORT

JSC ATOMENERGOPROM

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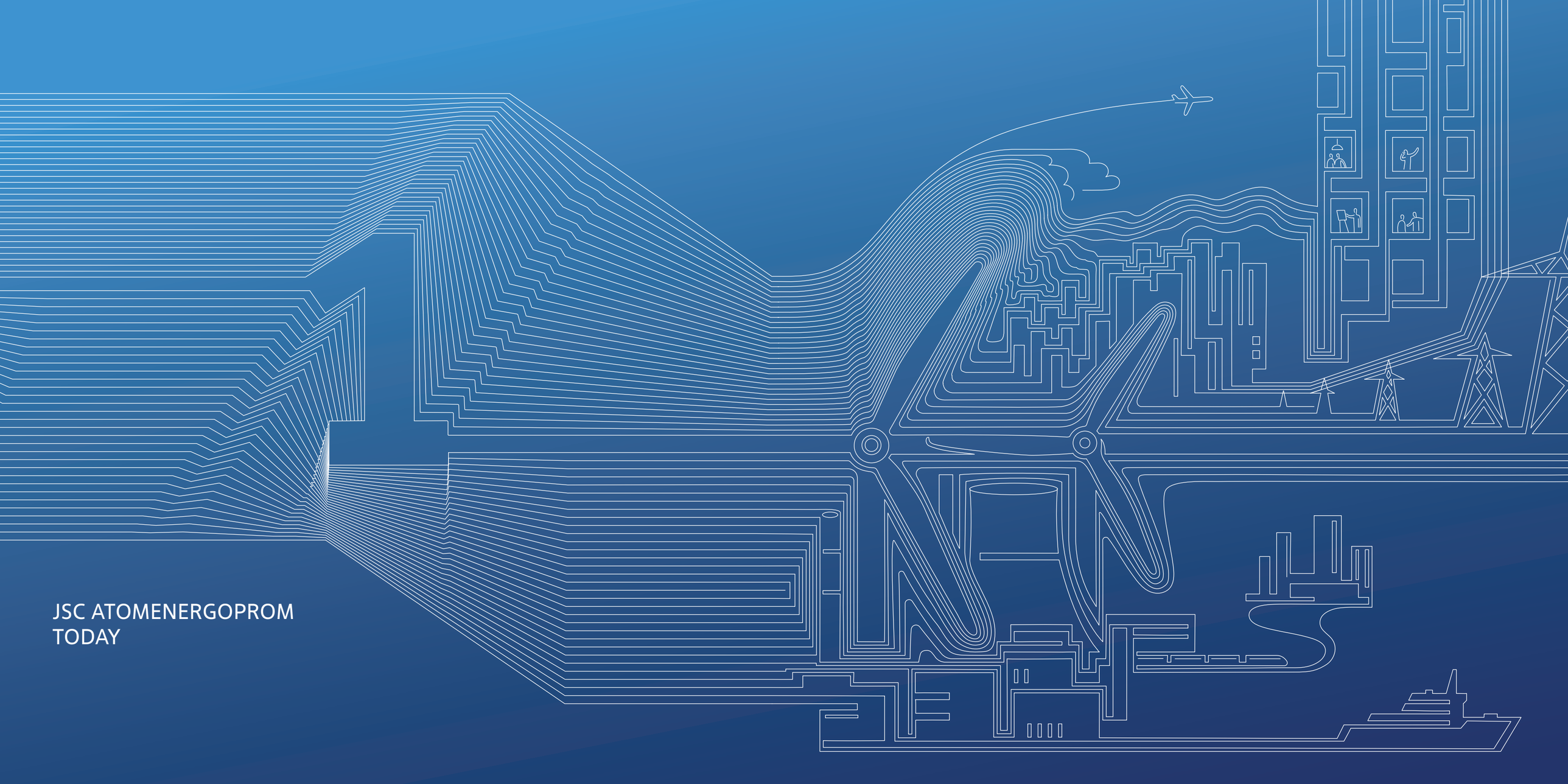

JSC ATOMENERGOPROM
TODAY

COMPANY PROFILE

GRI 102-1 Joint-Stock Company Atomic Energy Power Corporation
GRI 102-5 (JSC Atomenergoprom).
Primary state registration number (OGRN): 1077758081664.
State registration date: 19 July 2007.
State registration authority: Inter-District Inspectorate No. 46 of the Federal Tax Service in Moscow.
GRI 102-3 Location: 24 Bolshaya Ordynka Street, Moscow.
Tel.: +7 (495) 969-29-39.
Fax: +7 (495) 969-29-36.
Official website: www.atomenergoprom.ru

1. Shareholders of JSC Atomenergoprom

Holders of record of JSC Atomenergoprom as at 31 December 2021:

1.1. State Atomic Energy Corporation Rosatom

Location: 24 Bolshaya Ordynka Street, Moscow, 119017.
Status of the holder of record: shareholder.
Interest in the Company's authorised share capital: 95.3317%
Portion of voting shares held by the entity: 100%.

1.2. Russian Federation represented by the Russian Ministry of Finance

GRI 201-4 Location: 9 Ilyinka Street, Moscow, 109097.
Status of the holder of record: shareholder.
Interest in the Company's authorised share capital: 4.6683%
Portion of voting shares held by the entity: 0%.

2. Auditor of JSC Atomenergoprom

Full name: LLC Financial and Accounting Consultants (LLC FBK).
Location: 44/1 Myasnitskaya Street, Moscow, 101990.
INN: 7701017140
OGRN: 1027700058286
Tel.: +7 (495) 737-53-53
Fax: +7 (495) 737-53-47
Email: fbk@fbk.ru
JSC KPMG is the auditor for the summary consolidated IFRS financial statements for 2021.

3. Registrar of JSC Atomenergoprom's shares

The shareholder register of JSC Atomenergoprom is kept by **Joint-Stock Company Independent Registrar Company R.O.S.T.:**
Abbreviated company name: ***JSC IRC – R.O.S.T.***
Location: office IX, 18, Bldg. 5B, Stromynka Street, Moscow, 107996.INN: 7705038503.
OGRN: 1027739216757.
Licence: 045-13976-000001.
Date of issue: ***3 December 2002.***
Expiry date: ***perpetual licence.***
Licensing authority: ***Russian Federal Commission for the Securities Market (Federal Financial Markets Service).***
Date from which the registrar has kept the issuer's shareholder register: ***28 October 2009.***
JSC Independent Registrar Company R.O.S.T. also maintains shareholder registers of the majority of JSC Atomenergoprom's subsidiaries, which enables more rapid and reliable transactions in their shares when restructuring the corporate group.

REPORT PROFILE

GRI 102-46 The Public Annual Report (hereinafter referred to as the Report) of Joint-Stock Company Atomic Energy Power Corporation (hereinafter referred to as JSC Atomenergoprom or the Company) for 2021 has been prepared in the integrated format. The Report provides an integrated account of the Company's strategy and JSC Atomenergoprom's key financial, economic and operating results for 2021. The Report also outlines the Company's health, safety and environmental performance, its contribution to the development of the towns and cities where nuclear facilities are located, implementation of the social policy and other aspects of sustainable development.

GRI 102-50 JSC Atomenergoprom publishes its reports on a yearly basis. The previous annual report was published on 31 May
GRI 102-51 2021. This Report covers the operating results of the Company and its organisations within the scope of consolidation
GRI 102-52 in accordance with IFRS (hereinafter referred to as the organisations of JSC Atomenergoprom) for the period from 1 January through 31 December 2021. It also discloses some information on and the results of the Russian nuclear industry as a whole.

The annual report of JSC Atomenergoprom is approved by the Board of Directors.

Standards and regulatory requirements

The Report has been prepared in accordance with the following documents:

- The Uniform Industry-Wide Policy of State Atomic Energy Corporation Rosatom on Public Reporting and the Uniform Industry-Wide Methodological Guidelines (Standard) on Public Reporting of State Atomic Energy Corporation Rosatom and Its Organisations;
- The International Integrated Reporting Framework (the International <IR> Framework);
- The Global Reporting Initiative

GRI 102-54 Sustainability Reporting Standards (GRI SRS): this Report has been prepared in accordance with the Core option of the GRI Standards;

- The AccountAbility AA1000 framework;
- Federal Law No. 208-FZ on Joint-Stock Companies dated 26 December 1995;
- Regulations of the Bank of Russia No. 714-P on Disclosure of Information by Issuers of Issue-Grade Securities dated 27 March 2020.

Process for determining the materiality of disclosures

The materiality of information was determined through the following process: GRI 102-49

- A working group compiled a list of material topics related to the Company's operations;
- The Company's management and members of the working group preparing the Report prioritised material topics (based on the assessment of materiality of each of the proposed topics);
- Following the «filtering», a list of material topics to be disclosed in the Report was compiled.

The list and number of material topics covered in the Report for 2021 was revised in response to stakeholder requests. The following topics were excluded:

- 1. Implementation of the Company's strategy;
- 34. Response to the pandemic (business continuity, personnel, external stakeholders);
- 37. Environmental protection and environmental performance;
- 43. Development of herd immunity against COVID-19.

The following topic was added: 17. Digital products and contribution to the digitisation of the Russian economy.

The decision to include various GRI performance indicators in the Report was based on the materiality of the topics to which the indicators are related. Starting from this Report, environmental disclosures in accordance with the GRI 303, GRI 304, GRI 305, GRI 306 and GRI 307 Standards are provided for the organisations within the scope of JSC Atomenergoprom.

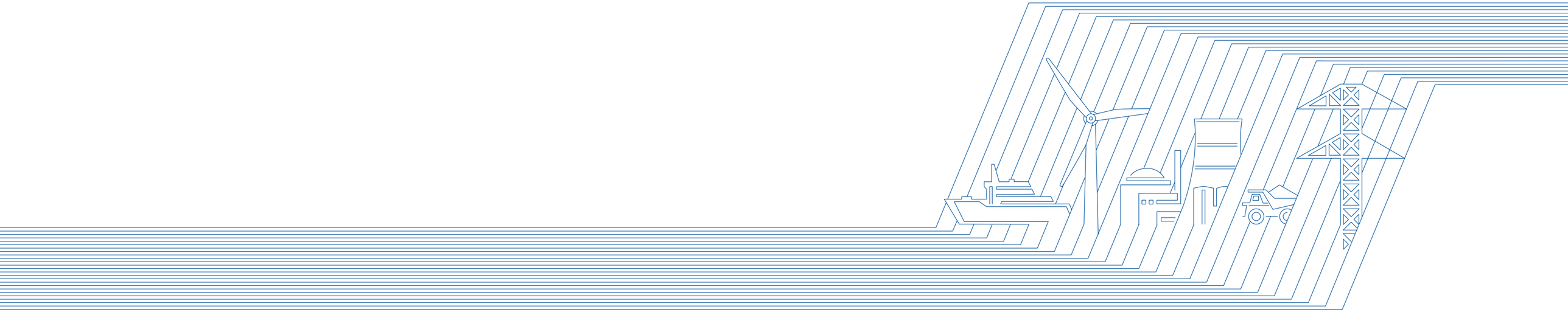
Verification of reporting information GRI 102-56

Reporting information was certified as accurate and reliable by an independent auditor which certifies the annual financial statements.

Non-financial reporting information was certified as accurate and reliable by an independent auditor which assured compliance of the Report with the GRI SRS Standards (the Core option).

Disclaimer

The Report contains information about the Company's medium- and long-term objectives and initiatives. The objectives are forward-looking, and their actual achievement will depend, among other things, on a number of economic, political and legal factors beyond the Company'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.



MESSAGE FROM THE MANAGEMENT

GRI 102-14

Ekaterina Lyakhova
Chair of the Board of Directors of JSC Atomenergoprom

Kirill Komarov
Director
of JSC Atomenergoprom

Dear colleagues and partners,

We would like to present the annual report of JSC Atomenergoprom for 2021.

In the reporting year, the Company continued to face challenges posed by the global coronavirus pandemic. The Company yet again demonstrated its resilience in times of crisis and a high level of social responsibility by contributing to the common fight against the COVID-19 pandemic.

In 2021, JSC Atomenergoprom remained a leader in low-carbon power generation in Russia. Electricity generation reached a new all-time high, as Russian nuclear power plants produced 222.4 billion kWh of electricity, accounting for about 20% of the country's total electricity output. Nuclear power generation in Russia helped to prevent greenhouse gas emissions into the atmosphere totalling 109 million tonnes of CO_2 equivalent.

Despite the challenges posed by the pandemic, the Company demonstrated a strong financial performance. Its revenue under IFRS increased by 15.9% year on year to RUB 1,083.5 billion, while profit under IFRS for the reporting period totalled RUB 210.6 billion.

In the reporting year, the Company successfully accomplished all its operational objectives. Two new generation 3+ nuclear power units equipped with VVER-1200 reactors and meeting the highest safety standards were put into operation at Leningrad NPP-2 and the Belarusian NPP. In addition, the first criticality procedure was launched at the second power unit of the Belarusian NPP. The construction of new NPP power units was started in China, India and Turkey.

The Company designed upgraded floating power units and signed a contract for the supply of four floating power units for the Baimsky Mining and Processing Plant in Chukotka. It also started to develop a pilot project to build an onshore small nuclear power plant in the Sakha Republic (Yakutia).

The Company's product portfolio includes 15 strategic programmes worldwide. New products offered by the Company provide new opportunities for developing healthcare and municipal infrastructure, improving environmental safety and making progress in other key areas relevant to sustainable development.

The reporting year saw a landmark event in the sphere of 'green energy': JSC Atomenergoprom placed the first issue of 'green' bonds worth RUB 10 billion. In addition, based on the findings of an independent study, the Company's sustainability performance was rated 'Robust', and it was assigned a score of 56/100, which is 12 points higher than the 2020 assessment[1].

Safety remains a top priority for JSC Atomenergoprom. In the reporting year, all nuclear facilities operated safely and reliably. In addition, the Company was actively developing new business areas.

By year-end 2021, a total of six wind power plants had been commissioned in Russia, with the capacity of the Company's wind farms totalling 720 MW. The Company plans to commission additional wind power generation capacities totalling 280 MW in 2022 and 1.7 GW by 2027.

In the sphere of composite materials, the Company has established an integrated domestic process chain covering all stages, from raw materials to finished products.

Plans for 2022 include launching power unit No. 2 of the Belarusian NPP, supplying key equipment and implementing the NPP construction programme, as well as increasing revenue from new products. The key objective is to fulfil all commitments taken on by the Company under existing contracts both in Russia and abroad.

We would like to thank our partners for fruitful cooperation; we would also like to give our thanks to employees of JSC Atomenergoprom's organisations for their efficient work. The Company has great potential enabling it to adequately respond to major macroeconomic challenges and successfully accomplish all medium- and long-term objectives that it has set itself.

[1] See the section 'Sustainable Development Management'.

JSC ATOMENERGOPROM TODAY

GRI 102-7

JSC Atomenergoprom is an integrated company that consolidates civilian assets of the Russian nuclear industry.

GRI 102-2

JSC Atomenergoprom is an organisation of State Atomic Energy Corporation Rosatom (ROSATOM).

The organisations of JSC Atomenergoprom comprise a complete cycle of nuclear production ranging from uranium mining to NPP construction and electricity generation. The organisations give priority to improving product quality, introducing innovative technologies and environmental management.

JSC Atomenergoprom (including JSC Atomenergoprom's group of companies) is the largest power generation company in Russia and one of the leading companies on the global market for nuclear services and technologies. JSC Atomenergoprom and ROSATOM are capable of providing turnkey solutions for NPP design and construction, supplying fuel to NPPs throughout their entire service life, upgrading NPPs, rendering maintenance services and providing employee training.

The Company integrates leading organisations and enterprises in the nuclear industry, whose development started more than 75 years ago, and possesses unique experience gained across the entire range of the nuclear fuel cycle and NPP construction technologies. In addition to traditional segments of the market for nuclear technologies and services, JSC Atomenergoprom is actively diversifying into wind power generation, nuclear medicine, composite materials, additive manufacturing, digital products, infrastructure solutions for towns and cities and other new areas of business.

See the section 'Business Diversification' for details.

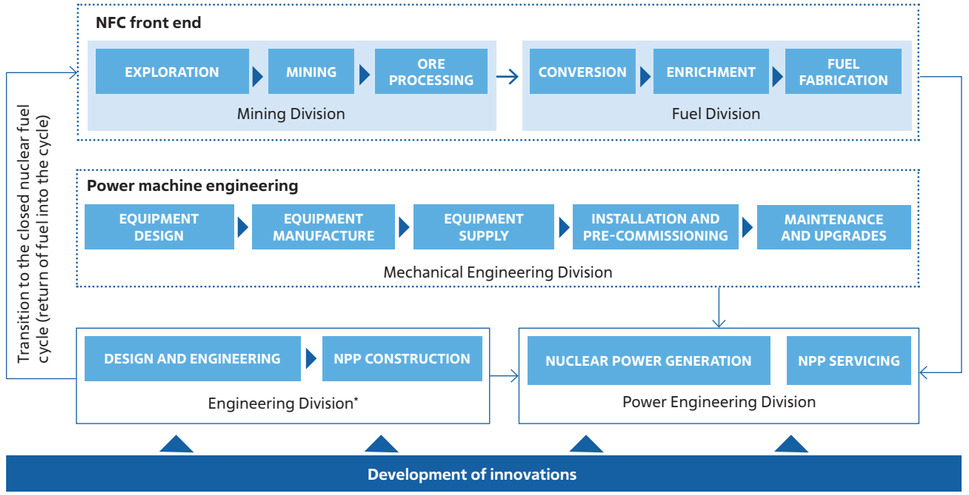
JSC Atomenergoprom Today

No. 1 in the world	**No. 1** in the world	**No. 2** in the world	**No. 2** in the world	**No. 3**	**20%**
in terms of the overseas NPP construction project portfolio (35 power units)[2]	in terms of uranium enrichment (38% of the global market)	in terms of uranium reserves	in terms of uranium production (15% of the global market)	on the global nuclear fuel market (17% of the global market)	share in electricity generation in the Russian Federation

[2] Including the portfolio of ROSATOM.

Production and process chain of JSC Atomenergoprom

GRI 102-9



New products
(wind power, nuclear medicine, advanced materials and technologies, digital products, infrastructure solutions, additive manufacturing, energy storage systems, automated process control systems and electrical engineering, environmental solutions)

** The Engineering Division is managed by ROSATOM.*

HISTORY OF JSC ATOMENERGOPROM

JSC Atomenergoprom was established in July 2007 pursuant to Federal Law No. 13-FZ on Peculiarities of the Management and Disposal of the Property and Shares of Organisations Operating in the Nuclear Power Industry and on Introducing Amendments to Selected Russian Laws of 5 February 2007, Decree No. 556 of the Russian President on Restructuring the Russian Nuclear Power Generation Complex dated 27 April 2007 and Resolution No. 319 of the Russian Government on Measures for Establishing Joint-Stock Company Atomic Energy Power Corporation dated 26 May 2007.

Regulations on the establishment of JSC Atomenergoprom stipulated a merger of 89 enterprises in all nuclear power engineering and nuclear fuel cycle segments, including three federal educational establishments. The state contributed shares of 31 companies under federal ownership to the authorised share capital of JSC Atomenergoprom upon its establishment (including shares of JSC TVEL, JSC TENEX, JSC Atomredmetzoloto, etc.). Other companies had been incorporated as federal state unitary enterprises (hereinafter referred to as FSUEs) and were subject to corporatisation to be merged with the nuclear corporation. Between 2008 and 2011, 55 FSUEs were reorganised into open joint-stock companies and merged with JSC Atomenergoprom. Thus, the formation of the Company's authorised share capital was completed.

These measures enabled JSC Atomenergoprom to start to form a new structure of the civilian branch of the nuclear industry and introduce a uniform policy on finances, corporate governance, HR management and management of non-core assets in 2011.

As at 31 December 2021, JSC Atomenergoprom's scope of consolidation in accordance with IFRS comprised 162[3] companies of different legal forms.

As at 31 December 2021, the shareholders of JSC Atomenergoprom were ROSATOM (95.3317%)[4] and the Russian Federation represented by the Russian Ministry of Finance (4.6683%).

[3] Including JSC Atomenergoprom.

[4] ROSATOM holds 100% of voting shares in JSC Atomenergoprom.

KEY EVENTS IN 2021

Electric power industry: NPPs and wind power plants

- Electricity output at Russian NPPs reached a record high of 222.4 billion kWh.
- Power unit No. 2 of Leningrad NPP-2 with a new-generation VVER-1200 reactor was put into operation.
- Five wind power plants were put into operation in the Rostov Region and the Stavropol Territory. ROSATOM's operating wind power plants have a total capacity of 720 MW, with electricity output totalling 1.2 billion kWh.

NPP construction abroad

- Power unit No. 1 of the Belarusian NPP was put into operation.
- The loading of nuclear fuel into the reactor (the first criticality procedure) was started at power unit No. 2 of the Belarusian NPP.
- Construction of power units No. 5 and 6 of Kudankulam NPP was launched in India.
- Concreting of the nuclear island started at power unit No. 7 of Tianwan NPP and power unit No. 3 of Xudabao NPP; licences were obtained for the construction of the nuclear island of power unit No. 8 of Tianwan NPP and power unit No. 4 of Xudabao NPP in China.
- A licence was obtained for the construction of power unit No. 4 of Akkuyu NPP in Turkey.

Development of science

- Construction of an innovative BREST-OD-300 lead-cooled fast neutron reactor was started in Seversk.
- The fit-up assembly of the multipurpose fast neutron research reactor (MBIR) was completed.
- Two projects to build small NPPs were launched: an onshore NPP in Yakutia and floating power units for the Baimsky Mining and Processing Plant in Chukotka.

Digitisation

- Logos Platform, a digital platform for solving complex engineering problems and conducting multidisciplinary research, was developed.
- A prototype of a four-qubit trapped ion quantum processor was created.

New materials and substances

— The Company commissioned a plant producing PAN precursor (which is used as feedstock for the manufacture of carbon fibre) with a capacity of up to 5,000 tonnes.

Sustainability progress

— JSC Atomenergoprom placed the first issue of ‘green’ bonds worth RUB 10 billion.
— JSC Atomenergoprom’s sustainability performance was rated as ‘Robust’, with a score of 56/100, which is 12 points higher than in 2020.

KEY RESULTS IN 2021

GRI 102-7
GRI 102-48

Indicator	2019	2020[5]	2021	2021/2020, %
Revenue under IFRS, RUB billion	889.0	934.7	1,083.5	115.9
EBITDA[6], RUB billion	346.6	335.3	398.0	118.7
Profit under IFRS, RUB billion	143.6	168.2	210.6	125.2
Assets under IFRS, RUB billion	3,408	3,720	4,084	109.8
Intangible assets, RUB billion	157.6	186.6	185.4	99.4
Nuclear power generation, billion kWh	208.8	215.7	222.4	103.1
NPP capacity factor, %	80.4	81.1	83.18	102.5
Uranium resources, ‘000 tonnes[7]	512.7	509.4	506.4	99.4
Uranium production, tonnes[8]	7,528	7,122	7,149	100.4

[5] Comparative data for 2020 have been revised due to the recognition of a common control transaction in the consolidated financial statements in 2021. In August 2021, a subsidiary of JSC Atomenergoprom acquired a 100% shareholding in Nukem Technologies GmbH (Germany). As a result, the Group acquired control over Nukem Technologies GmbH. Given that Nukem Technologies GmbH had been controlled by ROSATOM, this transaction has been recognised in the consolidated financial statements as a common control transaction; accordingly, comparative data for 2020 have been retrospectively adjusted.

[6] EBITDA = Operating results + Impairment of receivables + Depreciation and amortisation + Adjustments for non-cash items of other expenses and income.

[7] Data on uranium resources of the Mining Division in the Russian Federation (Russian assets).

[8] Data on uranium production at ROSATOM’s assets in Russia and abroad.

Indicator	2019	2020[5]	2021	2021/2020, %
Overseas NPP construction projects, number of power units[9]	36	36	**35**[10]	**97.2**
Portfolio of orders for new products (outside the scope of the nuclear industry), RUB billion[11]	1,169.1	1,602.1	**1,974.1**	**123.2**
Average salary in JSC Atomenergoprom, RUB ‘000 per month	88.15	95.2	**105.3**	**111.0**
Events rated at level 1 and above on the INES scale, number	0	0	**0**	**0**

FINANCIAL AND ECONOMIC PERFORMANCE[12]

Key financial results

Consolidated financial results of JSC Atomenergoprom under IFRS, RUB billion

GRI 102-7
GRI 103-3

	2019	2020[13]	2021	2021/2020, %
Revenue	889.0	934.7	1,083.5	115.9
Cost of sales	(549.8)	(611.6)	(690.9)	113.0
Gross profit	339.2	323.1	392.6	121.5
Selling and administrative expenses	(96.0)	(101.7)	(104.2)	102.5
Other income/(expenses), net	(32.5)	(21.8)	2.0	-9.2
Financial income/(expenses), net	(21.2)	23.5	(17.8)	-75.7
Share in the (loss)/profit of investments accounted for using the equity method	0.6	2.8	6.8	242.9

[9] Including the project portfolio of ROSATOM.

[10] Excluding power unit No. 1 of the Belarusian NPP commissioned in 2021.

[11] Including the order portfolio of ROSATOM.

[12] Information on financial and economic performance is disclosed in the Report based on consolidated financial statements available at: https://e-disclosure.ru/portal/files.aspx?id=11230&type=4.

[13] Comparative data for 2020 have been recalculated due to the recognition of a common control transaction in the consolidated financial statements in 2021. In August 2021, a subsidiary of JSC Atomenergoprom acquired a 100% shareholding in Nukem Technologies GmbH (Germany). As a result, the Group acquired control over Nukem Technologies GmbH. Given that Nukem Technologies GmbH had been controlled by ROSATOM, this transaction has been recognised in the consolidated financial statements as a common control transaction; accordingly, comparative data for 2020 have been retrospectively adjusted.

	2019	2020[13]	2021	2021/2020, %
Income tax expense	(46.5)	(57.7)	(68.8)	119.2
Profit for the year	143.6	168.2	210.6	125.2
Other comprehensive income/(expenses)	(27.0)	28.7	(15.9)	-55.4
Total comprehensive income for the year	116.6	196.9	194.7	98.9
Net operating profit after tax (NOPAT)	164.2	141.9	221.6	156.2

In 2021, revenue increased by 15.9% year on year, or by RUB 148.8 billion. The growth was driven mainly by the following factors:

- A 29.2% increase in revenue from sales of uranium products and enrichment services by the Sales and Trading operating segment driven by additional shipments to foreign markets;
- An 18.0% rise in revenue in the Electricity Generation segment, mainly as a result of an increase in sales.

Corporate profit for 2021 totalled RUB 210.6 billion, up by RUB 42.4 billion (25.2%) compared to 2020.

In 2021, operating profit totalled RUB 290,3 billion, up by RUB 90.8 billion (45.5%) year on year; this growth was driven mainly by profit from sales.

Foreign exchange differences for the periods in question totalling RUB 58.8 billion (before tax) also contributed to changes in profit (the financial statements reflect a foreign exchange loss totalling RUB 10.2 billion in 2021 and a foreign exchange gain totalling RUB 48.6 billion in 2020).

Structure of revenue from sales to external customers by operating segment

	2019		2020[14]		2021	
Operating segment	**RUB billion**	**% of the total**	**RUB billion**	**% of the total**	**RUB billion**	**% of the total**
Electricity Generation	507.0	57.0	518.1	55.4	**611.6**	**56.4**
Sales and Trading	142.9	16.1	158.1	16.9	**204.2**	**18.8**
Fuel	82.0	9.2	84.5	9.0	**85.6**	**7.9**
Mechanical Engineering	58.6	6.6	69.7	7.5	**65.6**	**6.1**
Mining	3.7	0.4	4.9	0.5	**6.7**	**0.6**
Other operating segments	94.8	10.7	99.4	10.6	**109.8**	**10.1**
TOTAL	**889.0**	**100**	**934.7**	**100**	**1,083.5**	**100**

[14] See footnote 13.

Cost of sales

Cost structure, RUB billion

Cost of sales	2019	2020[15]	2021	2021/2020,%
Materials and fuel	159.4	179.0	207.0	115.6
Staff costs	132.2	150.1	155.5	103.6
Cost of electricity purchased for resale and for own use	37.3	38.6	57.2	148.2
Electricity transmission services	26.0	25.7	28.0	108.9
Depreciation and amortisation	101.8	110.8	111.9	101.0
Production services of third-party contractors	28.6	33.0	50.6	153.3
Property tax and other taxes and payments to the budget	19.8	20.6	21.3	103.4
Other expenses	64.2	72.7	74.8	102.9
Changes in finished goods and work in progress	(19.5)	(18.9)	(15.4)	81.5
TOTAL	**549.8**	**611.6**	**690.9**	**113.0**

The cost of sales increased by RUB 79.3 billion (13.0%), with the growth driven mainly by the following items:

- An increase in the cost of materials by RUB 28.0 billion as a result of growing sales volumes;
- A rise in the cost of electricity purchased for resale by RUB 18.6 billion amid an increase in revenue;
- An increase in expenditure on operating personnel by RUB 5.4 billion.

[15] Comparative data for 2020 have been recalculated due to the recognition of a common control transaction in the consolidated financial statements in 2021. In August 2021, a subsidiary of JSC Atomenergoprom acquired a 100% shareholding in Nukem Technologies GmbH (Germany). As a result, the Group acquired control over Nukem Technologies GmbH. Given that Nukem Technologies GmbH had been controlled by ROSATOM, this transaction has been recognised in the consolidated financial statements as a common control transaction; accordingly, comparative data for 2020 have been retrospectively adjusted.

Structure of the statement of financial position

Key changes in the asset structure, RUB billion

	31 December 2019	31 December 2020[16]	31 December 2021
Goodwill	41	48	49
Intangible assets	158	187	185
Property, plant and equipment	1,891	1,992	2,160
Financial investments	196	164	187
Loans issued	86	137	123
Bank deposits	85	80	274
Cash	262	315	215
Accounts receivable	374	407	458
Inventory	189	234	232
Other current assets	6	8	12
Other non-current assets	120	148	189
TOTAL	**3,408**	**3,720**	**4,084**

The book value of the Company's assets increased by RUB 364 billion. This was driven primarily by an increase in bank deposits by RUB 194 billion.

The value of property, plant and equipment grew by RUB 168 billion due to investments in NPP construction in the Russian Federation and Turkey.

Cash decreased by RUB 100 billion.

Accounts receivable increased by RUB 51 billion. The most significant changes were related to outstanding payments for equipment manufacture and supply under long-term contracts for NPP construction abroad.

Other non-current assets increased by RUB 41 billion due to an increase in inventory with a useful life of more than 12 months.

[16] See footnote 15.

Financial investments increased by RUB 23 billion, which was mainly due to the acquisition of interests in joint ventures in 2021.

There were no significant changes in the lines 'Goodwill', 'Intangible Assets', 'Inventory', 'Loans Issued' and 'Other Current Assets' in 2021 compared to 2020.

Key changes in the structure of equity and liabilities, RUB billion

	31 December 2019	31 December 2020[17]	31 December 2021
Provisions	262	280	232
Accounts payable	510	582	594
Borrowings	142	221	440
Other liabilities	117	119	144
Non-controlling interest	347	344	78
Retained earnings	980	1,108	1,350
Equity	1,050	1,066	1,246
TOTAL	**3,408**	**3,720**	**4,084**

The non-controlling interest decreased by RUB 266 billion, while equity increased by RUB 180 billion, mainly as a result of a transfer of shares in subsidiaries as payment for an additional share issue to ROSATOM.

Retained earnings increased by RUB 242 billion.

Borrowings increased by RUB 219 billion as the Company obtained credit facilities from banks.

Provisions declined by RUB 48 billion mainly due to a rise in the discount rate as at 31 December 2021 compared to 31 December 2020.

There were no significant changes in the lines 'Accounts Payable' and 'Other Liabilities' in 2021 compared to 2020.

[17] Comparative data for 2020 have been recalculated due to the recognition of a common control transaction in the consolidated financial statements in 2021. In August 2021, a subsidiary of JSC Atomenergoprom acquired a 100% shareholding in Nukem Technologies GmbH (Germany). As a result, the Group acquired control over Nukem Technologies GmbH. Given that Nukem Technologies GmbH had been controlled by ROSATOM, this transaction has been recognised in the consolidated financial statements as a common control transaction; accordingly, comparative data for 2020 have been retrospectively adjusted.

Key financial and economic indicators

Financial sustainability indicator	**2019**	**2020**[18]	**2021**
Debt-to-equity ratio	0.33	0.35	0.40
Liquidity ratios			
Indicator	**2019**	**2020**	**2021**
Quick ratio	1.67	1.49	1.49
Current ratio	2.13	1.93	1.86
Turnover indicators, days			
Indicator	**2019**	**2020**	**2021**
Inventory turnover	70	83	78
Accounts receivable turnover	55	60	63
Accounts payable turnover	113	119	115
Profitability ratios, %			
Indicator	**2019**	**2020**	**2021**
Return on sales (ROS)	16.2	18.0	19.4
Return on assets (ROA)	4.2	4.5	5.2
Return on equity (ROE)	6.0	6.7	7.9

Profitability ratios increased in 2021, primarily due to a year-on-year increase in profit in the reporting period.

[18] Comparative data for 2020 have been recalculated due to the recognition of a common control transaction in the consolidated financial statements in 2021. In August 2021, a subsidiary of JSC Atomenergoprom acquired a 100% shareholding in Nukem Technologies GmbH (Germany). As a result, the Group acquired control over Nukem Technologies GmbH. Given that Nukem Technologies GmbH had been controlled by ROSATOM, this transaction has been recognised in the consolidated financial statements as a common control transaction; accordingly, comparative data for 2020 have been retrospectively adjusted.

Cash flow

	2019	**2020**	**2021**[19]	**2021/2020,%**
Cash flow from operating activities before changes in working capital	364.1	348.0	390.6	112.2
Changes in working capital	(35.2)	(35.0)	(58.1)	166.0
Income tax paid	(59.5)	(93.9)	(69.7)	74.2
Interest paid	(16.8)	(14.8)	(16.6)	112.2
Net cash flow from operating activities	**252.6**	**204.3**	**246.2**	**120.5**
Capital expenditures	(197.3)	(243.3)	(358.0)	147.1
Other	(86.1)	46.3	(160.6)	(346.9)
Net cash flow used in investing activities	**(283.4)**	**(197.0)**	**(518.6)**	**263.2**
Net changes in total debt	(40.0)	26.0	222.2	854.6
Other lease liabilities	(3.0)	(3.8)	(4.1)	107.9
Dividends paid	(19.7)	(23.4)	(41.9)	179.1
Acquisition of non-controlling interest	-	(7.2)	-	-
Net cash flow used in financing activities	**(62.7)**	**(8.4)**	**176.2**	**-2,097.6**
Net (decrease)/increase in cash and cash equivalents	**(93.5)**	**(1.1)**	**(96.2)**	**-8,745.5**
Cash and cash equivalents at the beginning of the reporting period	372.2	280.4	314.1	112.0
Effect of movements in foreign exchange rates on cash and cash equivalents	(17.1)	34.8	(3.3)	(9.5)
Cash and cash equivalents at the end of the reporting period	**261.6**	**314.1**	**214.6**	**68.3**

In 2021, proceeds from financing activities exceeded payments for financing activities by RUB 176.2 billion.

[19] See footnote 18.

Approach to taxation

JSC Atomenergoprom is a major taxpayer in Russia. Its organisations make significant contributions to budget revenue in their regions of operation. Information on taxes paid is regularly provided to regional administrations, the Government and the President of the Russian Federation. JSC Atomenergoprom views strict compliance with laws as a necessary prerequisite for the implementation of its strategy.

In order to develop a single approach and minimise tax risks, ROSATOM develops and regularly updates the following uniform industry-wide documents regulating tax matters for JSC Atomenergoprom and its organisations: the Uniform Accounting Policy for Taxation; the Methodological Guidelines on Tax Due Diligence of Transactions; the Methodological Guidelines and Procedure for Communication on Transfer Pricing Matters; the Procedure for Calculating Income Tax for Controlled Foreign Companies and the Methodological Guidelines on Inspecting and Classifying Foreign Entities for the Purpose of Income Tax Calculation in Russia; the Procedure for Compiling Country-by-Country Data; the Methodological Guidelines on Identifying and Assessing Risks to Be Identified for the Purpose of Tax Monitoring; the Methodological Guidelines on Assessing the Applicability of Benefits under Tax Treaties (MLI).

Tax management, control and risk management

JSC Atomenergoprom has developed and operates a corporate risk management system on an ongoing basis. The tax risk management process is aimed at preventing or minimising risks, analysing the outcomes of the relevant measures and disclosing information on risks. Tax risk management approaches are regulated by uniform industry-wide guidelines and recommendations. In addition, those organisations that have joined the tax monitoring programme prepare quarterly tax risk reports to be submitted to tax authorities, as required by the Federal Tax Service of Russia (the risk register is compiled and updated based on the Industry-Wide Risk Library).

The performance of the tax function of JSC Atomenergoprom's subsidiaries is monitored by ROSATOM, which sets the relevant key performance targets (for the materiality of errors and for the share of non-deductible expenses).

Stakeholder engagement and management of tax issues

Since 2013, major organisations in the industry have been included in the consolidated taxpayer group (CTG), with JSC Atomenergoprom as a responsible member of the CTG that collects data and files income tax returns.

JSC Atomenergoprom actively cooperates with the Federal Tax Service in developing the tax monitoring system in the Russian Federation. JSC Atomenergoprom and JSC Rosenergoatom joined the tax monitoring programme as from 1 January 2020. Starting from 1 January 2022, ROSATOM and nine enterprises in the Fuel Division also joined the tax monitoring programme. In the course of tax monitoring, the organisations use the Tax Monitoring Data Mart information system. This is a centralised industry-wide IT solution for information exchange with the Federal Tax Service. This system provides tax officials with real-time access to detailed data underlying the tax reports of the enterprises, including scanned contracts and primary accounting records. Currently, another 27 organisations in the industry are preparing to join the tax monitoring programme as from 1 January 2023.

The transition to tax monitoring enables JSC Atomenergoprom's organisations to significantly speed up decision-making on disputed tax issues, minimise risks and costs associated with tax control and enhance their reputation as reliable partners doing business in a transparent manner.

In 2021, representatives of JSC Atomenergoprom joined the Working Group on the Internal Control and Risk Management System established by the Federal Tax Service; in addition, together with JSC Greenatom, they participate in a pilot project launched by the Federal Tax Service to integrate taxpayers' information systems with the Nalog 3 Automated Information System operated by the Federal Tax Service. Participation in working groups and projects enables JSC Atomenergoprom to obtain information on upcoming changes in tax legislation and the regulatory framework in advance and to make comments and proposals. JSC Atomenergoprom is involved in the approval of draft laws; the Company also initiates amendments to tax legislation on matters relevant to its organisations.

Country-by-country reporting

Organisations within the scope of consolidation of JSC Atomenergoprom pay taxes to 24 foreign jurisdictions. In 2021, the share of taxes paid to overseas budgets in the total amount of taxes paid stood at 5.4%.


BUSINESS
STRATEGY

BUSINESS STRATEGY UNTIL 2030

Business context

Trends in the development of the nuclear industry

The development of the nuclear industry until 2030 will be influenced by a number of factors, including[20]:

- Global population growth from 7.9 billion people in 2021 to 8.5 billion people by 2030 and an increase in the share of urban population from 57% to 60%;
- Global GDP growth by up to 3% per year;
- Growth of global electricity output and consumption. Global electricity generation is expected to increase by 25% compared to 2021 and reach 34 TWh as early as in 2030, with the Asia Pacific region accounting for two thirds of the growth;
- Accelerating greenhouse gas accumulation. The global energy sector accounts for more than 60%[21] of man-made emissions; between 2015 and 2021, it generated about 34-36 billion tonnes of carbon dioxide per year.

The COVID-19 pandemic resulted in a 5.2% decrease in emissions from the energy sector in 2020; however, as early as in 2021, emissions increased by 6.1% (+0.6% compared to 2019). The increase in emissions was driven by economic recovery (in 2021, global GDP grew by 5.9%) and by the impact of the energy crisis on the actual energy mix (weather conditions in some regions of the world were unfavourable for renewable energy generation; combined with soaring gas prices, this led to an increase in coal-fired generation).

In 2020 and 2021, the world remained committed to developing low-carbon and sustainable energy. The zero-emissions strategy adopted by major economies might significantly accelerate the electrification of the global economy, which will necessitate active development of all zero-carbon energy sources.

The LCOE[22] for renewable energy sources (excluding offshore wind power plants[23]) on the global market[24] averages about USD 40-50 per megawatt-hour, whereas for conventional power generation facilities (gas-fired and coal-fired thermal power plants) the LCOE ranges between USD 60 and USD 75[25] per megawatt-hour. Although renewable energy sources are currently competitive, the potential for an increase of their share in the energy mix is limited: even if the cost of renewable energy generation continues to decrease, further conventional and nuclear backup facilities or energy storage systems will need to be built to ensure guaranteed power supply.

In the long term, the global nuclear power industry as an energy source will remain in demand. Leading global think tanks[26] predict an increase in installed capacity in the nuclear power industry from the current level of 389 GW[27] to 439-447 GW by 2030.

JSC Atomenergoprom has identified two groups of factors that have the most significant impact on the Company's global operations:

1. The economic and geopolitical situation. Although global economic growth outpaces that of the Russian economy, as a global company JSC Atomenergoprom sets itself higher growth targets, given persisting political pressure and a general trend towards growing protectionism.

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

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

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

The Company's competitive position[28]

GRI 103-3

The competitiveness of services provided by JSC Atomenergoprom is based on its unique facilities, technical capabilities and human resources, as well as the experience of coordinating R&D and design organisations. The Russian nuclear industry is one of the global leaders in terms of research and development in reactor design, capabilities and technologies in the nuclear fuel cycle and in the sphere of NPP operation, as well as in the development of advanced reactor technologies, including those based on fast neutron reactors with a closed nuclear fuel cycle.

[20] Data from the World Bank, the UN, the IEA World Energy Outlook 2021 (Stated Policies Scenario), IEA CO_2 Emissions in 2021, and the IAEA.

[21] Including industrial processes.

[22] The levelised cost of electricity (LCOE) is the net present value of the unit cost of electrical energy over the life cycle of an NPP.

[23] The LCOE for offshore wind power plants totals USD 80-90 per megawatt-hour.

[24] Data from BNEF LCOE 2H 2021 (global benchmarks).

[25] This estimate does not take into account the spike in fuel prices in late 2021 and early 2022.

[26] IEA World Energy Outlook 2021 (STEPS), WNA 'The Nuclear Fuel Report: Global Scenarios for Demand and Supply Availability 2021-2040' (Reference), UxC 'Nuclear Power Outlook 2021-Q4' (Base).

[27] Power Reactor Information System (PRIS) developed by the IAEA (https://pris.iaea.org).

[28] For information on the Company's main competitors, see the section 'Markets Served by Atomenergoprom'.

Russia has the most advanced enrichment technologies in the world; nuclear power plants with water-cooled water-moderated power reactors (VVERs) have proved their reliability over one thousand reactor-years of fail-free operation.

In 2021, JSC Atomenergoprom was the largest global market player in terms of the portfolio of overseas NPP construction projects (35 power units)[29].

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

The Company's competitive advantages:

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

Long-term strategic goals

JSC Atomenergoprom's strategic development is underpinned by the long-term strategy of ROSATOM.

GRI 103-1

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

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

JSC Atomenergoprom is taking steps to accomplish ROSATOM's mission of leveraging the achievements of nuclear science and modern high technology for the benefit of humanity.

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

[29] Including the project portfolio of ROSATOM.

JSC Atomenergoprom's operations facilitate the implementation of the global sustainable development agenda. JSC Atomenergoprom contributes to the achievement of the UN Sustainable Development Goals through its product line and its efforts to ensure the sustainability of internal environmental, social and governance processes. The business strategy of JSC Atomenergoprom provides general guidelines for the long term, shapes the target vision for 2030 and sets a framework for development.

The vision of JSC Atomenergoprom is to become a global technological leader. Accordingly, JSC Atomenergoprom intends to expand the scale of its business to match existing global technological leaders.

The COVID-19 pandemic was a major external factor both in 2020 and 2021; moreover, its impact will continue to be felt in the longer term. JSC Atomenergoprom views long-term impacts of the pandemic as providing opportunities for development due to:

- Heightened public interest in a number of product areas within the sphere of competence of ROSATOM and JSC Atomenergoprom;
- Growing demand for and accelerated adoption of effective digital solutions for a variety of applications;
- Heightened interest in the global environmental agenda and sustainability initiatives.

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

By 2030, ROSATOM intends to increase its revenue (including the portfolio of JSC Atomenergoprom) to RUB 4 trillion, with the share of new products in revenue expected to reach 40%; the Corporation also intends to expand its overseas footprint, with at least 50% of revenue to be generated by the overseas business.

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

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

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

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

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

For details on steps taken by the Company in order to increase its international market share, see the section 'International Business'.

Necessary prerequisites for the implementation of the strategy

GRI 103-2

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

Key strategy implementation risks

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

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

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

2.2. SUSTAINABLE DEVELOPMENT MANAGEMENT

Since 2020, ROSATOM has been a member of the UN Global Compact, an initiative with over 19,000 corporate participants in more than 160 countries.

JSC Atomenergoprom, which consolidates civilian assets in the nuclear industry, plays a leading role in the implementation of ROSATOM's sustainability initiatives and the fulfilment of the relevant commitments.

In the course of their operations, ROSATOM and JSC Atomenergoprom are guided by global sustainable development priorities and adhere to the 10 principles of the UN Global Compact. ROSATOM and JSC Atomenergoprom contribute to the achievement of the UN Sustainable Development Goals (SDGs) through their product line, their financial and economic performance and their efforts to ensure the sustainability of internal environmental, social and governance processes.

The safety of technological solutions, safe working conditions and environmental safety are a priority for the Company and all of its organisations. In addition, JSC Atomenergoprom is a responsible corporate citizen whose operations have a significant impact on the economy of a large part of Russian regions and a range of foreign countries where the Company is building NPPs and other facilities. The Company's efforts to develop its business both in Russia and abroad are aligned with long-term sustainable development objectives, taking into account the special characteristics of each individual region. Nuclear technology drives systematic improvements in the quality of people's life. At present, the product portfolio of the Russian nuclear industry comprises not only conventional solutions in the sphere of nuclear power, but also new areas, such as nuclear medicine, nuclear research and technology centres based on research reactors, radiation processing facilities, etc. In addition, the Company is developing its business in a number of adjacent non-nuclear areas: wind power, production of composite materials, additive manufacturing, etc.

NPP construction and operation contributes to economic and infrastructure development both in Russia and in foreign customer countries by guaranteeing long-term stable capacity utilisation for high-technology manufacturing enterprises, generating orders for companies in adjacent industries and providing employment for local communities, which translates into a corresponding contribution to GDP in the form of industry revenue and tax payments. NPP construction and operation provides employment for several thousand people, both at the plant itself and in the sphere of nuclear infrastructure.

Given the scale of their operations as a whole and individual NPP construction projects, ROSATOM and JSC Atomenergoprom make a major contribution to the achievement of the UN Sustainable Development Goals (SDGs), especially the following:

1) SDG 7 ‘Affordable and Clean Energy’, SDG 8 ‘Decent Work and Economic Growth’, SDG 9 ‘Industry, Innovation and Infrastructure’, SDG 12 ‘Responsible Consumption and Production’, SDG 13 ‘Climate Action’ and SDG 17 ‘Partnership for Sustainable Development’;

2) SDG 3 ‘Good Health and Well-Being’, SDG 4 ‘Quality Education’ and SDG 11 ‘Sustainable Cities and Communities’ are also important for the industry;

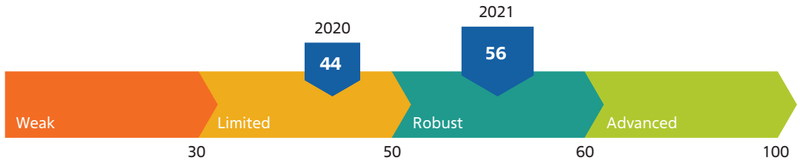
3) ROSATOM and JSC Atomenergoprom attach special importance to preventing the negative impact of any aspect of their operations in terms of SDG 6 ‘Clean Water and Sanitation’, SDG 14 ‘Life Below Water’ and SDG 15 ‘Life on Land’.

Key sustainable development results

GRI 102-12

As part of its commitments as a participant of the UN Global Compact, in 2021, ROSATOM prepared its first public sustainability report, which was published on the website of the UN Global Compact at https://www.unglobalcompact.org. The report presents key achievements in the sphere of environmental safety, human rights, labour relations and business ethics. The report has been rated ‘Active’, which means that ROSATOM not only monitors key ESG indicators but is also committed to improving its ESG performance and focuses on contributing to the achievement of the 17 UN Sustainable Development Goals.

ESG progress of JSC Atomenergoprom in 2020 and 2021, as rated by Vigeo Eiris



Starting from 2020, JSC Atomenergoprom has been assigned an independent sustainability rating by Vigeo Eiris, an international rating agency. In 2021, the Company’s sustainability performance was rated ‘Robust’, and it was assigned a score of 56/100, which is 12 points higher than the 2020 assessment. This was achieved due to JSC Atomenergoprom’s focused efforts to enhance its ESG maturity in 2020 and 2021.

In 2021, JSC Atomenergoprom placed the first ‘green’ bond issue in the industry with a par value of RUB 10 billion. The bond issue is compliant with international standards developed by ICMA. The bonds have been listed on the Moscow Exchange. They were more than eight times oversubscribed. This is the first placement of exchange-traded bonds by a Russian issuer to finance renewable energy sources. Eight Russian banks acted as underwriters for the bond issue, with the ExpertRA rating agency acting as an independent verifier.

Contribution to climate action

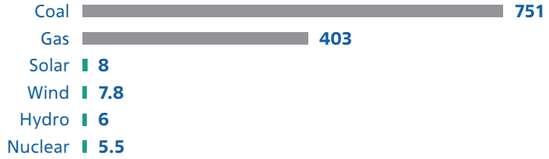
GRI 103-1

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

In 2021, Russia developed and approved a new 2050 Strategy of Social and Economic Development with Low Greenhouse Gas Emissions, which views nuclear power as a tool for achieving carbon neutrality.

A major highlight of 2021 was the inclusion of the nuclear power industry in the national Taxonomy of Green Projects (approved by Decree No. 1587 of the Government of the Russian Federation dated 21 September 2021 on Approving Criteria for Sustainable (Green) Development Projects in the Russian Federation and Requirements for the Verification System for Sustainable (Green) Development Projects in the Russian Federation).

Greenhouse gas emissions*



** Minimum values over the life cycle (g CO_2e/kWh); the average value is shown for nuclear power.*

In October 2021, the United Nations Economic Commission for Europe (UNECE) published a study showing that nuclear power plants produce the smallest amount of emissions over their life cycle compared to other power generation options (averaging 5.5 g CO_2e/kWh, while minimum emissions from hydropower and wind power plants total 6 g and 7.8 g CO_2e/kWh respectively).

https://unece.org/sites/default/files/2021-10/LCA-2.pdf

In addition, in 2021, ROSATOM and JSC Atomenergoprom actively assisted in preparing and hosting the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26) in Glasgow (UK). The conference was attended by more than 40,000 participants, including national leaders and global companies. The programme of the Russian pavilion included a special one-day event focused on nuclear power, the Clean Nuclear Energy Day. The COP26 conference included a number of events focused on the role of the nuclear industry in climate action. For the first time in the history of the conference, nuclear power was high on its agenda.

GRI 103-3

At present, the operation of all NPPs in Russia helps to prevent emissions exceeding 100 million tonnes of CO_2 equivalent per year (109 million tonnes of CO_2 equivalent in 2021), while the operation of all Russian-design NPPs globally helps to prevent emissions totalling about 208 million tonnes of CO_2 equivalent per year.

Nuclear power is currently the largest source of low-carbon 'green' energy in Russia: in 2021, JSC Atomenergoprom produced 222.4 billion kWh of electricity, accounting for 19.7% of the total electricity output in the country.

GRI 103-2

In order to expand the range of clean energy solutions, the Company has been developing the wind power business since 2017. Its first project in this area is the 150 MW Adygea Wind Power Plant, which started to supply electricity to the wholesale market in March 2020. Five new wind farms with a total capacity of 570 MW have been built and commissioned in the Rostov Region and the Stavropol Territory: the Kochubeyevskaya WPP (210 MW), the Marchenkovskaya WPP (120 MW), the Karmalinovskaya WPP (60 MW), the Bondarevskaya WPP (120 MW) and the Medvezhenskaya WPP (60 MW). In 2022, the Company plans to commission three more wind farms: the Kuzminskaya WPP (160 MW), the Trunovskaya WPP (60 MW) and the Berestovskaya WPP (60 MW).

GRI 103-2
GRI 103-3

The Company attaches great importance to developing low-carbon hydrogen energy production, which is a promising area. In 2018, hydrogen energy production was included in the Company's list of prioritised areas of scientific and technological development. The Russian nuclear industry has extensive technological and research capabilities for developing key hydrogen production techniques: electrolysis, which is one of the most environmentally friendly hydrogen production techniques, and steam methane reforming, which involves the use of CO_2 capture technology. The Company is focused on developing technologies for low-carbon hydrogen production and storage and participating in pilot hydrogen projects both in Russia and abroad.

As part of a project to build an export-oriented hydrogen production plant on Sakhalin Island, in 2021, the Company carried out a feasibility study jointly with a technology partner. The project involves building a hydrogen production plant on Sakhalin Island based on steam methane reforming technology; the plant will be equipped with a CO_2 capture system that will enable subsequent CO_2 utilisation (commercialisation). Arrangements for the project to launch a hydrogen-powered train on Sakhalin Island continue to be implemented. In 2022, at least one pilot hydrogen energy project is expected to be moved to the implementation stage.

Sustainable operations

Organisations in the industry adhere to the Unified Industry Policy on Sustainable Development of ROSATOM and Its Organisations, which sets out JSC Atomenergoprom's position on sustainable development matters, including the goals, objectives and key principles of its efforts in the sphere of health, safety and the environment, in the social sphere and in the sphere of corporate governance. In order to systematise sustainability initiatives across the industry, the Company has developed and approved the Uniform Industry-Wide Methodological Guidelines on the Management of Sustainability Initiatives.

Detailed information on the Policy is available at: https://www.rosatom.ru/sustainability/

The Company is committed to sustainable development leadership both in Russia and abroad (in the countries in which it operates). It adheres to sustainable development principles, assesses its ESG performance and sets ESG targets. The Company also promotes cooperation to achieve the UN SDGs and engages in open dialogue with stakeholders on sustainable development.

The Company's sustainable development initiatives involve continuous process improvement, implementation of health, safety and environmental projects, corporate social responsibility initiatives and volunteering, development of a supply chain management system, as well as personnel management and development of the talent pool. Progress on these aspects of sustainable development is monitored using ESG indicators.

Environmental aspect (E). The Company seeks to align its operations with the 'Do No Significant Harm' principle, which involves minimising pollution, the negative impact on ecosystems and risks to human health.

The goals and initiatives of ROSATOM and JSC Atomenergoprom in the sphere of environmental safety and environmental protection are reflected in the Uniform Industry-Wide Environmental Policy (2008[30]). As part of its implemen-

[30] The years of approval of the first versions of the documents are indicated.

tation, the Company annually takes measures to improve environmental safety and preserve the environment in the course of operations of nuclear organisations. To monitor progress and assess the efficiency of sustainable development processes in the sphere of environmental protection and environmental impacts, the Company uses such key indicators as the volume of pollutant emissions, water withdrawal, the area of restored land, the share of enterprises that have undergone certification in accordance with the ISO 14001 standard, etc.

The Social aspect (S) is another major aspect of sustainability of the Company's business. It includes ensuring occupational and process safety, protecting the life and health of employees in the industry and developing human potential. The Company implements social projects aimed at supporting employees in the industry and the residents of nuclear towns and cities and driving systematic improvements in the standard of living for employees and their families, local communities and consumers of the Company's products in its regions of operation.

ROSATOM and JSC Atomenergoprom have adopted the Uniform Industry-Wide Social Policy (2013) and the Uniform Industry-Wide Policy on Occupational Safety and Health (2013). Key indicators used for assessing the efficiency of sustainable development processes in the social sphere include the LTIFR, the personnel turnover rate, the number of employees who have undergone training, the gender balance, the number of employees engaged in NPP construction, etc.

As part of the *Governance aspect (G)*, the Company is building an integrated system of industry regulation and sustainable development standards and ensures the transparency of its business by disclosing as much information as possible.

In its production processes, the Company focuses on making the procurement system transparent for suppliers and building a 'sustainable' supply chain, including a requirement for compliance with environmental and social standards. The Company implements anti-corruption measures and introduces the principles of ethical business conduct on an ongoing basis.

The ROSATOM Production System has been developed and adopted in the industry; it is designed to promote a lean manufacturing culture and covers JSC Atomenergoprom's organisations. A quality management system has been introduced, and international standards such as ISO 14001 and ISO 9001 and other standards are applied.

Public sustainability reports are an integral part of JSC Atomenergoprom's practices to ensure the transparency of its business; they also serve as a stakeholder engagement tool. Starting from 2010, the Company's key Divisions annually publish non-financial reports in accordance with the international GRI Standards (these reports currently form part of ROSATOM's public annual report).

ROSATOM and JSC Atomenergoprom have adopted the Uniform Industry-Wide Public Reporting Policy (2009), the Uniform Industrial Procurement Standard (2009), the Uniform Industry-Wide Anti-Corruption Policy (2015) and the Code of Ethics and Professional Conduct (2016).

To monitor the efficiency of sustainable development processes in the sphere of corporate governance, the Company uses such key indicators as the findings of external audit of performance of the internal control system, the share of employees who have undergone anti-corruption training, the share of enterprises that have implemented measures for monitoring and recording social and environmental standards across the supply chain, etc.

Sustainable products

The product portfolio of JSC Atomenergoprom (including ROSATOM's portfolio) comprises more than 80 existing and future-oriented high-technology products and services. All of these products are aimed at improving the quality of people's lives and contribute to the achievement of the UN Sustainable Development Goals, each in their own way.

As part of product line development in the industry, special emphasis is placed on environmental and climate performance of products and projects. In this context, ROSATOM's strategic priority is to develop products and implement projects to support an efficient energy transition both in Russia and abroad. In addition to nuclear power technology, the Corporation is also developing other low-carbon products, including wind power generation, hydrogen energy technology, energy storage systems and digital solutions for the electric power industry.

As part of their focus on contributing to the achievement of the UN Sustainable Development Goals and climate action, ROSATOM and JSC Atomenergoprom give priority to increasing the share of 'green' products in their product line. To accomplish this objective, in 2021, the Corporation developed an internal product sustainability certification methodology and conducted a sustainability review of the first group of products in the industry, which involved producing recommendations for improving sustainability[31]. In 2022, product sustainability certification will be continued.

[31] Order of ROSATOM No. 1/1727-P dated 23 December 2021 on Approving the List of Sustainable ('Green') Businesses of ROSATOM and Its Organisations.

ROSATOM'S technologies contribute to the achievement of the 17 UN SDGs

NUCLEAR POWER Affordable and clean energy, economic growth	7, 8, 9, 12, 13, 17
NUCLEAR MEDICINE AND ISOTOPE PRODUCTS Healthcare and improvement of the living standards	3
WATER DESALINATION AND PURIFICATION Access to clean water and sanitation	3, 6
MULTIPURPOSE IRRADIATION CENTRES Eradication of hunger; healthcare and improvement of the living standards	2, 3
RESEARCH REACTORS Industrialisation, innovation, infrastructure development and education	4, 9
WIND POWER 'Green' energy	7, 13
COMPOSITE MATERIALS AND NEW MATERIALS Innovation, responsible consumption and production	9, 12

2.3. MARKETS SERVED BY ATOMENERGOPROM

In 2021, JSC Atomenergoprom ranked:

- First in the world in terms of the number of NPP power units in the portfolio of foreign projects (35 power units)*;
- First on the global uranium enrichment market (38%);
- Second in the world in terms of uranium production (15% of the market);
- Third on the global nuclear fuel market (17%).

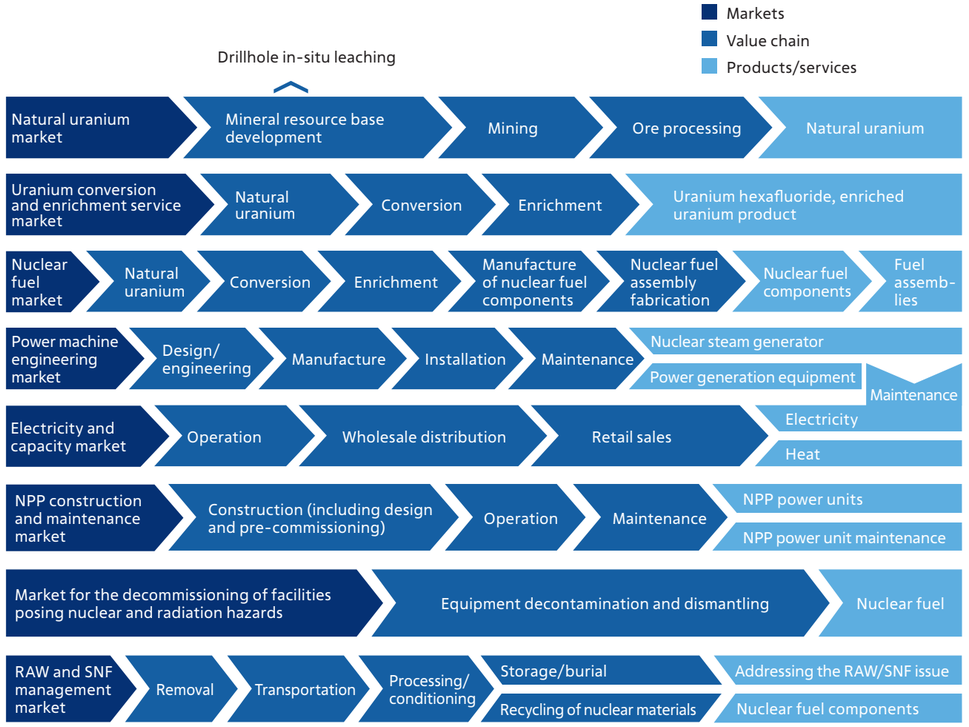
** Including the project portfolio of ROSATOM; not including power unit No. 1 of the Belarusian NPP commissioned in 2021.*

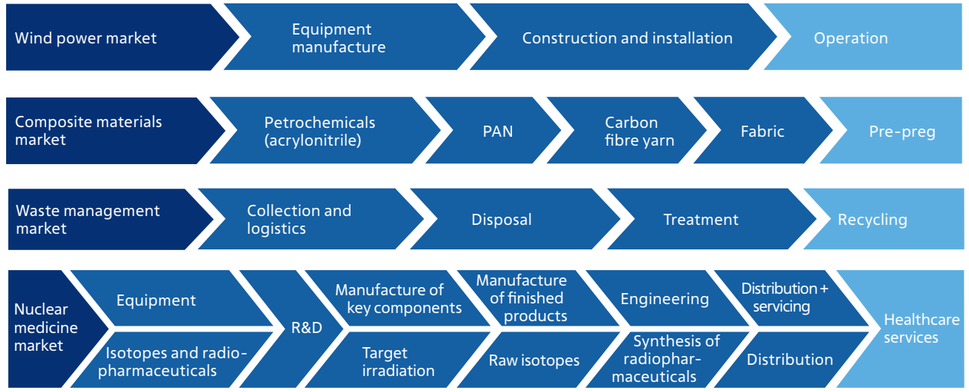
JSC Atomenergoprom's vision is to become a global technological leader. Accordingly, the Company intends not only to develop its business in traditional segments, but also to take active steps towards entering new high-technology markets as a leading research and technology company. Responsibility for the expansion of ROSATOM and JSC Atomenergoprom into new markets lies with the Director for Development and International Business of ROSATOM. GRI 103-1

One of the key priorities of the Company's business is to develop globally competitive products that are able not only to effectively replace imports, but also to become leaders on global markets.

Markets served by Atomenergoprom and value chains

GRI 102-2
GRI 102-6
GRI 102-9





Natural uranium market

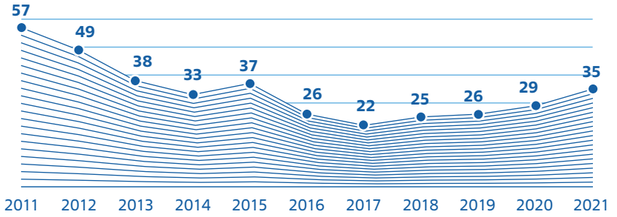
Forecast for changes in uranium demand by 2030

After 2011, there was a significant drop in prices on the nuclear fuel cycle front-end markets, including a long-term decline in quotations for natural uranium. Between 2017 and 2019, a number of key market players reduced uranium production amid an oversupply that was not matched by short-term demand. In 2020, major competitors announced suspension or curtailment of production due to the COVID-19 pandemic, which resulted in a significant decrease in global uranium production and a rise in spot prices.

2021 saw a significant increase in volatility on the uranium market. At the beginning of the year, spot prices declined amid a lack of stable demand, but starting from the end of the first quarter of 2021, prices resumed growth amid buying interest in uranium from financial investors and producers. In the second half of the year, spot prices soared, driven by aggressive uranium buying by the Sprott Physical Uranium Trust (SPUT).

In the reporting year, spot market quotations averaged USD 34.92/lb of U_3O_8, up by 18% year on year.

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



Sources: input data from UxC[32]; average values have been calculated by JSC Atomredmetzoloto

In 2021, global reactor demand for uranium totalled 61,800 tonnes[33]. At the same time, global demand taking into account commercial and strategic stockpiling not intended for current consumption is estimated at 81,800 tonnes[34].

The uranium market fundamentals remain favourable. In the medium and long term, demand for natural uranium is expected to increase due to the commissioning of new power units at NPPs in China, India and other countries. According to the base case forecast of the World Nuclear Association (WNA), global reactor demand for uranium will increase to 68,100 tonnes by 2024 and to 79,200 tonnes by 2030.

Natural uranium market overview

In 2021, global uranium production remained flat year on year and totalled 47,400 tonnes[35] . The lifting of COVID-19 restrictions enabled most competitors, including NAC Kazatomprom, Cameco and Orano, to boost production. China's CNNC and CGN increased uranium production by ramping up mining at the Husab mine in Namibia and acquiring a 49% stake in Mining Company Ortalyk LLP from NAC Kazatomprom in July 2021. At the same time, uranium mining at the Ranger mine in Australia (Rio Tinto) and the Akouta mine in Niger (Orano) ended in 2021 due to the depletion of reserves.

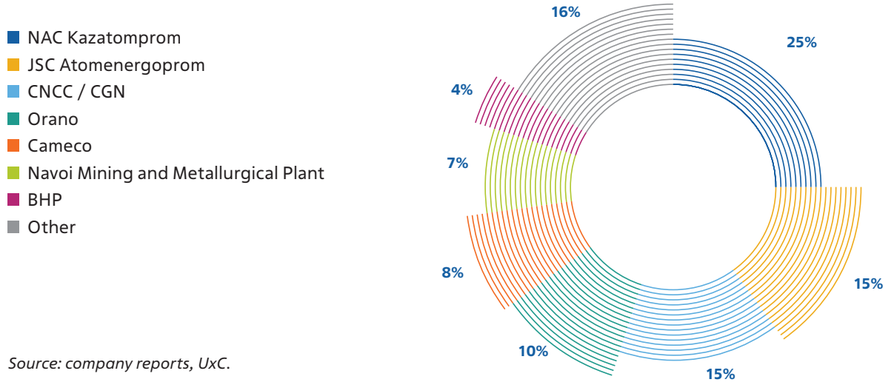
[32] UxC, LLC (UxC) is an independent international company specialising in market analysis, research and forecasting covering the entire nuclear fuel cycle. It was founded in 1994 (https://www.uxc.com/).

[33] UxC UMO Q1 2022

[34] UxC UMO Q1 2022

[35] UxC UMO Q1 2022

Largest players on the natural uranium market in 2021



Source: company reports, UxC.

Supplies from secondary sources (inventories of energy companies and some states, repreparation of depleted uranium hexafluoride, reprocessed uranium, etc.) in 2021 were estimated at 34,000 tonnes of natural uranium equivalent.

A stable group of leaders has emerged on the natural uranium market. The seven largest market players account for 84% of the total uranium output.

According to the UxC forecast, in 2022, global uranium production will total 52,200 tonnes, while supply from secondary sources will total about 25,000 tonnes. Global production of natural uranium is expected to increase by 2030 due to rising demand. Supply from secondary sources will total about 8,000 tonnes of natural uranium equivalent in 2030[36].

Uranium conversion and enrichment market

Products offered on the market include uranium hexafluoride (UF6), uranium conversion services, enriched uranium product (EUP) and uranium enrichment services measured in separative work units (SWU).

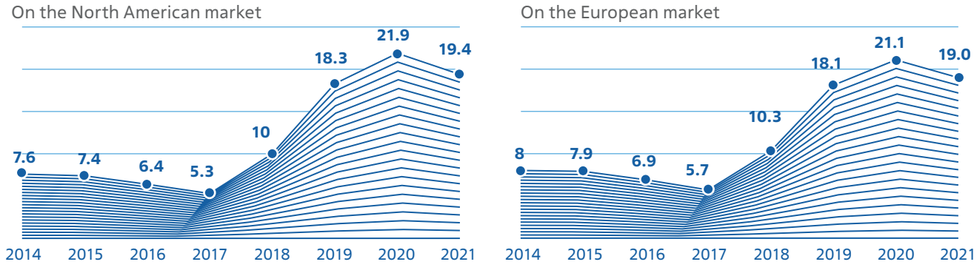
[36] Report by UxC for Q1 2021 (UxC UMO 1Q 2021).

Forecast for changes in demand for uranium conversion services by 2030

According to the base case scenario of the World Nuclear Association, in 2021, global reactor demand for uranium conversion totalled about 59,600 tonnes.

In 2021, average annual spot quotations on the North American and European markets dropped by 11% and 10% respectively, while average annual long-term quotations on both markets increased by 1%. This was caused by announcements about plans to restart a uranium conversion plant in the US, as well as a rise in natural uranium prices, which encouraged the release of additional volumes of feedstock convertible to uranium hexafluoride from secondary sources on the market.

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



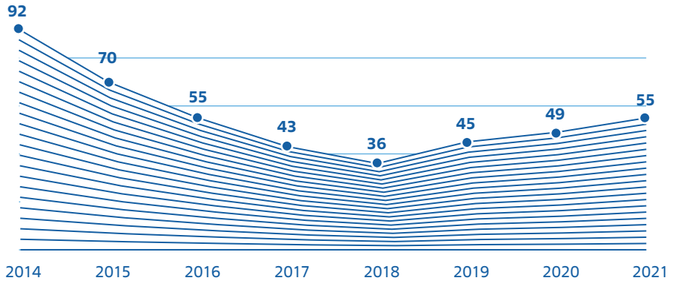
The development of nuclear power generation until 2030 will have a positive impact on the market for uranium conversion services. According to the base case scenario of the World Nuclear Association, global demand for conversion services will grow to 64,000 tonnes by 2024 and 76,000 tonnes by 2030.

Forecast for changes in demand for uranium enrichment services by 2030

According to the World Nuclear Association, in 2021, global reactor demand for enrichment totalled about 49 million SWU[37]. In 2021, average annual spot market quotations rose by 12% amid a decrease in supply from stockpiles, while long-term quotations increased by 14% as energy companies were actively concluding contracts for uranium enrichment services in order to lock in prices under contracts with delivery after 2030.

[37] Report by the World Nuclear Association, 2021 (at a tails assay of 0.22%). ROSATOM estimates this figure at 55 million SWU at a tails assay of 0.18% (which is equivalent to 49 million SWU at a tails assay of 0.22%).

Average annual spot market quotations for enrichment, USD/SWU



The development of nuclear power generation until 2030 will have a positive impact on the market for natural uranium enrichment services. According to the base case scenario of the World Nuclear Association, global demand for enrichment will grow to almost 52 million SWU by 2024 and 63 million SWU by 2030.

Uranium conversion and enrichment market overview

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

The main players on the global market for uranium enrichment services include JSC Atomenergoprom (38% of the global market), URENCO (UK, Germany, Netherlands; 31%), Orano (France; 14%) and Chinese companies (13%). Together, they control more than 90% of the market. At present, all players use modern gas centrifuge technology for uranium enrichment.

Nuclear fuel fabrication market

According to the Company, in 2021, the global nuclear fuel market capacity totalled about 11,000 tonnes of heavy metal (tHM), with fuel for light-water reactors requiring uranium enrichment accounting for approximately 7,000 tHM (including over 1,000 tHM of fuel for water-cooled water-moderated power reactors (VVERs)) and fuel for heavy-water reactors accounting for approximately 3,600 tHM.

As the reactor fleet will be expanding, the demand for fabrication services may increase to 13,000 tHM by 2030.

Major suppliers on the fabrication market include Westinghouse (with a market share of 22%), Framatome (AREVA until 2018, with a market share of 20%), JSC Atomenergoprom (17%) and Global Nuclear Fuel (8%).

In the reporting year, Russian nuclear fuel fully met the demand of Russia, the Czech Republic, Slovakia, Hungary, Bulgaria and Armenia for reactor fuel. The Company also partially met the demand of Ukraine, Finland, India and China for reactor fuel. ROSATOM, in cooperation with Framatome, also supplies fuel and components from reprocessed uranium to Western European NPPs.

Entering new nuclear fuel markets

In 2021, the Company continued to take steps towards entering the market for fuel for Western-design power reactors, and fuel and components for Western-design research reactors.

A separate promising area is the manufacture of fuel for fast neutron reactors. In 2021, fuel assemblies with MOX fuel for the tenth reloading of the BN-800 reactor core were produced and underwent acceptance testing.

The Company continues to implement the Proryv (Breakthrough) Project. It involves building a fuel fabrication/refabrication module, which will produce mixed nitride uranium/plutonium fuel. In 2021, concreting of the foundation slab for the BREST-OD-300 innovative fast neutron reactor was completed; it significantly outperforms slabs used in standard reactors in terms of strength. An engineering design of a fuel element based on uranium-plutonium nitride fuel (MNUP fuel) was developed for the BREST-OD-300 reactor.

For details, see the section ‘Research and Innovations’.

Power machine engineering market

Power machine engineering is one of the most high-technology industries in the world. Power engineering projects are capital-intensive and time-consuming. The key objectives in the power machine engineering market are to improve energy efficiency, reduce the environmental footprint and promote economic growth by commissioning new power generation capacities.

The energy transition has had a significant impact on market players. Most global power machine engineering leaders are exiting the business segment focused on the construction of coal-fired power plants and the manufacture of the relevant equipment; instead, they are refocusing their operations on equipment for other industries. At the same time, there have been structural changes in the strategies and business approaches of global power machine engineering companies. Key competitive advantages of the Mechanical Engineering Division include a combination of safe reference technologies, the ability to provide the package supply of NPP equipment, extensive in-house manufacturing capabilities and the development of new business areas.

In 2021, the Russian power generation equipment market recorded a mixed performance. The turbine equipment segment saw a decline in finished product output, with the production of steam and gas turbines decreasing by 83%[38] and 18% respectively. At the same time, the production of steam generation equipment, including nuclear reactors, surged by 219%. This was driven by the implementation of the DPM-2 programme and projects to build new NPP power units.

The Mechanical Engineering Division of JSC Atomenergoprom maintained its share in terms of revenue on the Russian market at 42%[39]. On the international market, the Mechanical Engineering Division is a major manufacturer and supplier of key equipment for power units under construction. The development of new businesses will enable the Division to further strengthen its foothold both on the Russian market and globally. The Division produces all main equipment for Russian-design VVER reactors; it also participates in designing and producing equipment for research reactors and small-scale nuclear power plants and is expanding its capabilities in order to enter the market for equipment for Western-design reactors. To enable ROSATOM to remain a leader on the Russian power machine engineering market, in addition to its core business, the Division is also expanding its non-nuclear business segments and sets ambitious goals in terms of expanding into new markets.

NPP construction and operation market

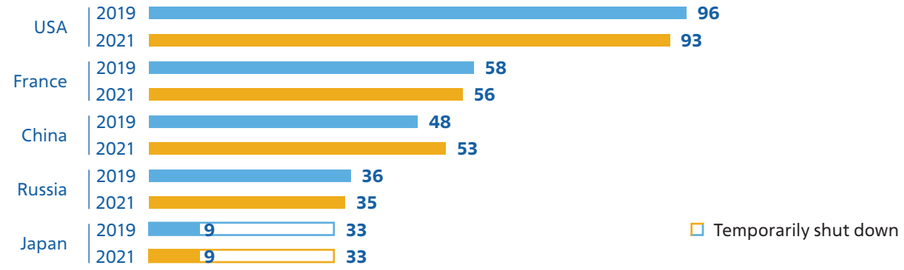
In recent years, key trends in the development of the global electricity market include heightened scrutiny of environmental aspects of the electric power industry and an increase in the share of zero-carbon power generation in the global energy mix. Countries seek to reduce the share of power plants using fossil fuels, such as coal and gas, and to develop renewable energy sources, such as solar and wind power plants, etc. Despite a surge in renewable power generation, the possibility of its stable use in the absence of expensive energy storage systems remains an unresolved issue. As a result, nuclear power generation is currently one of the most reliable, cheapest and most environmentally friendly sources of electricity. The International Energy Agency forecasts that by 2030, the global installed capacity of NPPs will reach 447 GW[40], which reflects steady growth of nuclear power generation.

[38] Preliminary estimate based on data from the Federal State Statistics Service.

[39] Based on estimated revenue of major Russian mechanical engineering companies.

[40] IEA World Energy Outlook 2021 (Stated Policies Scenario.

Leading countries by the number of operating NPP power units[41] in 2019 and 2021



In 2021, the nuclear power industry met more than 10% of global electricity demand. Preliminary data show that in 13 states, more than a quarter of electricity demand is met by nuclear power generation. Countries with the largest share of nuclear power generation include France (69%), Ukraine (55%), Belgium (52%) and Slovakia (52%).

According to preliminary data from the IAEA, as at 31 December 2021, 438 power reactors with a total capacity of 389.5 GW were in operation (including the suspended Japanese reactors). Another 50 reactors were under construction. In 2021, 35 power units of 10 NPPs and two reactor units of the floating thermal nuclear power plant were in operation in Russia, with their installed capacity totalling 29.6 GW. In 2021, JSC Atomenergoprom ranked second among nuclear power generation companies globally in terms of installed NPP capacity, surpassed only by the French EDF. Russia ranks fourth in the world in terms of the number of NPP power units in operation.

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

According to preliminary data from the IAEA, new nuclear power generation capacities connected to the grid globally in 2021 totalled 5.3 GW. At present, demand for NPP construction comes primarily from Asian countries, which is due to rapidly growing electricity consumption in this region. JSC Atomenergoprom is taking active steps to expand its footprint on the overseas market as a leader in terms of the number of NPP construction projects.

[41] Excluding the floating thermal nuclear power plant.

Overseas NPP servicing market

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

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

In the reporting year, the portfolio of power units serviced by the Company comprised 49 Russian-design NPP power units abroad.

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

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

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

In 2021, CJSC Belatomservice, a subsidiary of JSC Rusatom Service in the Republic of Belarus, was incorporated and started to operate. In 2021, it concluded maintenance and equipment supply contracts for the Belarusian NPP and started to carry them out.

JSC Atomenergoprom is also exploring opportunities for diversifying into the Western-design NPP servicing segment by 2030.

For details, see the section 'International Business'.

Market for the decommissioning of facilities posing nuclear and radiation hazards

By the end of 2021, about 200 power units had been shut down in the world. According to JSC Atomenergoprom's estimates, by 2030, the number of shut-down power units will reach 300 (the NPP construction activity peaked in the 1970s and 1980s, and in the 2030s the service life of many units will have reached 60 years). The total market size is estimated at more than USD 200 billion.

A growing number of countries are adopting the 'immediate dismantling' strategy, as its total cost is lower compared to 'deferred dismantling'. For instance, the US, Germany and Sweden are already decommissioning some of their NPPs; some countries (e.g. Belgium and the UK) are also making statements about 'accelerated decommissioning'. Other countries are considering a range of options, including the 'deferred dismantling' of the reactor island, where most radioactive materials are concentrated.

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

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

In 2021, JSC Atomenergoprom represented by JSC TVEL accelerated its efforts aimed at promoting cooperation in the back-end segment among the CIS countries, which involves, among other things, laying additional groundwork for addressing decommissioning tasks in the CIS countries.

See also the section 'International Business'.

[42] According to JSC SO UES.

Electricity and capacity market in the Russian Federation

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

Between 2010 and 2019, electricity consumption in Russia grew at a moderate rate of about 0.6% per year. In 2020, electricity consumption in Russia decreased by 2.3% amid the coronavirus pandemic and totalled 1,050.4 billion kWh[42]. In 2021, the country's economy partially recovered, which resulted in a 5.4% increase in total electricity consumption in Russia to 1,107.1 billion kWh. Electricity output in Russia totalled 1,131.2 billion kWh in 2021, up by 6.3% year on year. Nuclear power plants maintained their role in terms of meeting base load demand, with nuclear power generation reaching a new all-time high of 222.4 billion kWh in 2021. The increase in electricity output from Russian NPPs was driven mainly by the commissioning of a new 1,200 MW power unit No. 2 at Leningrad NPP-2 and the optimisation of the duration of maintenance and repairs. As a result, in the reporting year, JSC Atomenergoprom managed to remain a leader among power generation companies, with the share of nuclear power generation in the total electricity output in Russia amounting to 19.7% (20.3% in 2020; 19.0% in 2019).

JSC Atomenergoprom's key goal remains to ensure safe and reliable operation of nuclear power plants and remain a leader in terms of its share in the country's energy mix.

JSC Atomenergoprom also builds and operates wind power plants in Russia. The portfolio of wind power plants to be built by ROSATOM by the end of 2024 will total 1.2 GW. In 2021, electricity output from ROSATOM's WPPs totalled 1.2 billion kWh.

In addition to NPP and WPP construction and operation, the Company also sells electricity. In the reporting year, JSC Atom Energy Trade continued to operate as the power supplier of last resort in the Kursk, Tver, Smolensk and Murmansk Regions, while LLC REC continued to operate as the power supplier of last resort in the town of Zheleznogorsk (Kursk Region). JSC Atom Energy Trade and LLC REC provide services to 56,800 enterprises and more than 2 million individual consumers in Russia.

In 2021, retail electricity sales by the branches and standalone divisions of JSC Atom Energy Trade and LLC REC totalled 16.0 billion kWh, up by 7% compared to 2020 (14.9 billion kWh).

See also the section 'Power Engineering Division'.

[43] BNEF, Bloomberg, Capacity&Generation.

Wind power market

The global wind power market is actively developing; installed capacity of wind power plants (WPPs) is expected to increase significantly, from 0.83 TW in 2021 to about 1.19 TW and 1.71 TW in 2025 and 2030 respectively[43]. The market is highly competitive and consolidated, with the top five turbine manufacturers accounting for 57% of the total capacity of onshore and offshore WPPs commissioned in 2021[44].

As at May 2021, the capacity of onshore and offshore WPPs commissioned by the top 25 developers totalled about 0.33 TW, or about 45% of total installed capacity worldwide. Offshore WPPs make up about 50% of the pipeline of projects announced by the leading developers, highlighting the fact that offshore wind power generation is gaining traction[45].

Onshore WPPs with a total capacity of 3.4 GW are expected to be commissioned in Russia by the end of 2024 under renewable energy capacity supply agreements on the wholesale market, with the existing competitive selection mechanism to be used with regard to investment projects for the construction of power plants. According to the Corporation's estimates, by 2024, the total installed capacity of onshore WPPs might reach 3.6 GW, with annual turnover totalling about RUB 70 billion.

By the end of 2024, the portfolio of wind power plants to be built by JSC Atomenergoprom will total 1.2 GW, or more than 30% of the Russian wind power market.

See also the sections 'Sustainable Development Management' and 'Business Diversification'.

Composite materials market

According to a study by JEC Group[46], in 2019, the volume of the global market for composite materials and products totalled 11.7 million tonnes (in 2020, the market slumped by 14% to 10.0 million tonnes due to the impact of the COVID-19 pandemic on key end-use sectors: aviation, transportation and construction), with the value of finished composite products totalling USD 86 billion (USD 78 billion in 2020). At the same time, some industries demonstrated strong growth during the period[47]. These included wind power generation (+22.5%) and electronics (+3.5%).

[44] BNEF, Bloomberg, Wind Turbine Market Shares.
[45] IHS Markit, Global Wind Developer Rankings.
[46] JEC OBSERVER, Overview of the Global Composites Market 2019-2024.
[47] In carbon-fibre-reinforced plastics

According to an independent research company INFOMINE Research Group LLC, the Russian market for polymer composite materials (PCMs) has proved to be one of the most resilient to the impacts of the COVID-19 pandemic. In 2020, its volume totalled RUB 73.1 billion (USD 1.0 billion), up by ≥7% compared to 2019 (RUB 68.1 billion). Experts predict that the Russian PCM market will continue to grow and will reach about RUB 80 billion in 2022. This is largely due to the active adoption of PCMs in strategic industries (aerospace, energy, the military industry, etc.).

The global PCM market is expected to expand by 4% per year until 2030, with carbon-fibre-reinforced plastics (CFRPs) as the fastest growing segment with a CAGR of 4-10% in physical terms. In the fibreglass segment, as well as for other PCMs, the annual growth rate will total about 2%.

A further increase in the global use of composite materials is expected due to replacement of conventional materials and expansion of the areas of application. The following five high-technology industries make up about 80% of demand for carbon fibre, with consumption expected to grow exponentially by 2030:

- Wind power generation;
- The aerospace industry;
- The sports goods industry;
- The automotive industry;
- Construction.

Key drivers of development of the global PCM market include the fact that carbon fibre supports key global trends (new energy, fuel efficiency, environmentally friendly vehicles, etc.), development of technologies for the manufacturing and processing of carbon fibre products, a decrease in the cost of carbon fibre and its wider use in mass market products, digital modelling of products, materials and production processes.

Key characteristics of the market include the following:

- Composite fabrics and semi-processed materials account for 75% of demand from manufacturers of finished products;
- The maximum profitability of composite products is achieved in the final processing stages (finished products).

The following companies are the world's largest carbon fibre producers (in terms of production capacity):

- Toray (Japan): ~54,800 tonnes;
- Mitsubishi Chemical (Japan): ~16,000 tonnes;
- Hexcel (US): ~16,000 tonnes;
- Teijin (Japan): ~13,000 tonnes;
- SGL Carbon (Germany): ~13,000 tonnes.

They account for ~70% of the global carbon fibre production capacity.

Alliances and partnerships with manufacturers of finished products, the establishment of implementation centres in the industry, and the development/acquisition of production facilities in target markets are an integral part of the strategy of the leading players on the global PCM market. Between 2017 and 2020, most M&A deals were concentrated in the segment focused on finished products and the relevant production technology.

JSC Atomenergoprom is the key Russian manufacturer of carbon fibre with a production capacity of ~1,200 tonnes.

Successful implementation of the road map for developing the Technology for New Materials and Substances high-technology area (including the Polymer Composite Materials product area) may make an important contribution to the development of the Russian PCM market. Key outcomes of implementation of the road map include the following:

- A new PAN fibre plant with a capacity of up to 5,000 tonnes per year was commissioned on 22 November 2021 in the Alabuga Special Economic Zone (Republic of Tatarstan). As a result, a unique integrated modern CFRP production chain has been established in Russia; it comprises all stages, from crude oil, through PAN, carbon fibre, fabrics and pre-pregs to finished products;
- A high-modulus carbon fibre production line with a capacity of up to 45 tonnes per year has been put into operation;
- Technology has been developed for the production of medium-modulus carbon fibre (5.5 GPa) for application in prioritised sectors of the Russian industry.

See also the section 'Business Diversification'.

Nuclear medicine market

In 2021, the global nuclear medicine market totalled USD 10.2 billion and is expected to exceed USD 33 billion by 2030 (this figure refers to the total value of healthcare services provided globally).

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

The volume of the Russian nuclear medicine market exceeds RUB 106 billion, and the market is expected to grow steadily until 2030 (according to JSC Atomenergoprom's forecasts, the growth rate will total 6-7% per year), despite difficulties with covering the cost of publicly funded health care through compulsory health insurance.

In the coming years, key growth drivers will continue to include the implementation of the Healthcare National Project, nuclear medicine procedures and high-technology healthcare services being prescribed more often, as well as the development of healthcare infrastructure and, more specifically, the construction of nuclear medicine centres

specialising in radionuclide diagnostics and therapy. In a number of Russian regions, steps are being taken or plans have been developed to provide existing healthcare institutions with state-of-the-art nuclear medicine equipment for diagnostics and therapy.

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

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

The global market for isotope products for nuclear medicine is expected to grow from USD 5 billion in 2021 to USD 10 billion in 2030.

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

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

See also the section 'Business Diversification'.

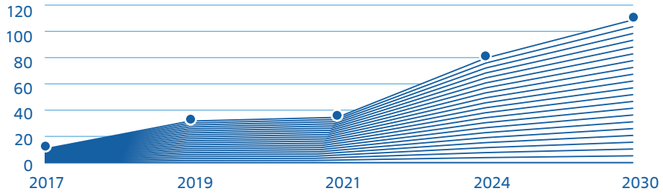
Market for cargo transportation along the Northern Sea Route

GRI 103-1

Mineral extraction, oil and gas production in the Arctic are projected to grow significantly, resulting in an increase in cargo traffic along the Northern Sea Route (NSR) from 34.9 million tonnes in 2021 to 80 million tonnes in 2024 and 110 million tonnes in 2030.

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

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



Waste management market

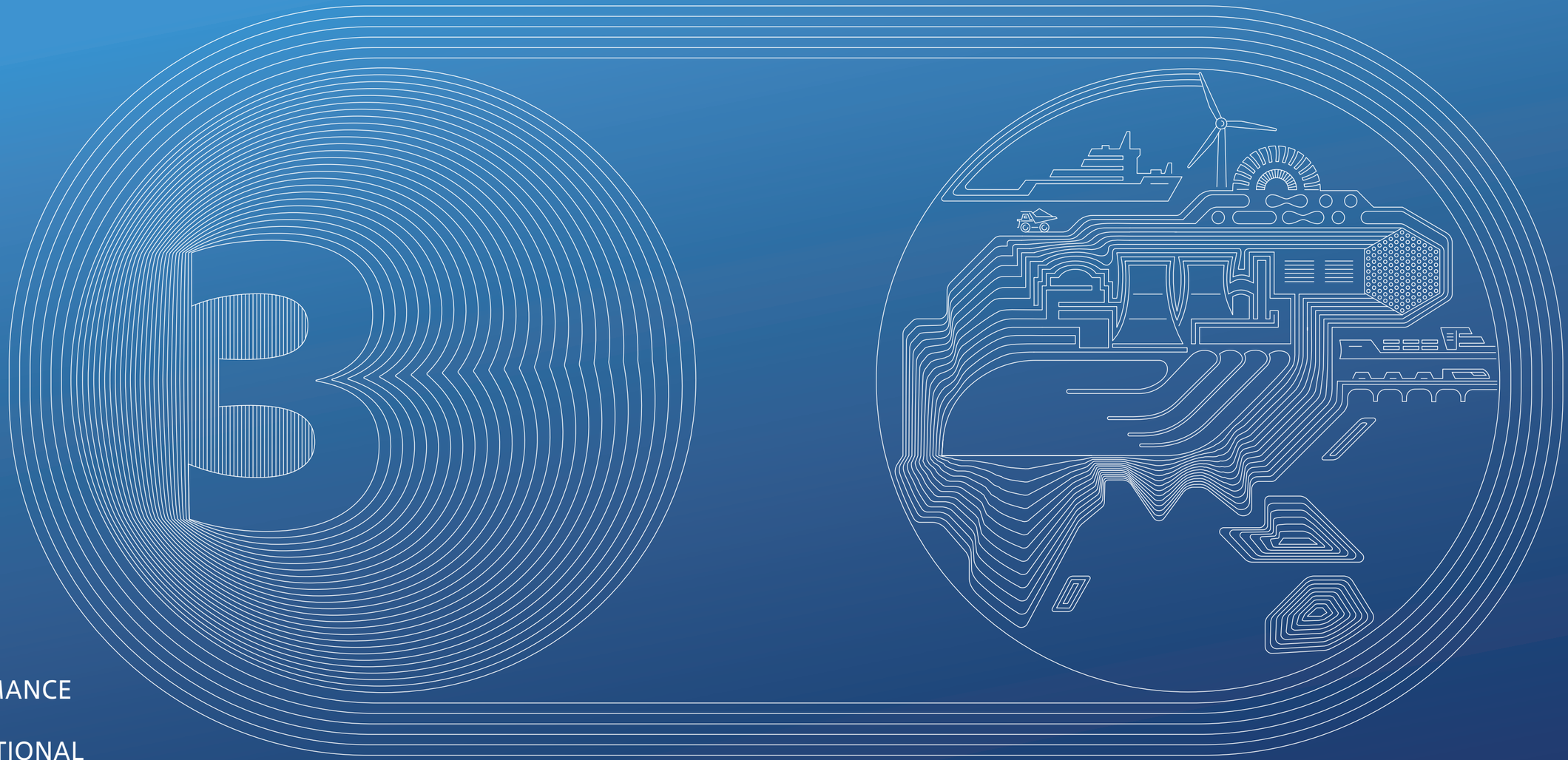
ROSATOM has been authorised to create an integrated system for the management of hazard class 1 and 2 waste in Russia. This initiative has been launched under the Infrastructure for the Management of Hazard Class 1 and 2 Waste Federal Project, which forms part of the Ecology National Project. Hazard class 1 and 2 waste includes 485 types of waste, such as mixtures of inorganic salts, oxides, hydroxides, acids (waste from the metals, manufacturing and mechanical engineering industries), mercury-containing waste (mercury-vapor lamps and mercury thermometers, as well as mercury-containing industrial waste), and waste containing organic components. About 350,000 tonnes of this waste is generated in the country every year; furthermore, experts predict that by 2030, hazard class 1 and 2 generation will reach 413,000 tonnes, or more than RUB 29 billion. At the time of the launch of this programme, only 1.5% of all waste was treated and recycled in an environmentally safe manner by operators that have licences for the relevant operations and the required capacities.

In December of the reporting year, a federal state information system for the tracking of hazard class 1 and 2 waste and monitoring its management became operational. The digital platform of the system will be used by almost 50,000 participants: waste-generating enterprises from different industries, transportation and waste processing companies. It will become a 'one-stop-shop' solution enabling waste tracking and monitoring over its entire life cycle, from waste generation to disposal. It will also help to forecast capacity utilisation and optimise logistics.

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

By 2025, seven modern high-technology facilities will be put into operation. They will treat and recycle 374 types of hazard class 1 and 2 waste (according to codes assigned in accordance with the Federal Waste Classification Catalogue).

For details, see the sections 'Business Diversification' and 'Safe Operation'.



PERFORMANCE
IN THE
INTERNATIONAL
ARENA

3.1. INTERNATIONAL BUSINESS

GRI 102-4

Key results in 2021:

- The 10-year portfolio of overseas orders* totalled USD 139.9 billion (USD 138.3 billion in 2020).
- The portfolio of overseas orders covering the entire life cycle totalled USD 205.4 billion.
- Revenue from overseas orders reached USD 8.98 billion (USD 7.5 billion in 2020).
- The overseas NPP construction project portfolio comprised 35 power units in 12 countries around the world*.
- Projects were underway in more than 50 countries worldwide.

** Including the project portfolio of ROSATOM.*

Promoting JSC Atomenergoprom's technologies on foreign markets

GRI 103-1
GRI 103-2
GRI 102-6
GRI 103-3

JSC Atomenergoprom is actively promoting Russian nuclear technologies for energy and non-energy applications both in countries that are beginning to develop nuclear power and in countries with a well-developed national nuclear power industry (including based on Russian technology).

In addition, the organisations of JSC Atomenergoprom provide support throughout the life cycle of nuclear facilities (including both energy and non-energy facilities) by supplying the global market with the full range of products and services in the front-end and back-end stages of the nuclear fuel cycle (NFC), as well as providing services related to the maintenance and modernisation of such facilities.

The following organisations of JSC Atomenergoprom play a major role in the Company's international activities:

- JSC Rusatom Overseas;
- JSC Rusatom Energy International;
- JSC Rusatom Service;
- JSC TVEL;
- JSC TENEX;
- JSC Rosenergoatom;
- JSC Atomenergomash.

NPP construction abroad

In 2021, the Company's overseas NPP construction project portfolio (taking into account the portfolio of ROSATOM) included 35 power units at different stages of implementation. Russian-design nuclear reactors that are currently under construction fully meet international safety requirements.

NPP, country	Results
Asia	
Rooppur NPP, Bangladesh	The reactor vessel and all four steam generators were moved into final position at power unit No. 1. The reactor vessel and steam generators for power unit No. 2 were manufactured and delivered to the construction site.
Kudankulam NPP, India	Official ceremonies to mark the start of concreting were held at the construction sites of power units No. 5 and No. 6. This reflected the transition to the active phase of construction.
Tianwan NPP, China	The licence for the construction of the nuclear island of power units No. 7 and No. 8 was obtained. A ceremony to mark the start of concreting was held at power unit No. 7. The supporting truss for the reactor pit of power unit No. 7 was delivered.
Xudabao NPP, China	The licence for the construction of the nuclear island of power units No. 3 and No. 4 was obtained. A ceremony to mark the start of concreting was held at power unit No. 3. Long-lead equipment is being manufactured.
Europe	
Paks II NPP, Hungary	Construction of the construction and installation base was underway. The licence for pit excavation up to the -5.000 level at the site of power unit No. 5 was obtained.
Belarusian NPP, Belarus	Power unit No. 1 started commercial operation. Loading of nuclear fuel was started at power unit No. 2, which marked the start of the first criticality procedure at the power unit.
Hanhikivi NPP, Finland	Licensing documents for obtaining the NPP construction licence were prepared and submitted to Fennovoima Oy, the Finnish customer.
Middle East and North Africa	
El Dabaa NPP, Egypt	A full set of documents for obtaining a licence for the construction of power units No. 1 and No. 2 was submitted to the Egyptian regulator for review. Safety analysis documents for power units No. 3 and No. 4 were submitted to the Egyptian customer as part of the licensing process for the construction of power units No. 3 and No. 4.
Akkuyu NPP, Turkey	The licence for the construction of power unit No. 4 was obtained. The reactor vessel was moved into final position at power unit No. 1. At power unit No. 2, the supporting and thrust trusses of the reactor vessel were moved into final position. At the facilities of power unit No. 3, installation of the first layer of the inner containment vessel was completed in the reactor building, and the concreting of the turbine building was completed.

NPP servicing abroad

JSC Atomenergoprom's product portfolio targeted at international markets includes a wide range of services covering the entire NPP life cycle: from assessing and developing key nuclear infrastructure components in customer countries to NPP decommissioning.

A contract for maintenance and repairs of equipment of power unit No. 1 of the Belarusian NPP was concluded and is being carried out.

2021 saw the completion of the project launched in 2015 to comprehensively upgrade the Armenian NPP and extend its service life. During this time, the Company completed a wide scope of work to improve safety, inspect and replace equipment at the NPP. As a result, the capacity of the power unit grew by 15% with nuclear fuel consumption remaining at the same level.

The Company provided support for scheduled preventive maintenance at Kudankulam NPP (India) and Tianwan NPP (China), including remote support.

Over 540 members of operating and maintenance personnel at foreign NPPs underwent training as part of long-term and short-term training programmes in 2021.

Analytical simulators for training centres at Novovoronezh NPP and ROSATOM's Technical Academy in Obninsk were produced and delivered.

Measures were taken to improve nuclear infrastructure in Egypt, Turkey, Bolivia and Bangladesh. The Company continued to develop nuclear infrastructure of the Plurinational State of Bolivia for the Nuclear Research and Technology Centre (NRTC) construction project (this involved preparing documentation for the NRTC operator and providing advisory services).

Export of uranium products and natural uranium enrichment services

JSC TENEX is the Company's main organisation promoting uranium conversion and enrichment services on the global market and supplying enriched uranium for power and research reactors. In 2021, JSC TENEX remained one of the world's leading suppliers of nuclear fuel cycle front-end products.

All contractual obligations under existing contracts in the reporting year were fulfilled by JSC TENEX on time and in full, with uranium products supplied to 49 customers in 17 countries worldwide.

Uranium mining abroad

In 2021, uranium mining enterprises of Uranium One implemented the annual production programme and produced 4,514 tonnes of uranium. A 6% year-on-year increase in production was driven by a significant reduction of the impact of the COVID-19 pandemic on the operations of joint uranium mining ventures in the Republic of Kazakhstan.

Uranium mining by Uranium One enterprises, tonnes

As at 31 December 2021, the mineral resource base of Uranium One enterprises (including a 100% stake in Mantra Resources Pty Limited) under international reporting standards totalled 191,400 tonnes.

As part of its strategy to optimise its portfolio of uranium assets in order to increase the cost efficiency of its operations, in December 2021, Uranium One Investments Inc. completed the sale of all shares in its subsidiary, Uranium One Americas, Inc. (USA), to an American company Uranium Energy Corp.

The Company plans to consolidate its position on the global uranium market, develop its mineral resource base and continuously improve the economics of its natural uranium mining projects.

Nuclear fuel export

The foreign revenue of JSC TVEL, which exports nuclear fuel, exceeded USD 0.7 billion in 2021. The share of JSC Atomenergoprom on the global nuclear fuel fabrication market totalled 17% in 2021.

In the reporting year, Russian-made nuclear fuel fully met the demand for reactor fuel in Armenia, Belarus, Bulgaria, Hungary, Slovakia and the Czech Republic. Nuclear fuel produced in Russia is also used in reactors at nuclear power plants in India, China, Ukraine and Finland. Furthermore, as part of cooperation with Framatome, the Company supplies Russian-made fuel and components from reprocessed uranium to Western European NPPs.

JSC TVEL continued to fulfil its existing contractual obligations in full. In 2021, this included supplying the first batch of nuclear fuel to the customer for the operation of the Belarusian NPP.

A contract for fuel supply for start-up loading and the first reloading of the CFR-600 reactor (China) was signed in 2021. The fuel will be supplied in several batches in 2022 and 2023.

JSC TVEL is consistently developing its production capabilities in order to operate on the global market. This included commissioning a line for the production of fuel for foreign-design reactors (PWRs) at the site of PJSC NCCP. The Company started to supply enriched uranium product to Ulba-FA LLP, a joint Kazakh-Chinese enterprise producing nuclear fuel for reactors of Chinese NPPs.

New products for international markets

Construction of Nuclear Research and Technology Centres, nuclear infrastructure and personnel training

In 2021, construction of a Nuclear Research and Technology Centre (NRTC) continued in Bolivia. On 26 July 2021, concreting was started at stage 4 of the Centre in the presence of the President of the Plurinational State of Bolivia, Luis Alberto Arce Catacora. This marked the start of construction of the research reactor complex. At stage 1 and 2 facilities, all construction, installation and finishing operations were completed. The first radiopharmaceutical production line was launched. An environmental permit was obtained for the construction of stage 3 (a radiobiology and radioecology laboratory).

In December 2021, the Company signed the General Framework Agreement with the Government of the Republic of Serbia on the construction of a Centre for Nuclear Science, Technology and Innovation, as well as the Agreement on the Establishment of a Joint Venture that will implement this project in Serbia. Under the agreements, the first stage of the Centre comprising a Nuclear Medicine Centre with a cyclotron complex and radiopharmaceuticals production facilities will be built in Serbia within the next three years.

In addition, in 2021, the Company continued to implement intergovernmental agreements signed earlier on cooperation in the construction of NRTCs in Rwanda and Vietnam, with a focus on preparing for the development of feasibility studies for these projects.

Foreign customers show strong interest in projects to build nuclear medicine centres and multipurpose irradiation centres, which are widely used in healthcare and agriculture. In 2021, opportunities were discussed for the implementation of such projects in Africa, Asia and Latin America.

Supply of isotope products

After a significant decline in consumption of radioactive isotope products for medical and industrial applications in 2020 due to the pandemic, 2021 saw a gradual restoration of logistics routes suitable for the transportation of radioactive isotopes and a gradual recovery of the medical isotope market. In 2021, the Company managed not only to maintain its foreign revenue from isotope products, but also to achieve a 33% year-on-year increase.

Promoting life cycle back-end services

As part of cooperation with Japan to assist in responding to the Fukushima Daiichi nuclear accident, JSC TENEX completed a two-year project to predict the properties of corium (materials from the damaged reactor core). The resulting data may be used during its extraction, transportation and storage.

Taking into account the Company's references for the decommissioning of facilities posing nuclear and radiation hazards, in June 2021, the CIS Economic Council decided to give JSC TVEL (an industry integrator for the decommissioning of facilities posing nuclear and radiation hazards managed by JSC Atomenergoprom) the status of a basic organisation for SNF and RAW management and decommissioning of facilities posing nuclear and radiation hazards in the CIS countries. Thus, JSC TVEL has become a single point of contact and a single platform for communication with potential customers in the CIS countries.

The Company is promoting the Balanced Nuclear Fuel Cycle, an integrated product for the back end of the nuclear fuel cycle, on the global market. This is an offer incorporating certain elements of a closed nuclear fuel cycle and enabling effective recycling of regenerated nuclear materials and a significant decrease in the volume and radioactivity level of radioactive waste sent for near-surface or medium-depth disposal. This is achieved through SNF processing and high-level waste fractionation.

Hydrogen energy

In 2021, the Company continued to actively develop of a new sector of the economy: Hydrogen Energy. In August 2021, the Government of the Russian Federation approved the Hydrogen Energy Development Concept, which highlights the importance of unlocking the national potential in the field of hydrogen production, use and export,

as well as enabling Russia to become one of the leading countries in this industry. As part of its hydrogen energy development efforts, the Company has plans for all prioritised aspects covered in the national Concept, including both domestically developed technologies and the establishment of international hydrogen supply chains.

In 2021, business relations were established and agreements were reached on the development of cooperation with numerous Japanese and Korean companies in the emerging hydrogen energy market.

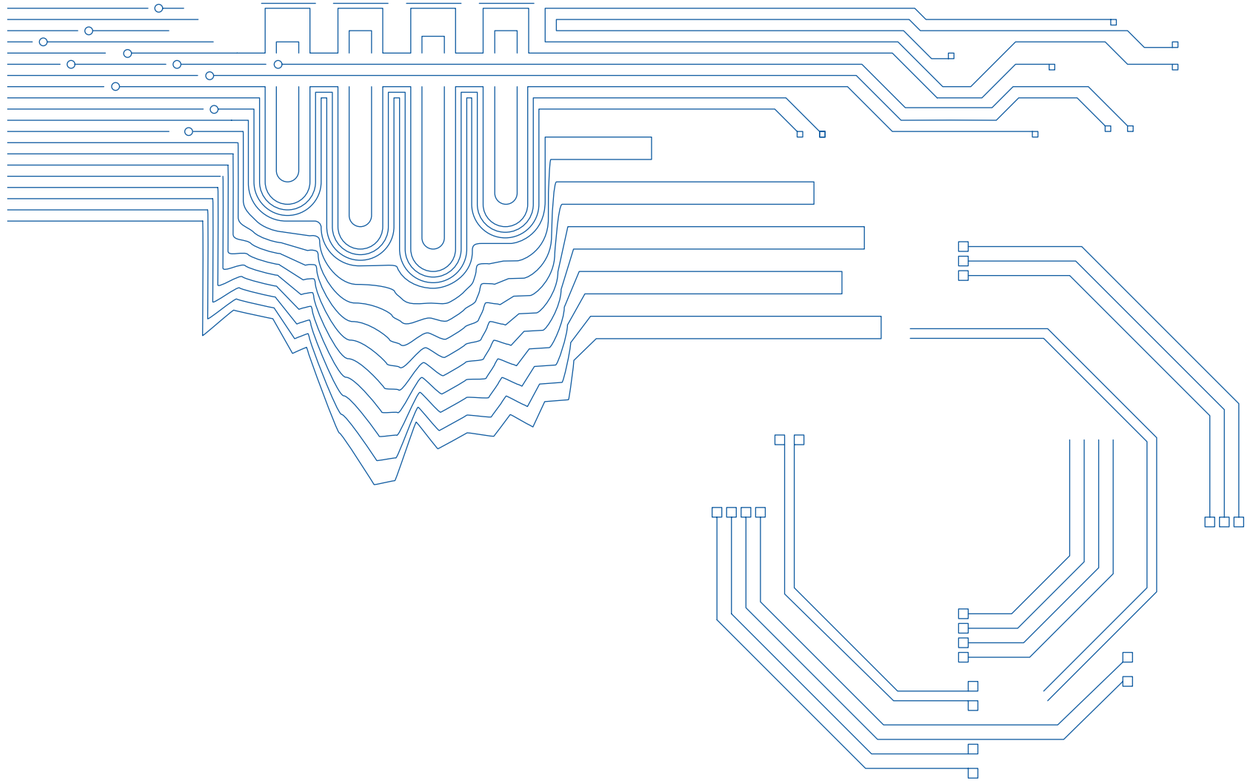
Plans for 2022

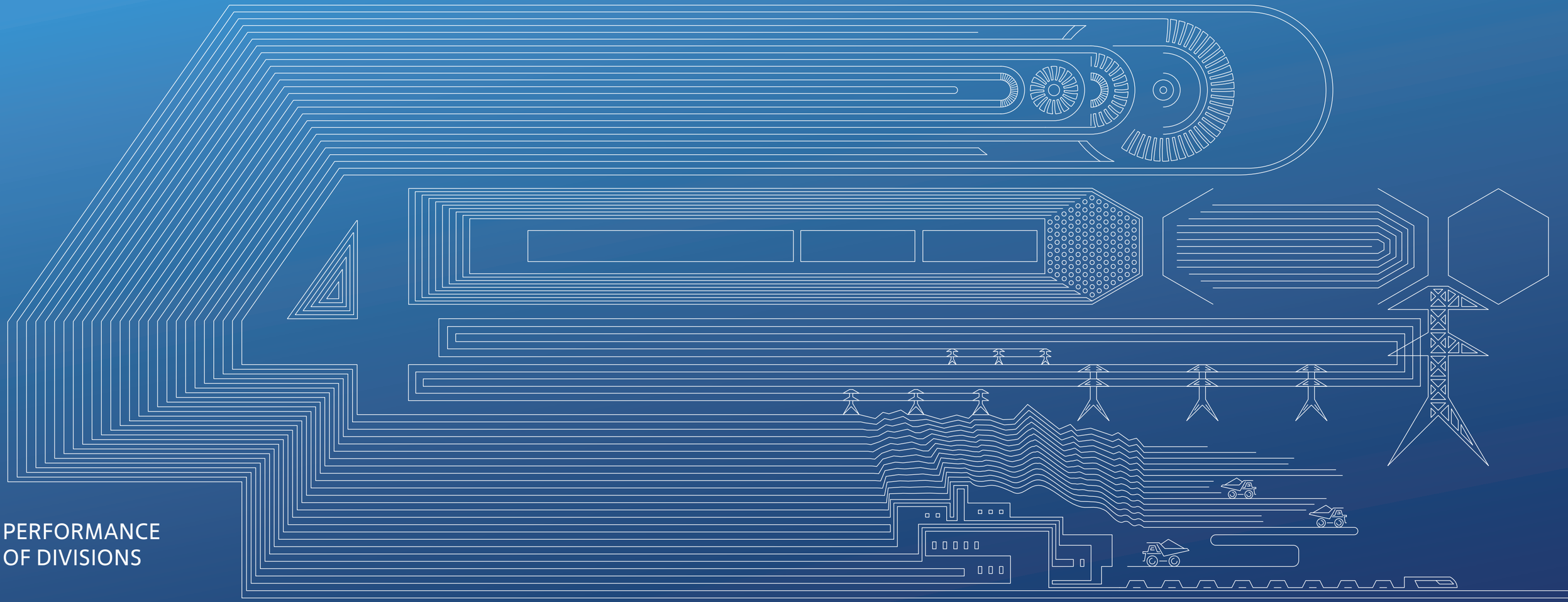
In 2022, the Company plans to launch power unit No. 2 of the Belarusian NPP and to achieve steady progress in the implementation of other ongoing projects. More specifically, as part of the Akkuyu NPP construction project in Turkey, the Company plans to complete the installation of the dome of the inner containment vessel at power unit No. 1 and to move the reactor vessel of power unit No. 2 into final position. Concreting of the foundation of the reactor building will be started at power unit No. 4. At the Rooppur NPP site in Bangladesh, the Company plans to complete the welding of the main circulation pipeline at power unit No. 1 and move the reactor vessel into final position at power unit No. 2 in 2022. In addition, the Company will continue to engage with customers in order to obtain approvals for licensing documentation for the implementation of NPP construction projects in Hungary, Finland, Egypt and China.

As part of the NRTC construction project in Bolivia, the Company plans to commission stage 1 and 2 facilities of the NRTC and to complete construction and installation operations in the radiobiology and radioecology laboratory.

Given that the customers' interest in the energy market is shifting towards flexible solutions (in terms of both the power generation volume and the amount of funding), the most important area in which the Company intends to achieve a major breakthrough in 2022 is the promotion of small nuclear power plants. The relevant efforts will be focused on developing the product line of nuclear energy solutions of JSC Rusatom Energy Projects, a company set up in 2022 to promote them. Many countries in Latin America, Africa, the Middle East, Central and Southeast Asia show strong interest in small nuclear power plants.

The Company plans to consistently diversify its product offer and launch new products on new markets. In 2022, it plans to be more active on foreign markets in the wind power segment and to leverage the capabilities of JSC Atomenergoprom's organisations in this industry. Special emphasis will be placed on the development of projects in the field of nuclear medicine, composite materials and energy storage systems, given the considerable potential of these market segments.





PERFORMANCE OF DIVISIONS

4.1. MINING DIVISION

Key results in 2021:

- JSC Atomredmetzoloto and Uranium One jointly produced 7,100 tonnes of uranium (15% of global uranium production).
- The uranium production plan was 100% completed.
- Mine No. 8 of PJSC PIMCU reached the milestone of one million cubic metres of rock mass.

The Mining Division (hereinafter referred to as the Division; its holding company is JSC Atomredmetzoloto) is one of the largest natural uranium producers in the world.

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

In addition to uranium mining, the Division is actively developing non-uranium businesses, including scandium mining as a by-product (JSC Dalur), brown coal mining (PJSC PIMCU), the design of an integrated production facility at the Pavlovskoye lead and zinc deposit, gold mining projects (JSC Elkon MMP), etc.

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

Operating results

Indicator	2019	2020	2021	Change analysis
Uranium production, tonnes	2,911	2,846	2,635	The decrease was driven by a high level of depletion of existing mines and deposits.
Uranium resources (Russian assets), ‘000 tonnes	512.7	509.4	506.4	No significant changes.
Average headcount, persons	7,166	7,246	7,325	The increase in the headcount was driven by the development of JSC Elkon MMP and the growing headcount at JSC RUSBURMASH.
LTIFR	0.22	0	0.22	–
Taxes, RUB million	6,298	7,586	7,951	No significant changes.
Revenue (RAS), RUB billion	18.8	20.4	23.2	Revenue growth was driven by business diversification, which resulted in a year-on-year increase in non-uranium revenue by one third.

Key operating results

JSC Atomredmetzoloto and Uranium One, which are subsidiaries of JSC Atomenergoprom, jointly produced 7,100 tonnes of uranium in 2021, accounting for 15% of global uranium production. JSC Atomenergoprom is the world’s second largest uranium producer.

The Division’s uranium production plan was 100% completed, with Mine No. 8 operated by PJSC PIMCU reaching the milestone of one million cubic metres of rock mass.

Uranium production in the Division totalled 2,635 tonnes, down 7% year on year. The main driver behind the decrease in production was a high level of depletion of existing mines developed by PJSC PIMCU. PJSC PIMCU continued the construction of its new Mine No. 6: in 2021, it completed the infrastructure programme and launched the construction of surface facilities.

In 2021, JSC Khiagda began preparations for the development of the Kolichkanskoye uranium deposit.

JSC Dalur completed geological exploration of the Dobrovolnoye deposit and launched the construction of a processing facility at a pilot production site using building information modelling (BIM) technology.

The Division leverages digital technologies to develop new mines. At the Istochnoye deposit in Buryatia, processes at all production stages have been digitised and automated to the fullest possible extent. In 2021, experience gained by the Division was leveraged at the Khokhlovskoye deposit in the Kurgan Region.

The Smart Mine project is an innovative smart technology for managing uranium deposits mined through drillhole in-situ leaching. Software systems enable a reliable assessment of mining and geological conditions at mining sites, the modelling of mining options, an accurate performance analysis, and prompt decision-making when reviewing progress and forecasting further development of a deposit, as well as during geological modelling and planning.

In 2021, pilot gold mining operations started at the Severnoye deposit, and the first batch of gold in the form of doré bars was produced.

The Division is implementing a number of ‘green’ technology projects, ranging from in-house manufacture of lithium-ion battery-powered mining equipment to the development of a lithium mining project in Russia.

In 2021, ROSATOM approved the project to mine lithium in Russia. The project is at a feasibility study stage. The Kolmozerskoye deposit (Murmansk Region) has been selected as a prioritised site for the project, which will involve lithium mining and subsequent production of lithium carbonate to meet the needs of manufacturing enterprises that will produce energy storage systems. Given the growing global demand for electric vehicles and green energy, the development of the Russian lithium deposit will be accelerated.

The Mining Division is a centre of responsibility tasked with supplying ROSATOM and the Russian Federation with uranium and other strategic metals which are used in cutting-edge areas of modern economic development, such as additive manufacturing, robotics, energy storage systems, high-temperature and renewable energy, etc.

The Division has achieved impressive results in developing new businesses. Production of coal with a high calorific value (sized coal) at PJSC PIMCU reached a stable level, which enabled an increase in coal sales to new consumers both in Russia and abroad. JSC Dalur continued to ramp up the output of scandium products (scandium oxide and aluminium-scandium alloy) in 2021.

The Mining Division implements a number of projects in the mining and related industries focused on the production of strategic metals, including the provision of services (exploration and drilling, engineering and design, and the construction of engineering facilities and utilities), gold mining, extraction and processing of non-uranium ores and other minerals, rare and rare-earth metals.

It also implements projects aimed at improving the processing depth of the Division's own mineral resources and industrial waste, including scandium, sized coal, and special-purpose technologies and materials, as well as large-scale greenfield projects, such as the Pavlovskoye project, lithium, titanium, phosphogypsum and gold (Severnoye and Sovinoye deposits) projects.

In the Zabaykalsky Territory and the Kurgan Region, projects are being implemented to improve the processing of raw materials produced by the Division. JSC Dalur (Kurgan Region) continues to produce scandium oxide and aluminium-scandium alloy as by-products of drillhole in-situ leaching. PJSC PIMCU (Zabaykalsky Territory) mines brown coal, generates heat and electricity and produces mining equipment.

JSC Elkon MMP implements a gold and silver mining project at the Severnoye deposit and a gold mining project at the Sovinoye deposit. The Division continues to operate in the Novaya Zemlya Archipelago (the Pavlovskoye lead and zinc mining project), in the Tomsk Region (titanium-zirconium sands), etc.

Service companies specialising in drilling, geological exploration (JSC RUSBURMASH), engineering and design (JSC VNIPIPT) also contribute to the growth of the Division's business.

Providing raw materials for strategic initiatives (Rare and Rare Earth Metals product area). In 2021, the President of the Russian Federation approved a law enabling the disposal of radioactive waste from operations that do not involve the use of nuclear energy at existing RAW disposal sites[48].

[48] Federal Law No. 421-FZ of 21 December 2021 on Amendments to Article 28 of the Federal Law on Radioactive Waste Management and on Amendments to Certain Laws of the Russian Federation.

As part of implementing a road map for the development of the Technology for New Materials and Substances high-technology area, as approved by the Government of the Russian Federation, including the production of rare and rare-earth metals, the Division completed the first phase of construction of Tugansk Ore Mining and Processing Enterprise in the Tomsk Region. The enterprise will process ilmenite-zircon sands. JSC Atomredmetzoloto, represented by its subsidiary United Uranium Enterprises LLC, became a shareholder of the enterprise. Its processing capacity will ensure stable, secure and uninterrupted supply of strategically important zirconium and titanium concentrates to meet the needs of the nuclear industry and other customers.

Mobile sorption columns were commissioned to increase the output of high-quality scandium products: the Division produced more than 390 kg of scandium oxide equivalent and sold 565 kg of high-purity scandium oxide and 238 kg of aluminium-scandium alloy. As a result of the launch of the new production facility in Tugansk Ore Mining and Processing Enterprise, 200 new jobs were created in the Tomsk Region and more than 100 jobs in supplier and contractor companies.

In 2021, the Division took the first step towards resuming the production of rare metals in Russia by building Russia's first titanium production plant. Rare metal concentrates will be supplied to Russian industrial enterprises to produce titanium dioxide, ferroalloys, welding electrodes, refractory materials, zirconium metal and ceramics.

A new project being implemented in Voskresensk (Moscow Region) will involve processing man-made phosphogypsum waste and extract individual rare earth compounds. The recycling of phosphogypsum will provide new sources of rare earth metals and will help to address a number of environmental problems related to environmental contamination with harmful pollutants, such as fluorine, phosphorus, strontium, heavy metals, etc. In the future, the project could be scaled up to process phosphogypsum waste accumulated in other Russian regions.

The development of projects to produce rare metals and rare earth elements will boost JSC Atomenergoprom's revenue, as well as tax revenues to the regional and federal budgets. In addition, rare earth metals will be used in the production of permanent magnets for the wind power industry.

Pavlovskoye project. The aim of the project is to build a cost-effective integrated production facility comprising a mine and a processing plant at the Pavlovskoye lead and zinc deposit. GRI 103-2

A Pre-Feasibility Study (PFS) for an updated project concept has been developed; additional engineering studies have been completed on Novaya Zemlya, and Mineral Resources and Ore Reserves Estimates have been prepared in accordance with the JORC Code.

The project will contribute to social and economic development in the Arkhangelsk Region by creating infrastructure facilities and will become an important milestone in the development of the Novaya Zemlya Archipelago and the Northern Sea Route. It will also significantly expand the resource base in the Arctic Zone and help to meet the needs of the Russian Federation.

Development of gold and silver mining at the Severnoye deposit. The aim of the project is to build an ore mining and processing complex at the Severnoye deposit and produce bars of gold and silver alloy, which are a highly liquid product. In 2021, pilot production was launched, and the first batch of gold in the form of doré bars was produced (more than 12 kg). As part of pilot operations, in the reporting year, 100 new jobs were created at the Severnoye deposit and more than 150 jobs in supplier and contractor companies involved in the project. The project will enable the Division to start preparations for the future comprehensive development of the Elkon uranium mining district in the Sakha Republic (Yakutia) and improve the social situation in the region.

Reforestation in the Kurgan Region

In 2021, JSC Dalur carried out a reforestation project in the Kataysky and Shatrovsky Districts of the Kurgan Region and in the vicinity of the Stary Prosvet village near Kurgan.

The project involved planting two-year-old pine seedlings. The company allocated RUB 5.605 million for the planting of forest trees. Environmental benefits include the conservation of plant and animal biodiversity (the restoration of 59.3 hectares of forest and forestry plantations).

Development of gold mining at the Sovinoye deposit. The aim of the project is to build an integrated production facility for the mining and processing of gold-bearing ores. In 2021, a prospecting and evaluation project was developed and reviewed by Rosgeolekspertiza.

Sustainable development projects

Support for social and charity initiatives in Krasnokamensk (Zabaykalsky Territory). The aim of the project is to promote social support and social security for local residents, create social partnership and provide opportunities for the introduction of innovative sustainable development technologies in the regions of operation, and to foster self-employment. In 2021, the Division held the 8th Contest of Charity and Social Projects. Based on the contest results, financial assistance totalling RUB 3.75 million was provided for 36 out of 50 important social projects submitted for the contest. A range of training and development events titled ‘Project Workshop: From Problems to Solutions’ was arranged for social entrepreneurs.

A grant programme titled ‘Krasnokamensk: a Zero Waste Lifestyle’ was launched for the first time to sponsor a delegation of volunteers from Krasnokamensk attending the We Are Together International Forum held in Moscow in December 2021. The delegation presented videos on environmental issues faced by Krasnokamensk, which had been selected through voting on social media.

Local production of self-propelled mining equipment. The aim of the project is to set up and develop production of mining equipment at the repair and mechanical plant of PJSC PIMCU to replace imports. In 2021, the first load-haul-dump machine was shipped to a foreign customer. This marked a new stage in the company’s development: expansion into the international mining equipment market. Today, environmentally friendly battery-powered machinery accounts for 25% of the underground equipment fleet at PJSC PIMCU. Reduced noise and air pollution levels in mine workings help to improve working conditions and reduce the negative impact on employees’ health. Zero carbon dioxide emissions reduce the environmental footprint of both the production cycle and logistics operations.

Plans for 2022

In the medium term, the key priorities of the Division are to further improve uranium mining performance, including through the development of new deposits, and actively develop new businesses.

The construction of Mine No. 6 at PJSC PIMCU remains a priority for the Division. Upon commissioning, the project will make it possible to offset a decline in uranium production due to the depletion of reserves and mothballing of existing mines and will support the long-term operation of PJSC PIMCU. In 2022, the construction of a headframe is scheduled to begin at Mine No. 6.

To maintain production, the Division continues to develop new uranium deposits using in-situ leaching (ISL), which is an environmentally friendly and cost-effective technique:

- JSC Khiagda: start of development of the Dybrynskoye deposit;
- JSC Dalur: completion of construction of pilot site facilities at the Dobrovolnoye deposit.

As part of its new business development strategy, the Division will continue to take active steps to increase the processing depth of raw materials that it produces (scandium oxide production, sized coal mining) and expand its metals portfolio to include gold, rare and rare-earth metals and their compounds. The implementation of new projects in the mining industry and related sectors will drive the growth of the Division’s business and enhance its long-term social and financial sustainability.

4.2. FUEL DIVISION

Key results in 2021:

- In 2021, revenue totalled RUB 235.7 billion, up 13% year on year.
- The technical design of a nuclear fuel element based on mixed plutonium-uranium nitride (MNUP) fuel for the BREST-OD-300 reactor was developed.
- Accident tolerant fuel (ATF) meeting new-generation safety standards started to be used.
- The first batch of REMIX fuel was loaded at Balakovo NPP.
- The first full reloading of the BN-800 reactor core with MOX fuel was carried out at Beloyarsk NPP.

JSC TVEL, the fuel company of ROSATOM (hereinafter also referred to as TVEL Fuel Company or the Company) is a leading player on the global nuclear fuel cycle front-end market and the only supplier of nuclear fuel for Russian NPPs and the nuclear-powered icebreaker fleet.

The Company consolidates the assets of ROSATOM's Fuel Division, which comprises nuclear fuel fabrication, uranium conversion and enrichment, and gas centrifuge production enterprises, as well as research and design organisations.

JSC TVEL's core business is mainly focused on the global market. The Company is the main supplier of fuel for Russian-design VVER reactors abroad and has the necessary capabilities for the fabrication of nuclear fuel for PWR and BWR reactors and its components from reprocessed uranium (in cooperation with Framatome), as well as fuel pellets for BWR and PHWR reactors. TVEL Fuel Company has developed its own in-house design of fuel assemblies (FA) for PWR reactors and markets it as TVS-K fuel. The Fuel Division's enterprises also fabricate nuclear fuel and its components for research reactors of Russian and foreign design around the world.

TVEL Fuel Company supplies the Russian and global markets with a wide range of non-nuclear products and services for a variety of applications, including the metals, chemical and mechanical engineering sectors, additive manufacturing and energy storage. The optimal organisational format for the development of the Company's non-nuclear businesses is the creation of industry integrators.

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

Operating results of the Division

Indicator	2019	2020	2021	Comments
LTIFR	0.02	0.02	0.05	The increase was driven by the growing number of accidents in enterprises managed by the Fuel Company (two accidents in 2021; one accident per year in 2019 and 2020).
Environmental costs, RUB million	3,216.9	1,989.1	2,345.8	The increase in environmental costs was related to the implementation of the production programme by the enterprises. JSC Vladimir Tochmash Production Association (Vladimir) expanded its production programme, which led to an increase in environmental costs. At PJSC Kovrov Mechanical Plant, there was an increase in wastewater treatment and discharge costs. JSC UEIP reported an increase in expenditure on solid RAW transfer for disposal. The increase was also driven by the rising cost of services aimed at improving industrial environmental control systems.
Consolidated revenue, RUB million	194,618.7	208,736.7	235,734.6	Revenue growth was driven by changes in the production programme, currency exchange rates, product prices and tariffs, as well as by changes in the scope of consolidation.
Average headcount, persons	22,111	21,835	21,841	Natural attrition, changes in the Company's scope of business, including the sale of assets and the establishment of new integrator companies.
Tax payments (actual), RUB million	12,976	14,773	13,939[49]	The decrease in tax expenses resulted from changes in the scope of consolidation.

Key operating results in 2021

Core nuclear business and NFC-related R&D activities

Despite the COVID-19 pandemic and related lockdowns, the Division met all the targets of the 2021 production programme and made the scheduled deliveries of nuclear fuel to all Russian and foreign customers.

The construction of an innovative nuclear power unit with a BREST-OD-300 lead-cooled fast neutron reactor was launched at the Siberian Chemical Plant in Seversk. Concreting was started in June; concreting of foundation slabs for

[49] The calculation includes the following taxes and contributions of organisations included in the scope of the Report: income tax paid by both organisations forming part of the consolidated taxpayer group and organisations outside its scope; social insurance contributions; other taxes, levies and payments charged to expenses or to non-current assets (corporate property tax, land tax, state duties, etc.). The amount of VAT payable in 2021 totalled RUB 6.8 billion. In 2021, the Company paid a total of RUB 20.7 billion in taxes (including VAT payable).

the reactor building and the turbine building was completed in November. The new power unit will form part of the Pilot and Demonstration Energy Facility, which will comprise a nuclear power plant and onsite facilities forming part of the closed nuclear fuel cycle. This facility will be unique in the global nuclear industry.

Accident tolerant fuel (ATF) meeting new-generation safety standards started to be used at power unit No. 2 of Rostov NPP. Three combined fuel assemblies, each containing 12 innovative fuel elements, were loaded into the VVER-1000 reactor core.

VVER-1000 fuel assemblies with experimental fuel elements based on uranium/plutonium REMIX fuel were successfully piloted at power unit No. 3 of Balakovo NPP.

The first batch of VVER-1000 fuel assemblies consisting entirely of REMIX fuel rods was loaded into the reactor core at power unit No. 1 of Balakovo NPP.

The first full reloading of the core of the BN-800 fast reactor with uranium/plutonium MOX fuel was carried out at Beloyarsk NPP.

The active phase of construction of the second depleted uranium hexafluoride (DUHF) processing unit, W2-ECP, was launched at the Electrochemical Plant in Zelenogorsk (JSC PA ECP). As a result of the project, the existing Russian DUHF defluorination or deconversion capacity will double.

A new technology for the production of uranium dioxide using the reductive pyrohydrolysis method was implemented at the MSZ Machinery Manufacturing Plant (JSC MSZ) in Elektrostal. A large-scale project to replace obsolescent gas plasma units with modern equipment will help to make the production process much more cost-efficient and environmentally friendly.

In 2021, a new production facility was commissioned at JSC MSZ; it will produce nuclear fuel for Chinese CFR-600 fast reactor.

JSC Chepetsk Mechanical Plant completed a large-scale project to launch zirconium sponge production. The production technology was developed in-house by Russian specialists. Twelve manufacturing process stages were developed from scratch; unique equipment was manufactured, and a new large-scale production facility was built.

A new production facility for the fabrication of TVS-K nuclear fuel for Western-design reactors was commissioned at the Novosibirsk Chemical Concentrates Plant to enable commercial supply of various versions of fuel for NPPs with PWR reactors.

The Uranium Enrichment Centre (JSC UEC) delivered the first batch of enriched uranium product to Kazakhstan for Ulba-FA LLP, a Kazakhstan-China joint venture in Ust-Kamenogorsk specialising in nuclear fuel fabrication for Chinese NPP reactors.

JSC TVEL and the Nuclear Power Corporation of India Limited (NPCIL) signed contract documents for the implementation of a comprehensive engineering project which involves transitioning two operating power units equipped with VVER-1000 reactors at Kudankulam NPP to new TVS-2M fuel and extending the fuel cycle from 12 to 18 months.

New businesses

Chemicals

A pilot unit was launched at the Angarsk Electrolysis Chemical Plant to produce battery-grade materials, which are in demand among domestic and foreign manufacturers of lithium-ion batteries.

Metals industry

In 2021, an industry integrator, LLC Rusatom Metal Tech, was established in the Division.

A joint venture was established to produce Russian high value-added titanium products.

The Company received a directive from the Russian Ministry of Industry and Trade on local production of magnets to be supplied under the contract with Red Wind B.V. in accordance with a decree of the Russian Government.

Superconductors

The European Organisation for Nuclear Research (CERN, Switzerland) successfully completed acceptance tests of Russian niobium-tin superconductors produced under the CERN FCC Conductor Development Programme for the proposed Future Circular Collider (FCC), which will replace the Large Hadron Collider.

The design of superconducting strands and the relevant manufacturing technology were developed at the Bochvar High-Technology Research Institute for Inorganic Materials in Moscow, and a qualification batch of superconducting wires with a total length of 50 km was manufactured at the Chepetsk Mechanical Plant. During the tests, Russian superconductivity technologies demonstrated record performance, and JSC TVEL qualified as a supplier of superconductors for programmes focused on developing high-field accelerator magnets.

Additive manufacturing

Prototypes of 200 W, 400 W, 700 W and 1,000 W lasers were designed and produced for use in 3D printers based on selective laser melting (SLM) technology.

A pilot batch of titanium powder for additive manufacturing was produced.

A demonstration model of an RM 300M printer was put into operation at the Additive Manufacturing Centre run by LLC RusAT in Moscow.

Energy storage systems

LLC RENERA is an integrator company specialising in energy storage systems.

RENERA and the government of the Kaliningrad Region signed a cooperation agreement on the construction of a large plant for the production of energy storage systems based on a Korean technology.

Together with JSC Atom Power Industry Trade, the company put into operation 18 energy storage units at power distribution grid facilities of PJSC Rosseti Centre and PJSC Rosseti Centre and Volga Region. This is Russia's first commercial dispatch system based on lithium-ion batteries for industrial consumers.

Addressing the nuclear legacy

In 2021, the CIS Economic Council made the decision to give JSC TVEL the status of a core organisation for spent nuclear fuel and radioactive waste management and decommissioning of facilities posing nuclear and radiation hazards in the CIS countries. Its activities as the core organisation cover a wide range of areas and give new impetus to the successful implementation of projects in the CIS countries, provide additional opportunities for international cooperation, and promote a consistent and comprehensive approach to harmonising rules and standards for safe decommissioning of nuclear facilities and radioactive waste management.

In 2021, JSC TVEL and FSUE National Operator for Radioactive Waste Management (NO RWM) signed a cooperation agreement on joint implementation of projects related to the decommissioning of facilities posing nuclear and radiation hazards, as well as RAW and SNF management projects. This move is aimed at pooling their existing capabilities in order to offer near-surface RAW disposal services in foreign markets.

At year-end 2021, the portfolio of orders for decommissioning services in Russia and abroad totalled RUB 5.2 billion.

Engineering and design

JSC Central Design and Technological Institute successfully completed a project to develop design documentation for the Siberian Circular Photon Source (SKIF) Shared Research Facility under a government-awarded contract and received a positive opinion from inspection authorities. SKIF is a 'mega science' project; it is a Generation 4+ synchrotron radiation source with an energy of 3 GeV. It will be built in the science town of Koltsovo in the Novosibirsk Region as part of the Science and Universities National Project.

Digitisation

In 2021, the Digital Engineering product was launched, and the first revenue contract with an external customer was concluded.

The GOST R 57700.37–2021 'Computer Models and Modelling. Digital Twins of Products. General Provisions' standard was developed and approved.

AtomBot.Procurement, procurement software developed in 2020, was included in the register of domestic software.

LLC T-COM, a Russian manufacturer of telecommunications equipment, was established and included in the Nuclear Industry Special Goods List (the Special Goods List attached to the Uniform Industry Procurement Standard).

Sustainable development projects

The Siberian Chemical Plant in Seversk launched pilot production of uranium/plutonium REMIX fuel. In future, this will enable NPP operators to use REMIX fuel without any changes to reactor design or additional safety measures. The use of this fuel will considerably increase the availability of feedstock for the nuclear power industry by closing the nuclear fuel cycle and will enable the recycling of irradiated nuclear fuel instead of storing it.

ROSATOM's innovative nuclear fuel projects reached the final of the Technological Breakthrough 2021 Award in the Technological Breakthrough in Nuclear Power and Industry category. The winning projects included accident tolerant fuel (ATF) meeting new-generation safety standards and the uranium/plutonium REMIX fuel for VVER reactors. The award ceremony took place at the Nobel Vision. Open Innovations 2.0 Forum.

The Fuel Division, in cooperation with Beloyarsk NPP, the Pilot and Demonstration Engineering Centre for the Decommissioning of RBMK Reactors and a number of nuclear organisations, established a programme to develop technologies and infrastructure for the management of SNF-contaminated waste, with 25 initiatives scheduled for 2022–2028.

A comprehensive programme for the management of minor actinides until 2030 was developed and approved by nuclear organisations, with detailed cost estimates prepared for 2022–2024. The implementation of the programme will contribute significantly to the development of SNF management technologies and practices.

On 31 August 2021, the first graduates of a joint English-language Master's degree programme run by JSC TVEL, ROSATOM and Lomonosov Moscow State University received their degrees in nuclear decommissioning project management.

The Sirius Presidential Lyceum in Sochi hosted an official ceremony to mark the opening of the Additive Manufacturing Research and Training Laboratory for School Students. The laboratory was established with assistance from Rusatom – Additive Technology, an industry integrator. The company fully equipped engineering classrooms to train future specialists in modelling and prototyping.

Plans for 2022

- To develop a range of electrolysis plants with a capacity ranging from 5 to 40 normal cubic metres per hour (Nm3/h) for hydrogen production;
- To launch an Additive Manufacturing Centre in Novouralsk;
- To produce the first batch of nuclear fuel for the Chinese CFR-600 fast neutron reactor and deliver it to China;
- To complete a number of engineering projects related to developing new nuclear fuel for VVER-440 reactors.

4.3. MECHANICAL ENGINEERING DIVISION

Key results in 2021:

- Mechanical engineering products were delivered to 16 nuclear power plants.
- The Division's share in the Russian power machine engineering industry stood at 42.2%.
- The Division's consolidated revenue reached RUB 106 billion.
- The order portfolio grew to RUB 988 billion.

The Mechanical Engineering Division (hereinafter referred to as the Division; its holding company is JSC Atomenergomash) is one of the leading groups of mechanical engineering enterprises in Russia and the key supplier of main and auxiliary equipment for Russian-design NPPs under construction.

The Division includes engineering and design centres, major power machine engineering enterprises and smelters, as well as research and materials science organisations in Russia, the CIS and the European Union. Enterprises of the Division are located in six regions of the Russian Federation, with another three enterprises located abroad.

The company leverages its expertise acquired over the years in the development and production of equipment for the nuclear power industry and is successfully developing adjacent business areas at an accelerating pace. Atomenergomash offers a range of solutions for the manufacture and supply of equipment for the nuclear and thermal power industries, shipbuilding, the oil and gas industry, and the special steel market. Extensive production and technological capabilities of the Division's enterprises and control over the entire production chain enable the Division to supply its customers with high-quality reliable equipment. Atomenergomash has well-established manufacturing operations, which enables it to effectively participate in NPP construction projects and provide maintenance and upgrade services.

Equipment produced by the Division is used at all Russian-design NPPs. The Division is the chief designer and single-source supplier of all marine reactor units for the *Arktika*, *Sibir* and *Ural* multipurpose nuclear icebreakers with RITM-200 reactors, which are rightly considered the largest and most powerful icebreakers.

The Division manufactures high-performance equipment for the Russian oil and gas industry. In addition, the Division's enterprises have a proven track record in the design and manufacture of equipment for the thermal power industry: the Division has supplied equipment to 40% of CHPPs in Russia and the CIS. As part of the Clean Country Federal Project, the Division has become the main producer of key process equipment for waste-to-energy plants.

Operating results

Indicator	2019	2020	2021	Analysis of changes in operating results
Delivery of mechanical engineering products, number of NPPs	9	19	16	Products are delivered for NPP construction projects and for the maintenance and supply of equipment and spare parts for operating units.
Share in the Russian power machine engineering industry, %	38	42	42.2	The Division's position is further strengthened by the development of new businesses and the high resilience of the nuclear power industry to adverse impacts of the COVID pandemic.
Consolidated revenue, RUB billion	75	83	106	Revenue growth was driven by increased supply of products for NPP construction projects and the development of new non-nuclear businesses.
Order portfolio, RUB billion	756	850	988	Portfolio growth was driven by increased supply of products for NPP construction projects and the development of new non-nuclear businesses.
Average headcount, persons	16,733	17,978	18,455	The increase was driven by increased supply of products for NPP construction projects and the development of new non-nuclear businesses.
LTIFR[50]	0.14	0.07	0.07	–
Taxes paid, RUB billion	8.1	7.6	8.4	The increase in the amount of VAT accrued and paid to the budget was driven by revenue growth in 2021 compared to 2020.
Charity expenditure, RUB million	76	85	93	The change in the amount of charity spending is due to the fact that it is targeted in nature; accordingly, the list of beneficiaries and the list of charitable activities vary from year to year.
Occupational health and safety costs, RUB million	333	535	466.8	The change is due to the frequency of special assessments of working conditions and training in occupational safety and health.

[50] The figure does not include the Division's foreign enterprises.

Key operating results

In the reporting year, the Division delivered mechanical engineering products to 16 NPPs.

At the end of the reporting year, the Division's share in the Russian power machine engineering industry stood at 42.2%.

The Division's consolidated revenue reached RUB 106 billion in 2021, up by 28% year on year. Revenue growth was driven by increased supply of products for NPP construction projects and the development of new non-nuclear businesses.

In 2021, the Division's order portfolio grew to RUB 988 billion.

In the reporting year, the Division delivered a set of pipes for the main coolant pipeline (MCP), reactor coolant pump (RCP) casings, the reactor vessel and four steam generators, the fourth moisture separator-reheater (MSR), the second high-pressure feed heater, a separation tank for the MSR and fuel handling machines to Rooppur NPP (Republic of Bangladesh).

Steam generators, the emergency core cooling system, in-vessel components, RCP casings and MCP pipe spools were delivered to Akkuyu NPP (Turkey).

Deliveries of hull castings and propeller blanks for follow-on multipurpose nuclear icebreaker No. 4 were completed.

A design concept of an LNG carrier with an innovative LNG storage and transportation system based on Type B independent tanks (Project 10070) and draft design specifications for a semi-submersible heavy-lift vessel for the transportation of floating nuclear power units and other items were developed. The design specifications were approved by the Principal Customer and the potential joint contractor.

JSC Efremov Institute of Electrophysical Apparatus (NIIEFA) built and put into operation Europe's first and the world's third test bench for critical LNG equipment. The project was implemented in accordance with instructions from the Russian President on replacing imported critical equipment.

Full sets of process equipment for four waste-to-energy plants in the Moscow Region were delivered under the existing contracts.

Contracts for the supply of equipment for a waste-to-energy plant in Kazan were negotiated.

The development of new businesses is an important strategic focus for the Division. In 2021, the Division's revenue from new businesses totalled RUB 53.6 billion. It is expected to grow steadily until 2030, which will enable the Division to create new jobs and maintain social stability in the towns and cities where it operates. The new business development programme will leverage the existing technological and production capabilities and human resources of the Division's enterprises and will involve building alliances and business partnerships in their regions of operation.

Sustainable development projects

The Division manages its production operations in such a way as to support comprehensive economic, social and environmental development of its enterprises and the regions where they are located.

The Division supports the globally recognised UN initiative and is committed to contributing to the implementation of the global sustainable development agenda. The Division assists the global community in achieving those Sustainable Development Goals (SDGs) that are relevant to its operations by promoting social and economic development in its regions of operation. In addition to contributing to budget revenues on the regional and local level, the Division implements a wide range of social, charitable and environmental programmes. In 2021, it allocated RUB 51.5 million to charity.

The Division pursues a socially oriented policy that meets the immediate needs of local communities in its host towns and cities without jeopardising the interests of future generations.

The Division's enterprises actively participate in initiatives promoting the development of their regions of operation. The Division cooperates with municipal administrations and provides annual assistance to socially important municipal facilities and to local residents. For instance, in the reporting year, the Division's subsidiary planted the Grove of Victory in the Gladyshevsky Nature Reserve (Vyborgsky District of the Leningrad Region) to commemorate the heroic deeds of our people during World War II. The event was a follow-up to the nationwide Forest of Victory campaign.

In 2021, the Division's enterprises held 14 blood donation campaigns, provided humanitarian aid for children from orphanages, organised charity fundraising events and running races, and held sports events to promote a healthy lifestyle.

The Division's priorities in the sphere of environmental protection include emission reduction, recycling and energy conservation. Every year, the Division's enterprises set up battery collection points, organise landscaping and tree-planting campaigns, lectures on ecology, volunteer clean-up days and other events aimed at preserving the environment.

The Division's enterprises are adopting state-of-the-art resource-saving production technologies and implementing environmental measures. The quality and HSE management systems of all enterprises in the Division are annually certified as effective by external auditors, such as TÜV Thüringen, DQS GmbH, IQNet, etc. In 2021, the Division successfully underwent the second surveillance audit confirming the compliance of its quality management system with ISO 9001:2015 and ISO 19443:2018 'Quality Management Systems — Specific requirements for the application of ISO 9001:2015 by organisations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety'. The audit was carried out by the relevant certification body (AFNOR, France).

Plans for 2022

- To ensure the supply of key equipment and perform work under the NPP construction programme;
- To increase revenue from new products and sales in foreign markets;
- To carry out existing contracts and develop cooperation with foreign companies and industrial partners;
- To consolidate the Division's positions in target markets;
- To expand the range of equipment supplied by the Division and its sales footprint.

Thermal power:

- To expand the package supply of equipment for waste-to-energy plants and develop engineering and maintenance competences;
- To expand the portfolio of thermal power engineering orders in Russia as part of waste-to-energy plant construction programmes and negotiate the conditions for further implementation of the programme for the construction of waste-to-energy plants in Russia.

Shipbuilding and the construction of floating power units:

- To finalise a full engineering design of the modernised floating power unit (MFPU) and launch the construction of the flagship MFPU;
- To manufacture and deliver the blanks and the core support plate for the RITM-400 reactor unit.

4.4. POWER ENGINEERING DIVISION

Key results in 2021:

- Electricity output at Russian NPPs reached 222.4 billion kWh (102.2% of the balance target set by the Federal Antimonopoly Service of Russia).
- Power unit No. 2 of Leningrad NPP-2 was commissioned.
- NPPs accounted for 19.7% of Russia's energy mix.
- Performance against the targets of JSC Rosenergoatom's investment programme stood at 105.5%.

The Power Engineering Division (hereinafter referred to as the Division; its holding company is JSC Rosenergoatom) is the only NPP operator in Russia and a major player on the Russian electricity market.

The Division ranks first among major power generating companies in terms of the share in the total electricity output in Russia and is the second largest company globally in terms of installed NPP capacity.

The Division's main business areas include power and heat generation at NPPs and the operation of nuclear facilities (nuclear power plants), radiation sources, and storage facilities for nuclear materials and radioactive substances, in accordance with Russian legislation.

The Division comprises JSC Rosenergoatom (hereinafter referred to as Rosenergoatom) and its branches, including 11 operating nuclear power plants, directorates of NPPs under construction, the Capital Projects Implementation Branch Office, the Technology Branch Office, Pilot and Demonstration Engineering Centres (PDEC) for Decommissioning of VVER and RBMK Reactors and the Akkuyu Engineering Centre, as well as 20 subsidiaries and more than 20 controlled entities, including JSC Atomenergoremont, JSC AtomTechEnergo, JSC VNIIAES, LLC Energoatominvest, JSC CONSYST-OS, JSC Atomdata Centre, JSC CONCERN TITAN-2[51] and other organisations.

[51] A controlled entity for IFRS purposes.

Operating results

Indicator	2019	2020	2021	Analysis of changes in operating results
Nuclear power generation, billion kWh	208.785	215.745	222.437	The increase in electricity generation was mainly driven by a reduced duration of scheduled repairs at NPP power units.
Consolidated revenue, RUB million	546,851	592,702	735,129	Growth was driven by an increase in revenue of JSC Rosenergoatom and its subsidiaries.
Tax expenses, RUB million	67,809	75,953	87,552	The increase was driven by revenue growth.
Average headcount (across the Division), persons	54,411.93	56,951.77	56,815.12	No significant changes.
Charity expenditure, RUB million	865	3,117	2,111	The change was due to the funding of industry-wide expenses from the charity budget in 2020.
LTIFR	0.04	0.03	0.04	The increase compared to 2020 was driven by the inclusion of accidents in Rosenergoatom's branches which occurred and were investigated in 2021 in LTIFR calculation.

Key operating results

As at 31 December 2021, the Division operated 35 nuclear power units at NPPs and a floating thermal nuclear power plant with total installed capacity of 29.6 GW.

On 18 March 2021, power unit No. 2 of Leningrad NPP-2 equipped with a VVER-1200 reactor with installed capacity of 1,188.151 MW was commissioned.

On 19 December 2021, power unit No. 1 of Kursk NPP equipped with an RMBK-1000 reactor with installed capacity of 1,000 MW was shut down for decommissioning.

In 2021, electricity output at NPPs totalled 222.437 billion kWh, or 102.2% of the balance target set by the Federal Antimonopoly Service (FAS) of Russia (217.674 billion kWh) and 103.1% of the actual electricity output in 2020 (215.745 billion kWh).

The NPP capacity factor stood at 83.18% in 2021; the share of nuclear power generation in electricity output in Russia totalled 19.7%[52].

Electricity output exceeded the target set by the FAS of Russia by 4.76 billion kWh mainly because the duration of scheduled repairs at power units was reduced by 216 days.

Sustainable development projects

The Division makes a significant impact on the social and economic well-being of local communities and environmental protection in its regions of operation and the locations of the nuclear power plants, as well as globally.

Enhanced design solutions for the conventional water-cooled water-moderated power reactor (VVER) technology

In the reporting year, the Division was implementing a programme to improve design solutions for the conventional VVER technology (the Programme), in accordance with instructions from ROSATOM. The Programme includes R&D projects in 26 areas focused on enhancing safety features and optimising NPP designs based on VVER reactor technology. The deliverables of these R&D projects are intended to be introduced at both operating and newly built NPP power units equipped with VVER reactors. The Programme is scheduled to be implemented from 2019 through 2024.

The implementation of the Programme is expected to deliver an overall reduction of nuclear power unit construction costs by more than RUB 2.2 billion through the introduction of new technologies and construction solutions and lower equipment costs. Moreover, NPP construction time will be shortened by at least 6.5 months.

Work under the Programme is financed as part of Rosenergoatom's investment programme, with a total of RUB 1.671 billion allocated for the period from 2019 through 2024. The R&D results are already being applied at operating NPPs and in the construction of power units No. 1 and 2 of Kursk NPP-2. They will also be used in the construction of power units at new NPP sites in Russia and abroad.

[52] According to a press release of JSC SO UPS.

Electricity demand management

The Division continues to provide electricity demand management services to businesses. Following competitive tendering for demand-side management services, the Division (JSC Rosenergoatom and JSC Atom Energy Trade) increased its total managed capacity to more than 100 MW by the end of 2021 (a 20-fold year-on-year increase). The demand side management pilot project will continue in 2022, as this is a practical step for Rosenergoatom and its partners demonstrating their commitment to the ESG agenda.

AI-powered robotic firefighting system

As part of R&D activities commissioned by Rosenergoatom, the Division developed a multifunctional robotic firefighting system for NPP turbine islands. The system is unique in Russia; it is designed for preventive monitoring, automated fire detection and fire suppression management without direct human involvement. The use of AI-powered robotic systems has significantly increased the technical and technological firefighting capabilities. In 2021, the prototype system passed acceptance tests at the firefighting training site of Kalinin NPP. An invention application was filed. In the future, the use of robotic systems of this kind could be extended to conventional power plants and enterprises in the oil and gas, space and other industries.

Environmental projects

In 2021, the Division implemented a number of important environmental initiatives:

NPP	Activity	Environmental benefit
Снижение негативного воздействия отходов на окружающую среду		
Kola NPP	Solid radioactive waste (SRW) processing using radioactive waste compactors and shredders, transfer to a specialised organisation for conditioning.	SRW volumes were reduced by a factor of 3.0 or more. SRW processing through shredding helped to reduce the amount of SRW accepted for storage by a factor of 3.2 on average.
Leningrad NPP	Measures to reduce RAW generation at LNPP-2 power units.	SRW generation limits were lowered by 20% to reduce waste generation. Actual SRW generation totalled 81.3% of the annual limit.

NPP	Activity	Environmental benefit
Smolensk NPP	Sorting of municipal solid waste (MSW), paper and cardboard waste.	— Sites for MSW containers were prepared/ concreted; — 12 containers were purchased; — Waste sorting boxes for waste paper and used batteries were purchased and installed.
Reducing the negative impact on water bodies		
Balakovo NPP	Upgrading of fire water mains and the construction site area.	The existing steel pipeline was replaced with polyethylene pipes to minimise water losses and reduce waste generation by extending the service life of the pipeline. Environmental benefits include reduced water losses and reduced waste generation as a result of a longer service life of the pipelines.
Kalinin NPP	Implementation of automated monitoring of petroleum product content in wastewater.	Environmental benefits include preventing the risk of petroleum product content in wastewater exceeding the statutory limit (0.05 mg/l).
Reducing the negative impact on biodiversity and biodiversity conservation (stocking of water bodies with fish)		
Beloyarsk, Kalinin, Novovoronezh, Rostov, Smolensk, Kursk NPPs	Stocking reservoirs and cooling ponds of nuclear power plants with fish.	The stocking of water bodies and NPP cooling ponds with fish is an important environmental measure implemented at NPPs in order to improve the environmental condition of water bodies. Replenishment of aquatic wildlife helps to maintain the balance of fish fauna and replenish fish stocks.

Plans for 2022

The main operational objective of the Division is to maintain electricity output at a level equal to or exceeding the balance target approved by the FAS at 217.87 billion kWh.

Construction of power units No. 1 and 2 of Kursk NPP-2:

— To move the reactor vessel at power unit No. 1 into final position in accordance with the government order.

Digitisation:

— To roll out virtual workstation infrastructure for 5,000 users comprising software and hardware fully developed and produced in Russia;
— To further expand the data centre network, including in the Moscow and North-Western Regions, and develop data centre infrastructure solutions for the Arctic and a number of overseas sites;
— To continue to develop the Digital NPP Operation Template, a single industry-wide digital solution for the efficient operation of nuclear facilities in Russia and abroad.

INNOVATIONS
AND NEW PRODUCTS

5.1. RESEARCH AND INNOVATIONS

Key results in 2021:

- A comprehensive programme titled ‘Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation’ was launched.
- Revenue of the Research Division increased by 11% compared to 2020.
- 155 patents were obtained in more than 35 countries, with 42 new applications filed.
- About 110 Doctors of Sciences and almost 450 Candidates of Sciences are involved in R&D.

GRI 103-1

JSC Atomenergoprom creates breakthrough technologies and innovation infrastructure to facilitate long-term development and meet the energy needs of mankind.

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

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

Twelve companies controlled by JSC Science and Innovations, including JSC SSC RIAR, JSC State Scientific Centre of the Russian Federation – Leypunsky Institute for Physics and Power Engineering (IPPE), JSC RI SPA LUCH, JSC NIIgraphite, JSC SRC RF TRINITI, etc.[53], are directly involved in R&D and innovation activities.

In 2021, the Division significantly expanded its portfolio of international orders and its product line, and improved its financial performance.

Over the past five years, revenue from new products has increased five-fold, accounting for around 40% of total revenue. Overall, revenue was 11% higher than in 2020.

In 2021, companies managed by JSC Science and Innovations carried out 64 research and development (R&D) projects as part of the Consolidated Industry-Wide Plan of R&D Topics, which is 25% more than in 2020.

[53] A full list of organisations is available on the website at http://www.innov-rosatom.ru/network/vertical/nii/.

In addition to technologies to be applied in nuclear power, microelectronics, instrumentation, aerospace and other industries, there is an increased focus on developing nuclear medicine. Radiopharmaceuticals and materials for equipment are being developed to enable timely cancer diagnosis and treatment.

Key research activities of the institutes in 2021 included the following: GRI 103-3

- JSC SSC RIAR developed a new technology to produce MNUP fuel containing minor actinides for fast neutron reactors (including the BREST-OD-300 reactor under construction in Seversk) and produced an experimental batch of fuel pellets;
- JSC IPPE developed a method for accelerated radiation testing of structural materials. The method will make it possible to obtain information on the properties of samples under study faster and will help to ensure the safe operation of nuclear facilities;
- JSC Research Institute of Nuclear Materials (INM) developed a technology for producing carbon matrices with two types of radioisotopes, which have been used to build mock-ups of the most powerful independent power sources to date. Such batteries are needed to power various systems on spacecraft, in microelectronics, instrumentation and household appliances;
- Specialists from JSC RI SPA LUCH participated in a project to produce uranium-zirconium metal fuel and manufacture a pilot batch of fuel elements based on the resulting alloy. These elements are characterised by increased thermal conductivity and energy capacity. They are currently being used in international critical experiments at the Delta test bench; the results of these experiments are important for ensuring the reliable operation of nuclear reactors of various types;
- JSC NIIgraphite developed a technology for producing large-sized high-strength graphite with adjustable properties which potentially can be used in small high-temperature gas-cooled nuclear reactors (HTGRs) and in spacecraft engines;
- JSC SRC RF TRINITI developed an innovative mobile laser unit designed for efficient and safe underwater cutting of large metal structures, such as sunken ships and submerged port structures.

Specialists from the Industry-Wide Competence Centre for Intellectual Property Management at JSC Science and Innovations obtained 155 patents in more than 35 countries and filed 42 new applications. These patents cover primarily technologies related to reactor units equipped with water-cooled water-moderated power reactors (VVERs), fast neutron reactors and small nuclear power plants. In addition, nine patents were obtained and 35 applications were filed in Russia.

A highlight of the year was the launch of a comprehensive programme titled ‘Development of Technical Capabilities, Technology and Scientific Research in the Use of Nuclear Energy in the Russian Federation’ for the period from 2021 through 2024 (CP DTTS). As part of its implementation, institutes forming part of the Research Division develop new technologies and materials and participate in the construction of unique facilities and infrastructure for the nuclear power industry and controlled thermonuclear fusion, as well as small nuclear power plants. GRI 103-2

The phases of the project to build the Multipurpose Fast Neutron Research Reactor (MBIR) scheduled for 2021 have been successfully completed. This work forms part of a federal project to produce state-of-the-art experimental test facilities for the development of technologies for a two-component nuclear power industry based on a closed nuclear fuel cycle. All major construction tasks have been completed ahead of schedule, with some tasks fulfilled a month and a half or two months ahead of schedule. Key events of the reporting year included the installation of monolithic reinforced concrete structures of the reactor unit up to the +13 metre level and the installation of the floor slab at the base of the reactor pit. In addition, a national programme of advanced research at MBIR for the period from 2028 through 2040 has been approved and will inform the discussions on a future international programme of experimental research. MBIR will be the most powerful among research reactors currently in operation and under construction in the world; it will provide the nuclear industry with technologically advanced state-of-art research infrastructure for the rest of the century.

A large number of R&D activities are centred around basic research on thermonuclear fusion and plasma physics (as part of a federal project focused on fusion and plasma technologies) and the development of the relevant facilities. Examples include the T-11M tokamak in Troitsk, where in 2021 the emitter system was successfully reloaded with lithium externally without disturbing the vacuum in its working chamber. The new technology will be used in the T-15MD tokamak recently built at NRC Kurchatov Institute, which is an important part of the international thermonuclear ITER project.

In October 2021, JSC SRC RF TRINITI received a positive opinion of the State Expert Review Panel on the design documentation for experimental test facilities. After the completion of construction, the institute will be able to test plasma propulsion engines and a powerful neutron source, as well as materials for advanced fusion reactors.

Key projects focused on developing new materials and technologies include R&D conducted by JSC SRC RF TRINITI, JSC NIIgraphite and JSC RI SPA LUCH. For instance, last year, JSC SRC RF TRINITI developed six versions of flameless hydrogen oxidation catalysts which are more than ten times more cost-effective than existing ones. After all tests are completed, the Russian industry will have a unique, globally competitive energy product.

Specialists from JSC NIIgraphite created new carbon materials with increased corrosion resistance. Their potential applications include spent fuel reprocessing modules for molten-salt reactors, where this is one of the key requirements for further development of the technology.

In 2021, JSC RI SPA LUCH completed the development of a three-axis laser scanner for Russian 3D metal printers, which is unique in the world. This is a key component that will improve the quality of products produced using additive manufacturing methods.

In 2021, the total value of foreign contracts concluded by the Division's enterprises reached RUB 3 billion, which is 2.3 times higher than in 2020. Foreign revenue for the year rose by 31%, and the portfolio of overseas orders grew by 84%.

Key achievements in 2021 included the completion by specialists of JSC RI SPA LUCH of a ten-year project to convert the IVG.1M research reactor in Kazakhstan to low-enriched nuclear fuel. Previously, the reactor had used highly enriched uranium (HEU). After a series of unique studies, new technologies have been developed that do not involve the use of sensitive nuclear materials, and the technical and economic feasibility of the conversion has been confirmed. The results of the project, which is aimed at improving safety, can be applied to other HEU-fuelled research reactors abroad.

Another major international project started in 2021. Together with partners from Japan and the EU, the Research Institute of Nuclear Materials (INM) is conducting reactor tests of functional materials for the future European DEMO fusion reactor. This research will identify the materials that will form the basis of the world's first experimental fusion power plant.

In 2021, studies began on the use of plutonium recovered from spent MOX fuel in fast neutron reactors. This is the first project of its kind. In addition to the Research Division, several organisations of ROSATOM and French partners are involved in the project. The successful implementation of the project will contribute to the development of a two-component nuclear power industry and a cheaper and more sustainable nuclear fuel cycle.

About 110 Doctors of Sciences and almost 450 Candidates of Sciences are involved in all R&D activities at JSC Science and Innovations. No other Russian institution has such a high concentration of scientists.

Plans for 2022

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

5.2. BUSINESS DIVERSIFICATION

GRI 102-2

GRI 102-6

Key results in 2021*:

- Revenue from new products outside the scope of the nuclear industry totalled RUB 329.6 billion, which is 18% higher than the target for 2021 (RUB 280 billion) and 26% more than in 2020 (RUB 261.7 billion).
- The 10-year portfolio of orders for new products outside the scope of the nuclear industry reached RUB 1,974.07 billion.

** Including the portfolio of ROSATOM.*

GRI 103-1

One of JSC Atomenergoprom's strategic goals is to develop new products for the Russian and international markets. The relevant operations provide new opportunities for developing healthcare and municipal infrastructure, improving environmental safety and making progress in other key areas relevant to sustainable development.

New business areas have been formed taking into account the maximum number of overlaps with existing technical, technological and research competences, including the research and production capabilities of the Company's enterprises. Responsibility for new business development has been assigned to the Development and International Business Unit of ROSATOM.

GRI 103-2

In accordance with the Company's business strategy, it is intended that new products will make up 40% of the total revenue by 2030. The system for managing new businesses at the Company level is focused on the development of strategic programmes. At the moment, there are 15 such programmes (Wind Power, Products and Services for the Oil and Gas Industry, Industrial and Consumer Waste Management, the Programme to Launch the Production of Composite Materials in the AM&T Division, Development of the Nuclear Medicine and Technology Product Line, Energy Storage Systems Based on Electrochemical Cells, Additive Manufacturing, Digital Products, the Smart City, an International Logistics Operator, APCS and Electrical Engineering, Development of the Lithium Business, Renewable Energy (Foreign Markets), Hydrogen Energy, and Gold Mining).

At the same time, the Company is actively searching for areas that could become strategically important in the near future.

Results in 2021

In the reporting year, revenue from new products totalled RUB 329.6 billion, with the target set at RUB 280 billion.

GRI 103-3

The 10-year order portfolio outside the scope of the industry reached RUB 1,974.07 billion, which is 23% higher than the target set for 2021 and the figure for 2020 (RUB 1,602.1 billion).

In 2021, the largest contributors to the order portfolio included Sales and Trading (16.6%), Wind Power (13.3%), the Mechanical Engineering Division (12.0%), and Automated Process Control Systems (APCS) and Electrical Engineering (12.0%).

Revenue from new products and 10-year portfolio of orders for new products, RUB billion

Wind power

GRI 102-6

JSC Atomenergoprom is actively developing the Russian wind power market. In the reporting year, the Company commissioned five new WPPs with a total capacity of 570 MW in Russia: the Kochubeyevskaya WPP (210 MW), the Marchenkovskaya WPP (120 MW), the Karmalinovskaya WPP (60 MW), the Bondarevskaya WPP (120 MW) and the Medvezhenskaya WPP (60 MW).

ROSATOM's WPP project portfolio increased by 460 MW (with commissioning scheduled for 2025–2027) to 1.7 GW.

In 2022, the Company plans to commission three more WPPs: the Kuzminskaya WPP (160 MW), the Trunovskaya WPP (60 MW) and the Berestovskaya WPP (60 MW).

Hydrogen energy

As part of a project to build an export-oriented hydrogen production plant on Sakhalin Island, the Company carried out a feasibility study jointly with a technology partner in 4Q 2021. Key project parameters are as follows:

- Construction of a hydrogen production plant based on steam methane reforming technology on Sakhalin Island; the plant will be equipped with a CO_2 capture system that will enable subsequent CO_2 utilisation (commercialisation);
- Hydrogen production method: steam methane reforming;
- Storage and transportation method: liquefied hydrogen.

The Company continues to implement the project to launch a hydrogen-powered train on Sakhalin Island.

Environmental protection

As a key participant in the Ecology National Project, ROSATOM is implementing two major initiatives involving the organisations of JSC Atomenergoprom[54]:

- The development of an integrated system for hazard class 1 and 2 waste management (ROSATOM is responsible for a separate federal project focused on creating a management system for hazard class 1 and 2 chemical waste). In accordance with the federal project, ROSATOM has an important task of creating a transparent market for industrial waste management in the country. In December 2021, market participants began to be connected to the federal state information system for class 1 and 2 waste management. The information system was run in test mode until March 2022 in order to connect all participants and enter the necessary information; afterwards, the information system became fully operational;
- Implementation of projects aimed at repairing historical environmental damage (by 'non-nuclear' enterprises):
  1. The project to reclaim the Chelyabinsk municipal landfill, which is the country's largest household waste landfill, was completed ahead of schedule. The reclamation process involved applying world-class state-of-the-art technology. The project helped to improve the quality of life for more than 1 million people. Harmful emissions into the atmosphere in the city were reduced by 30%, and discharges of harmful leachate into the Miass River ceased completely. The 74-hectare area is now completely safe.
  2. The clean-up of the Krasny Bor toxic industrial waste landfill in the Leningrad Region is in progress.
  3. The Company is implementing a project to enhance environmental safety in the town of Usolye-Sibirskoye in the Irkutsk Region. In 2021, a number of key activities were completed as planned, including the following:
     - Decommissioning of 12 brine wells;
     - Containment of an oil lens;
     - Dismantling of a mercury cell electrolysis workshop;
     - Preparation of the bulk of soil and building structures remaining after the dismantling of the mercury cell electrolysis workshop for further mercury remediation at the Vostok Environmental Technology Park.
  4. ROSATOM, with assistance from enterprises of JSC Atomenergoprom, is working to repair historical environmental damage as part of a related federal project titled 'Preservation of Lake Baikal'. A waste disposal project has been developed for the Baykalsk Pulp and Paper Mill (BPPM). In 2021, a set of top-priority measures was implemented to prevent emergency situations at the BPPM (lowering the water level above the sludge layer; mudflow prevention measures, such as the clearing of river beds and riverbank stabilisation).

Thus, ROSATOM and JSC Atomenergoprom leverage their considerable experience to introduce high standards of environmental responsibility throughout the country as part of the Ecology National Project. This systematic approach will help to prevent accumulation of environmental damage in the future.

Nuclear medicine

In the reporting year, the Company (via JSC Isotope Regional Alliance) provided steady supply of medical radioisotope products manufactured by JSC Karpov Institute of Physical Chemistry and JSC National Technical Physics and Automation Research Institute (NIITFA) to healthcare facilities across Russia. The Company supplies medical and industrial isotope products to more than 55 countries worldwide.

In 2021, the Company developed and produced a prototype of the ONYX radiation therapy facility (JSC NIITFA), conducted technical and qualification tests and commissioned a mass production site; Intellectual property obtained during the development of the radiation therapy facility (17 certificates and patents) was registered and entered in the register. This work form part of a project to create a radiation therapy facility based on a 6 MeV linear electron accelerator that will replace imported solutions and to develop the core of a competitive high-technology nuclear medicine industry based on radiation technology in the Russian Federation.

The Brachium gamma radiation therapy facility for brachytherapy was successfully registered[55]. Brachium is designed for cancer treatment using the contact radiation method. The device uses advanced high-dose brachytherapy technology, which enables treatment involving high-precision insertion of radiation sources. Mass production of Brachium

[54] JSC Rusatom Greenway is a participant in the Federal Project titled 'Infrastructure for Hazard Class 1 and 2 Waste Management', which forms part of the Ecology National Project.

[55] Registration certificate No. RZN 2021/16149 dated 24 December 2021 issued by the Federal Service for Surveillance in Healthcare (Roszdravnadzor).

facilities has been launched. A contract was concluded for the supply of eight pieces of equipment, and four sets of equipment were manufactured.

Design and construction documents for the construction of two radionuclide therapy centres in the cities of Lipetsk and Ufa were submitted to inspection authorities.

These achievements help to accomplish the objectives of the federal project titled ‘Combating Cancer’, which forms part of the Healthcare National Project; they will be in demand in cancer treatment using state-of-the-art domestically produced equipment.

New materials

In 2021, JSC CMP launched the production of zirconium sponge, a material for making nuclear fuel cladding with the minimum level of hafnium impurities. Zirconium sponge is used in the production of fuel for both Russian-design and foreign-design power reactors. Zirconium sponge is widely used in the production of fuel for all major types of power reactors (both Russian- and foreign-design).

In 2021, the Company launched industrial production of domestically manufactured PAN precursor at a site in the Alabuga Special Economic Zone and contributed to the establishment of an integrated production chain in Russia covering all stages, from PAN fibre to carbon fibre, fabrics and prepregs.

In 2021, as part of a project titled to upgrade the capacities of JSC Prepreg – Advanced Composite Materials (JSC Prepreg-ACM) and LLC Argon for successful qualification of fabrics and prepregs by key customers, the Company built a laboratory unit, purchased laboratory furniture, acquired laboratory equipment (a gel timer, a thermal analysis facility, an automated titration system, an automated extractor, a water purification system for a chromatograph, etc.) and put it into operation.

In the field of polymer composite materials, as part of import substitution in key industries of the Russian Federation, the Company tested industrial technology for producing PAN precursors for the production of carbon fibres. Samples of carbon fibres of all types planned for production were obtained.

As part of an R&D project titled ‘Development and Testing of Aircraft Interior Materials’, a non-combustible binder and prepregs based on it were created in order to develop polymer composite materials that will replace imported aircraft interior materials in the future.

A competence centre named ‘Sirius. Composite Technology’ was opened at the Sirius Presidential Lyceum in Sochi.

The Company assisted in the conclusion of contracts for the accelerated development of composite materials for the needs of strategic industries of the Russian Federation. In 2022, the Company will accelerate its efforts to accomplish a crucial task of import substitution for strategic consumers in Russia.

Additive manufacturing

The Association for Additive Technology Development in Russia was established; it is a competence centre in the sphere of additive manufacturing.

A research and training laboratory specialising in additive manufacturing was opened at the Sirius Presidential Lyceum in Sochi. It was established by JSC Atomenergoprom; the laboratory uses domestically produced 3D printers.

The Russian Ministry of Education and Science and the Russian Academy of Sciences adopted a resolution on the development of a comprehensive R&D programme titled ‘Additive Manufacturing’, which will cover the entire innovation cycle. Support was provided for the development of the programme; its approval is pending. Approval of the programme by the Government of the Russian Federation is scheduled for 2022.

As part of its efforts focused on technological tasks, in 2021, the Company produced a pilot batch of titanium powder using plasma atomisation and centrifugal atomisation methods, developed a pilot version of the Virtual Printer software for 3D modelling, preparing printing tasks and modelling the additive manufacturing process, commissioned a demonstration model of an RM-300M printer with a 300x300 mm working area at the Industrial Additive Manufacturing Centre, and commissioned MeltMaster 3D – 250M printers designed for printing implants made from titanium-based alloys. Printing technology was developed, and large-size (over 600 mm) items were produced from a heat-resistant nickel alloy using selective laser melting technology and domestically produced equipment. Prototypes of a standardised series of 200-1,000 W single-mode ytterbium fibre lasers for additive manufacturing equipment and for use in mass production of domestically designed additive manufacturing equipment were produced and tested; they were assigned the O1 designation.

The annual Leader Forum titled ‘Additive Manufacturing Technologies: Expanding the Horizons’ was held in December; it was attended by more than 1,000 professional participants. A Strategy for the Development of Additive Manufacturing Technologies in the Russian Federation until 2030 was developed jointly with the Ministry of Industry and Trade of the Russian Federation (Order No. 1913-r of the Government of the Russian Federation dated 14 July 2021).

A regulatory framework for additive manufacturing is being developed, with 37 national standards approved to date, including 20 standards developed by organisations of ROSATOM and JSC Atomenergoprom. ROSATOM is currently a leader in terms of the number of additive manufacturing standards being developed.

The development of a prototype of a direct laser metal deposition machine (a DMD 3D printer) is scheduled to be completed in 2022.

Digital technology

ROSATOM, with assistance from organisations of JSC Atomenergoprom, continues to implement the road map for developing the Quantum Computing high-technology area (development of prototypes of quantum processors) and, as a joint contractor, the road map for developing the New Production Technologies high-technology area.

In 2021, as part of the implementation of the Quantum Computing road map, the operation of a prototype of a four-qubit trapped ion quantum processor and the performance of two-qubit operations on it using qudits (multilevel storage media) was demonstrated.

As part of efforts to develop mathematical modelling systems, the Logos product was recognised at the federal level as a ‘National CAE System’.

Plans for 2022 include updating some digital products, including the Logos product line, and releasing a version of the product ‘Productisation of a Standardised Personnel Management System’ that does not rely on imported technology.

Modernised floating power units (MFPUs)

As part of the development of small NPPs, ROSATOM, jointly with enterprises of JSC Atomenergoprom, is implementing a project to supply power to the Baimsky Mining and Processing Plant (Baimsky GOK) planned for construction at the Peschanka gold-copper-molybdenum deposit (Chukotka Autonomous District); this will involve docking three main MFPUs with a total installed capacity of 318 MW and one standby MFPU to replace the main ones during repairs and fuel reloading in the port of Nagloynyn (Chukotka Autonomous District).

On 23 July 2021, ROSATOM and LLC GDK Baimskaya signed an agreement to jointly implement the project to supply power to Baimsky GOK.

Equipment for the oil, gas and petrochemical industry

In 2021, pilot tests of a cryogenic electric pump for pumping liquefied natural gas (LNG) designed and produced by JSC Atomenergoprom’s enterprises (JSC Afrikantov OKBM, JSC NIIEFA) were completed. This is the first high-voltage large-capacity liquefied natural gas (LNG) pump in the history of the Russian gas and petrochemical industry to be independently designed and manufactured by a domestic manufacturer. The electric pump is used to load liquefied natural gas onto LNG carriers.

In addition, the construction of Europe’s first test bench for medium- and large-scale LNG plant equipment was completed in 2021. The facility was built on the NIIEFA site in Saint Petersburg, and the commissioning permit was obtained. The test bench is intended to be used for certification testing of both Russian equipment and foreign LNG equipment imported to the Russian Federation. The test bench can be used to test pumps, turboexpanders and compressors. If required, the test bench can be adapted for testing other equipment. The existence of a test bench of this kind in Russia will reduce dependence on imported equipment and will contribute to the development of a new sector of Russian industry.

Smart City

The Company continued its active cooperation with the regions on the introduction of digital products forming part of this business area. This included the ongoing implementation of the Smart City digital platform in the regions where enterprises of ROSATOM and JSC Atomenergoprom operate. The platform is designed to improve the efficiency of urban management.

By the end of 2021, digital services forming part of the Smart City platform had been rolled out in 36 towns and cities, including 18 towns and cities where nuclear facilities are located. Overall, more than 600,000 people across the country used the Smart City services in 2021.

In addition, in 2021, JSC Atomenergoprom’s enterprises joined programmes to digitise regional and municipal segments of federal information systems and their components based on an integrated digital platform of the Russian Federation, GosTech, and the Federal State Information System Integrated Information Platform of the National Data Management System.

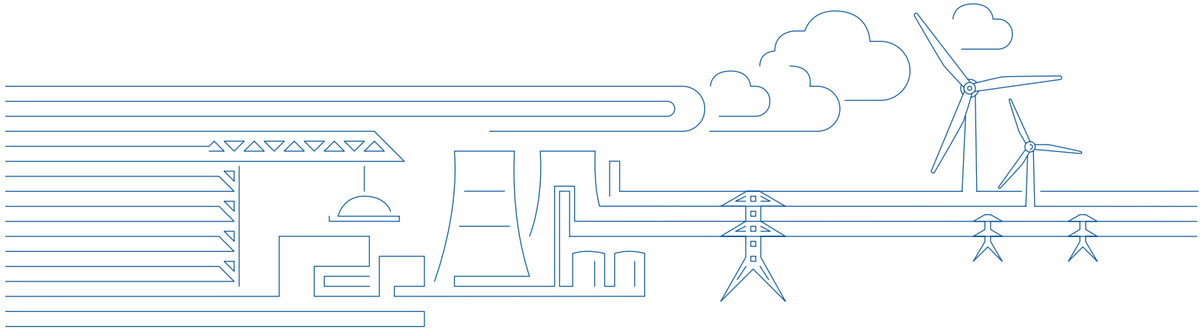
A project was launched to develop urban digital applications in the town of Glazov for the benefit of and with assistance from local communities in order to reduce the digital divide by making digital services more accessible to the public, small and medium-sized businesses.

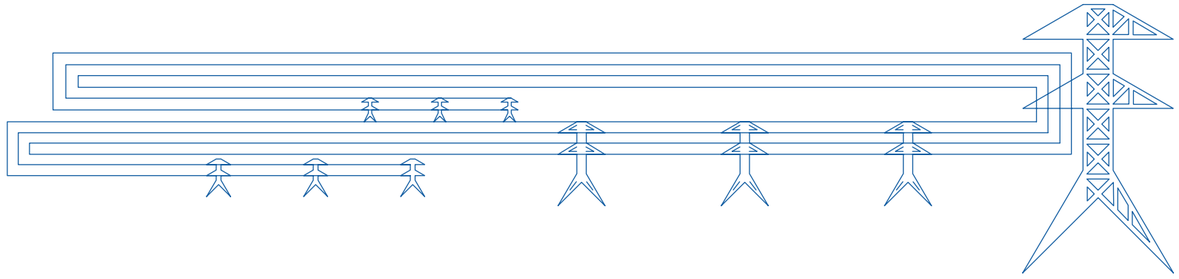
The Centre of Professional Management Communities at the Regional and Municipal Level is being developed pursuant to an order from Dmitry Chernyshenko, Deputy Prime Minister of the Russian Federation. The Centre covers over 500 municipalities and promotes horizontal cooperation aimed at developing digital products and addressing issues related to communication with federal and regional governments; it also formulates mandatory requirements for products developed at the federal and regional level.

In addition, in 2021, the Company launched the Digital Water Supply and Sewerage System, its new product for managing water supply systems, and piloted it in Glazov.

Plans for 2022 and beyond

- Wind power: to commission three WPPs: the Kuzminskaya (160 MW), Trunovskaya (60 MW) and Berestovskaya (60 MW) WPPs;
- Hydrogen energy: to move at least one pilot hydrogen energy project to the implementation stage;
- Environmental protection: to complete the construction of three greenfield environmental technology parks for hazard class 1 and 2 waste processing being developed by JSC Rusatom Greenway as part of the federal project titled ‘Infrastructure for Hazard Class 1 and 2 Waste Management’; to ramp up the plant for polyethylene terephthalate waste recycling into PET flakes in the Republic of Tatarstan to design capacity;
- Nuclear medicine: to complete phase 1 construction and installation work at the radiopharmaceuticals plant in Obninsk; to complete the construction of the building frames of the Radionuclide Therapy Centres in Lipetsk and Ufa, as well as the Nuclear Medicine Centre in Irkutsk;
- New materials: to accomplish a crucial task of import substitution for strategic consumers in Russia;
- Additive manufacturing: to complete the development of a prototype of a direct laser metal deposition machine (a DMD 3D printer);
- Optimised floating power units (MFPUs): to conclude a long-term power supply agreement with LLC GDK Baimskaya;
- Smart City: to launch the Digital Heat Supply product on the market;
- Equipment for the oil, gas and petrochemical industry: to conduct certification tests of both Russian LNG equipment and foreign LNG equipment imported to the Russian Federation at the test bench for medium- and large-capacity plant equipment.






DIGITAL
TRANSFORMATION

Key results in 2021:

- Solutions based on end-to-end digital technologies were put into operation in 18 enterprises.
- Two new digital products were launched.

6.1. UNIFORM DIGITAL STRATEGY

ROSATOM and JSC Atomenergoprom are implementing a Uniform Digital Strategy (UDS) approved in 2018. This is the first strategy of this kind approved by a Russian state-owned corporation. The UDS is updated on an annual basis taking into account changes in the internal and external environment.

Key stakeholders in the implementation of the Uniform Digital Strategy are the enterprises and organisations of ROSATOM and JSC Atomenergoprom, as well as partner companies that are potential consumers of digital products of ROSATOM and JSC Atomenergoprom, and the Government of the Russian Federation, which monitors the implementation of the Digital Technology Federal Project forming part of the Digital Economy National Programme. All organisations managed by the Company contribute to the digitisation of the nuclear industry.

In 2021, the Digitisation Unit continued to actively implement ROSATOM's Uniform Digital Strategy. Its efforts are aimed at supporting the digitisation of the Russian economy, launching digital products developed in-house on the market, internal digitisation and development of end-to-end digital technologies.

Digitisation contributes to the achievement of strategic goals set by ROSATOM and JSC Atomenergoprom and is a driver of JSC Atomenergoprom's overall efficiency. Based on ROSATOM's 2030 Vision developed in 2021, a Digital Vision has been formulated, which involves updating the UDS in 2022.

Economic benefits

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

In 2021, the uniform methodological framework for calculating benefits from the implementation of IT projects was expanded. In addition, a webinar and a video course on performance evaluation were prepared. To support the Divisions, information materials were developed, including a library of industry examples of calculating economic benefits from IT projects and a reference book of digital technology benchmarks.

In 2022, the Company plans to provide training in impact assessment for over 50% of project managers and to continue the audit of IT projects with a focus on evaluating their effectiveness.

Digital hierarchy

A pool of more than 70 chief digital officers (CDOs) managing digitisation initiatives in the Divisions and key enterprises has been formed. To maintain a high professional level of digitisation managers in the industry, a CDO competence model and a methodology for assessing their professional and technical competences were developed in 2021.

Plans for 2022 include pilot testing of the level of knowledge and skills of chief digital officers, with a CDO training programme to be prepared based on the testing results.

Digitisation programmes in the Divisions

18 digitisation programmes closely linked with the UDS have been developed and are being implemented in the Divisions. In 2021, the structure and content of the programmes were aligned with the Methodological Recommendations of the Ministry of Digital Development, Communications and Mass Media of the Russian Federation.

Plans for 2022 include holding strategic sessions with CDOs of the Divisions on digitisation matters and approving the methodological framework for developing and updating digitisation programmes in the Divisions.

6.2. PARTICIPATION IN DIGITISATION IN RUSSIA

GRI 103-3

In accordance with Decree No. 234 of the Government of the Russian Federation dated 2 March 2019, ROSATOM has been granted the status of a competence centre and an active participant of the Digital Technologies Federal Project forming part of the Digital Economy National Programme. The Company's organisations take an active part in the implementation of the programme.

Quantum computing

In 2021, as part of the implementation of the road map for the development of the Quantum Computing high-technology area[56] (hereinafter referred to as the Road Map), the operation of a four-qubit trapped ion quantum processor and the performance of quantum operations on it using qudit states was demonstrated. For the first time in Russia, a four-qubit system was developed using a proprietary technology for scaling quantum processors based on multi-level data storage media, namely qudits (extended versions of qubits capable of simultaneously being in several states).

In 2021, as part of the development of a service providing access to a cloud-based platform for quantum computing in accordance with the Road Map, three modules of the cloud-based platform were developed; five quantum algorithms were implemented; more than 1,500 experiments were performed on the cloud-based platform for quantum computing.

In order to form a science and technology ecosystem in Russia, five partner universities ran Master's and post-graduate degree programmes in quantum computing in 2021. In the field of general education, 11 events (lectures, workshops, discussion groups, etc.) were held; they were attended by more than 700 people. Three continuing professional education programmes focused on quantum computing were developed, including at ROSATOM's Corporate Academy. 26 international and domestic events focused on the establishment and development of professional communities were held, including the 6th International Conference on Quantum Technologies ICQT-2021.

In order to provide the necessary facilities and equipment, high-technology laboratory equipment worth a total of RUB 3,369.0 million was purchased, with funding provided from the federal budget. This includes cleanroom equipment, which will enable the development and testing of prototype quantum processors under the Road Map in the future. In addition, extra-budgetary funding totalling RUB 2,725.4 million was allocated from ROSATOM's own funds for the implementation of activities under the Road Map in 2021.

The key objectives for 2022 are to develop a prototype of a 16-qubit quantum processor based on one of the technological platforms, to implement the service providing access to the cloud-based platform for quantum computing, and to launch Master's degree programmes in two more partner universities.

[56] Approved by minutes No. 14 of the meeting of the Presidium of the Government Commission of the Russian Federation on Digital Development and the Use of Information Technology to Improve the Quality of Life and the Business Environment dated 31 July 2020. The work is carried out under the letter of intent signed by ROSATOM and the Government of the Russian Federation on 10 July 2019 in order to develop the Quantum Computing high-technology area in the Russian Federation pursuant to Order No. 1484-r of the Government of the Russian Federation dated 8 July 2019 (hereinafter referred to as the Agreement).

6.3. END-TO-END DIGITAL TECHNOLOGIES AND DATA MANAGEMENT

The end-to-end digital technology development and data management (EDT & DM) programme provides technological capabilities for the implementation of other prioritised initiatives.

In 2021, the Company launched a transformation of the End-to-End Digital Technologies and Data Management subsidiary programme into an investment programme. As part of these efforts, performance indicators of various components of the programme were evaluated; a project selection methodology was developed; the programme charter was updated; funding limits were revised; investment indicators of the programme until 2030 were calculated and approved by the Steering Board of the Digital ROSATOM programme.

In 2021, R&D in the field of end-to-end digital technologies and data management was carried out in accordance with the approved road maps. A total of 54 projects and initiatives to introduce end-to-end digital technologies are being implemented in the industry.

In 2021, as part of the EDT & DM development programme:

- 50% of pilot projects were recognised as qualifying for further development;
- Solutions based on end-to-end digital technologies were put into operation in 18 enterprises.

The Company continued to take steps to consolidate the expertise of industry-wide EDT & DM competence centres. The most significant progress was achieved in artificial intelligence, virtual and augmented reality (VR/AR) technologies:

- Seven professional articles were published in scientific journals;
- More than 40 meetings were held to share experience in the sphere of end-to-end digital technologies and data management in the nuclear industry;
- A research team focused on the neuromorphic artificial intelligence system was formed;
- An international conference on artificial intelligence was organised by the industry-wide EDT & DM competence centre.

As part of the project to create a Digital Management System (DMS), a prototype digital solution was developed in the nuclear industry; a decision-making process using the DMS was approved, and a plan was developed for the roll-out of the pilot solution. A contractor was selected through competitive tendering, and the design phase began.

A project to develop the Technologies, Materials and Structures (TMS) digital platform was launched under the resolution of the Steering Board. The project involves creating a digital ecosystem based on information about those materials and technologies that provide a foundation for any technical systems. The platform will enable seamless

communication between consumers and suppliers of materials and technologies, including developers of new materials and designers that are willing to apply them to accomplish their tasks, as well as owners of new technologies and industrial partners that will create new products based on these technologies.

Pilot projects in the field of end-to-end digital technologies and data management were successfully implemented. JSC RASU assisted in developing a prototype text mining solution based on natural language processing technologies. A pilot sample of the knowledge management system was designed. Stages of projects focused on prototyping predictive analytics solutions in the enterprises of the Fuel Division were successfully implemented. Based on their outcomes, the Company plans to develop a digital platform for big data and predictive analytics.

The Company continued to develop laboratories of the International Research Centre for Advanced Nuclear Technologies, as well as a joint laboratory at the Obninsk Institute for Nuclear Power Engineering (a branch of NRNU MEPhI). In 2021, the laboratories focused on the development of professional competences and personnel training for the nuclear industry in the field of end-to-end digital technologies and data management.

As part of the TMS project, in 2022, the Company plans to develop a detailed solution concept and carry out an analysis of business processes and marketing research. As part of the Navigator Digital Management System project, the Company plans to pilot a module solution for the Operations Committee. A text mining solution for regulatory documents will be productised.

In 2022, the Company plans to include LSP projects in the EDT & DM programme, develop road maps for the application of digital technologies at production sites, create RPS benchmarks, review initiatives to create industry-wide platforms, such as AR/VR, AI and digital twins, and implement pilot projects to test the readiness of technological solutions and assess potential benefits from their implementation in industry enterprises in the future.

As part of the EDT & DM programme, the Company will also continue to work on neuromorphic technologies in order to search for, analyse and develop applied solutions for the industry.

6.4. DIGITAL PRODUCTS

In December 2021, the Company unveiled two software products for supercomputer modelling and engineering analysis forming part of the Logos family.

Logos Platform. The software module is designed to enable technical integration of individual Logos modules and their integration with third-party original developments.

A Consortium of Russian Developers of CAD/CAE Systems was created based on the Logos Platform under the general management of LLC Rusatom Digital Solutions.

Logos Hydrogeology is a Logos software module focused on modelling environmental conditions in the vicinity of man-made and industrial facilities.

Enterprise and production management

Digital Engineering is a set of services focused on practical application of modern digital design and analysis technologies. It is a project of the Company's Fuel Division (JSC TVEL). Consumers of these services include enterprises in prioritised sectors of the Russian industry: nuclear power, oil, chemical and aircraft engineering, the automotive industry and the conventional power industry.

Dedal-Scout is a digital service for automating field service procedures. Products developed by JSC Scientific Production Complex Dedal have been included in the Register of Domestic Software.

Digital infrastructure

The **Xelent Data Centre** is the first commercial data centre in Saint Petersburg that has undergone certification in accordance with the Tier III Design standard. It is one of the ten largest data centres in Russia. The data centre provides services to more than 350 companies. Its current capacity totals 984 racks (including 954 commercial racks), while the network connection capacity totals 10 MW (with potential for expansion to 14 MW).

In 2021, JSC Atomdata-Centre (a subsidiary of JSC Rosenergoatom, which is the integrator of commercial data centre infrastructure) completed the acquisition of the Xelent Data Centre in Saint Petersburg. The Xelent Data Centre will be used both by JSC Rosenergoatom itself and by existing and new commercial customers.

The **StoreData Data Centre** is a 160-rack data centre. This is a Tier-3 data centre built in accordance with the TIA-942 international standard, with an expected uptime of at least 99.98%. It has highly reliable, PCI DSS certified infrastructure.

The StoreData capacities and infrastructure will be used to roll out the format of a compact specialised data centre that provides customers with the most highly customised services.

Design and construction. Multi-D digital products

Multi-D Docs & Resources (MDDR) is electronic document management and resource planning software that does not rely on imported technology. An in-house expert review of the development and sales strategy was carried out to launch the digital product of JSC ASE on the external market.

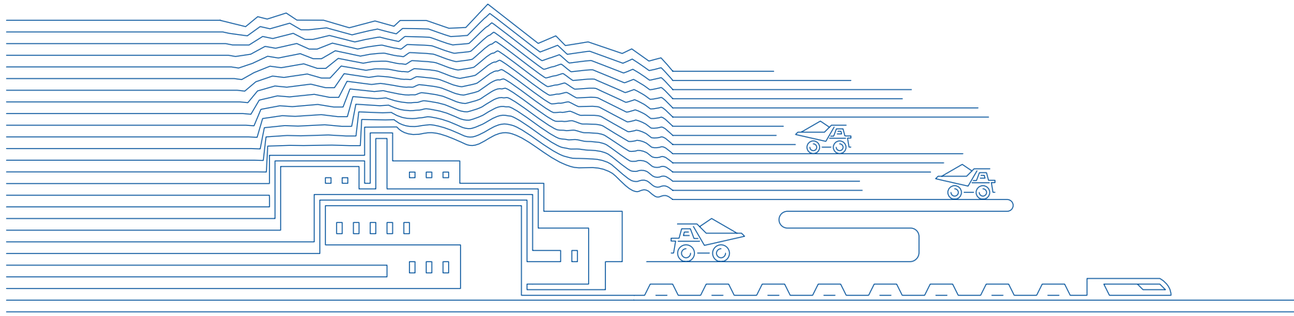
MDDR consumers include industrial and infrastructure construction, mining and public sector companies.

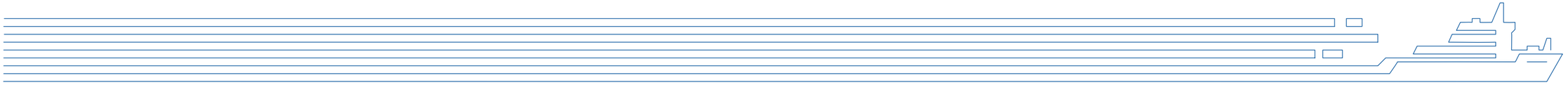
The following Multi-D products have been included in the Register of Domestic Software: Multi-D Docs&Resources, the Multi-D Unified Time Schedule, the Multi-D Enterprise Service Bus, the Executive Documentation Module of the Electronic Document Management Subsystem of the IMS 4.0 System.

A pilot project focused on the Multi-D ESB (Enterprise Service Bus) product was completed. The project was approved by an external customer. There are plans for full-scale implementation of the product.

Key objectives for 2022 include:

- Launching the following digital products on the market: REPEAT, Intellectum, Multi-D ESB, the Micro Data Centre;
- Implementing the Dedal-Scout digital project;
- Developing the first version of the Logos digital product in English;
- Preparing and presenting the strategy for a new area: Effective Cybersecurity.





GOVERNANCE SYSTEM

7.1. CORPORATE GOVERNANCE

Objectives, principles and mechanisms of corporate governance

JSC Atomenergoprom exercises its shareholder powers with regard to organisations in the nuclear industry in accordance with the applicable Russian corporate legislation in order to ensure that corporate procedures established in JSC Atomenergoprom are followed in a timely manner and to the required standard. Since ROSATOM holds 100% of voting shares in JSC Atomenergoprom, the shareholder's decisions with regard to organisations in the Russian nuclear power sector are aligned with ROSATOM's position.

JSC Atomenergoprom's actions with regard to organisations in the nuclear industry are aimed at improving their performance in order to help to achieve the strategic goal of ROSATOM, namely to ensure the security and competitiveness of the Russian Federation.

The corporate governance system in the nuclear industry is currently underpinned by the following key principles:

- Standardisation of governance in the organisations in the Russian nuclear power and nuclear weapons sectors, organisations of various legal forms specialising in nuclear and radiation safety, nuclear science and technology and personnel training, with due regard to the special characteristics of each enterprise and organisation;
- Removing non-operating and inactive companies from the nuclear industry and eliminating redundant corporate ownership levels;
- Avoiding excessive expansion of the area of competence of corporate governance bodies of nuclear organisations and transferring a number of optional issues to the level of cooperation between them based on regulatory documents adopted in the industry with regard to various groups of business processes;
- A division-based management model within the civilian part of the nuclear industry, which involves creating core business divisions of ROSATOM (e.g. the Mining, Fuel, Mechanical Engineering, Power Engineering and Engineering Divisions), as well as a number of business incubators and functional industry organisations whose holding companies own/manage various organisations in the nuclear industry, depending on their areas of business.

Key governance mechanisms include the following:

- Corporate governance activities: currently, ROSATOM directly or indirectly (through its subsidiary, JSC Atomenergoprom) exercises the powers of an asset owner or a shareholder/member with regard to nuclear organisations, as stipulated by applicable legislation of the Russian Federation;
- Engagement on operational matters through additional coordination of certain areas of operations of the said organisations based on the procedures for cooperation signed by ROSATOM and holding companies of its business divisions, business incubators and functional industry organisations.

Governing bodies

Board of Directors of JSC Atomenergoprom[57]

GRI 102-18

Between 1 January 2021 and 31 December 2021, members of the Board of Directors of JSC Atomenergoprom were reelected several times:

Composition of the Board of Directors and tenure of Board members in 2021

GRI 102-22

Name	1 January 2021 – 28 June 2021	29 June 2021 – 10 November 2021	11 November 2021 – 31 December 2021
Kirill Komarov	V	V	V
Ekaterina Lyakhova, Chair of the Board of Directors	V	V	V
Anna Miroshnichenko	V	V	V
Ilya Rebrov	V	V	V
Vladislav Korogodin	V	V	V
Natalia Plotnikova		V	V
Yulia Vrzhesen			V

[57] Information on the composition of the Board of Directors and the Regulations on the Board of Directors are available at: http://atomenergoprom.ru/ru/corp/manag/, http://atomenergoprom.ru/u/file/pologen_sd_260421.pdf.

Kirill Komarov
Date of birth: 1973 год.
Place of birth: Leningrad (now Saint Petersburg).
Education: university degree.
Since 2010 – Executive Director of the Directorate for the Nuclear Power Complex of ROSATOM; Deputy Director General for Development and International Business of ROSATOM. Currently, he is the First Deputy Director General for Development and International Business of ROSATOM, simultaneously holding the position of Director of JSC Atomenergoprom. In his position as a member of the Board of Directors, he is responsible for coordinating sustainability initiatives.
Member of the Board of Directors since 2010. He does not own the Company's shares.

Ekaterina Lyakhova
Date of birth: 1975.
Place of birth: Ekaterinburg.
Education: university degree.
Since 2011 – Director for Investment Management and Operational Efficiency, Director for Economy and Investments of ROSATOM. Currently, she is the Director for Business Development of ROSATOM, simultaneously holding the position of Deputy Director of JSC Atomenergoprom.
Member of the Board of Directors since 2012.
She does not own the Company's shares.

Ilya Rebrov
Date of birth: 1976.
Place of birth: Saint Petersburg
Education: university degree.
Since 2010 – Director of the Economy and Financial Controlling Department; Economy and Finance Director; Financial Director of ROSATOM. Currently, he is the Deputy Director General for Economy and Finance of ROSATOM.
Member of the Board of Directors since 2012.
He does not own the Company's shares.

Vladislav Korogodin
Date of birth: 1969.
Place of birth: Moscow.
Education: university degree.
Since 2010 – Deputy Director of the Directorate for the Nuclear
Power Complex. Currently, he is the Director for NFC and NPP Life Cycle Management of ROSATOM.
Member of the Board of Directors since 2014. He does not own the Company's shares.

Anna Miroshnichenko
Date of birth: 1978.
Place of birth: Murmansk.
Education: university degree.
Since 2010 – leading specialist in the Division of Corporate Engagement with Joint-Stock Companies, Federal State Unitary Enterprises and Federal Government Agencies of the Department for Legal Issues and Corporate Governance of ROSATOM. Currently, she is an adviser in the Division of Corporate Engagement with Joint-Stock Companies, Federal State Unitary Enterprises and Federal Government Agencies of the Department for Legal Issues and Corporate Governance of ROSATOM, simultaneously holding the position of Corporate Secretary of JSC Atomenergoprom. She is responsible for arranging the participation of representatives of various stakeholder groups in meetings of JSC Atomenergoprom's Board of Directors in their capacity as experts.
Member of the Board of Directors since 2018. She does not own the Company's shares.

Natalia Plotnikova
Date of birth: 1966.
Place of birth: Moscow.
Education: university degree.
Since 2017 – Head of Internal Audit, Director of the Internal Audit Department. Currently, she is the Deputy Director for Internal Control and Audit and the Director of the Internal Audit Department of ROSATOM.
Member of the Board of Directors since 2021.
She does not own the Company's shares.

Yulia Vrzhesen
Date of birth: 1982.
Place of birth: Almalyk, Republic of Uzbekistan.
Education: university degree.
2015 – present – Director of the Organisational Development Department of ROSATOM.
Member of the Board of Directors since 2021.
She does not own the Company's shares.

There are no independent members of the Board of Directors.

To assist the Board of Directors of JSC Atomenergoprom in carrying out its corporate governance and control responsibilities, in 2021, an Audit Committee was established under the Company's Board of Directors.

57% of members of the Board of Directors are women.

In accordance with the Regulations on the Board of Directors, resolutions of the Audit Committee are advisory in nature (paragraph 5.1 of the Regulations).

Composition of the Committee:

- Vladislav Korogodin;
- Natalia Plotnikova;
- Yulia Vrzhesen.

Director of JSC Atomenergoprom

Kirill Komarov was appointed as Director of JSC Atomenergoprom as from 14 April 2020 (minutes of the meeting of JSC Atomenergoprom's Board of Directors No. 481 dated 13 April 2020).

Report of the Board of Directors

GRI 102-34

In 2021, the Board of Directors of JSC Atomenergoprom held 55 meetings.

Under the resolution of the Board of Directors dated 28 May 2021, the Company's annual financial (accounting) statements for 2020 were approved.

Under the resolution of the Board of Directors dated 24 May 2021, the auditor for 2021 was approved.

In March 2021, the Bank of Russia registered amendments to the resolutions on additional issues of ordinary and preferred shares of JSC Atomenergoprom and the accompanying prospectus (reflecting an extension of the share placement period).

A number of decisions were taken to streamline the structure of JSC Atomenergoprom's group of companies (*see 'Key Changes in the Corporate Structure in 2021'*).

Shareholders of the Company as at 31 December 2021

	Interest in the Company's authorised share capital	Portion of ordinary (voting) shares in the Company held by the shareholder
State Atomic Energy Corporation Rosatom	95.3317%	100%
Russian Federation represented by the Ministry of Finance	4.6683%	0%

Resolutions of the sole shareholder

In 2021, the shareholder owning all voting shares adopted six resolutions, including:

- Profit distribution for 2020;
- Election of the Board of Directors;
- Payment of dividends for 2020, for the first half of 2021 and for the nine months of 2021;
- Approval of a new version of the Company's Charter.

Payment of declared (accrued) dividends on JSC Atomenergoprom's shares

Under the resolution of ROSATOM as the holder of 100% of voting shares in JSC Atomenergoprom, outstanding dividends for the nine months of 2020 totalling RUB 8,111 million were paid on ordinary shares held by ROSATOM in January 2021.

Under the resolution of ROSATOM as the holder of 100% of voting shares in JSC Atomenergoprom, dividends were declared and paid within the prescribed time frame as follows:

Dividend payments in 2021

	June 2021 (for 2020)	3Q 2021 (for 1H 2021)	4Q 2021 (for 9M 2021)
Amount of dividends declared and paid within the prescribed time frame, RUB million, including:	13,437	7,453	17,752.6
on ordinary shares	12,800	7,100	16,911.3
on preferred shares	637	353	841.3

Major transactions and non-arm's length transactions

In 2021, JSC Atomenergoprom did not conclude any major transactions.

In accordance with paragraph 17.1 of the Charter of JSC Atomenergoprom, the provisions of Chapter 11 of the Federal Law on Joint-Stock Companies do not apply to the Company.

Key changes in the corporate structure in 2021

GRI 102-10

1. JSC AEM-Technologies took steps to acquire mechanical engineering assets of a number of major Russian companies;
2. JSC Atomenergoprom co-founded the Association of the Largest Software and Hardware Consumers;
3. JSC Atomenergoprom divested from Limited Liability Company United Innovation Corporation by selling its interest in the authorised share capital to JSC TVEL (a wholly owned subsidiary of JSC Atomenergoprom);
4. JSC Atomenergoprom established a wholly owned subsidiary, ISTOK Engineering and Construction Joint-Stock Company.

JSC Atomenergoprom's compliance with the principles and recommendations of the Corporate Governance Code recommended by the Bank of Russia

JSC Atomenergoprom adheres to the key corporate governance principles stipulated by Russian legislation and the Corporate Governance Code (e.g. respect for shareholder rights, the procedure, format and scope of information disclosure), with some exceptions stemming from the nature of the business and the legal status of JSC Atomenergoprom and its organisations (restricted civil circulation of shares of joint-stock companies appearing on the lists approved by the Russian President and comprising legal entities that may be holding nuclear materials or nuclear facilities).

Key provisions of JSC Atomenergoprom's policy on remuneration and/or reimbursement of expenses; information on remuneration and/or reimbursement of expenses

GRI 102-35

No decisions were taken in 2021 to pay out remuneration and/or reimburse expenses incurred by the members of JSC Atomenergoprom's Board of Directors; no remuneration or reimbursement for expenses were paid out.

Board members who are full-time employees of the Company/ROSATOM are remunerated for their work in accordance with the Standardised Industry-Wide Remuneration System instituted by ROSATOM. Remuneration paid to Board members, including salary, is regulated by employment contracts and applicable local regulations of the Company/ROSATOM on remuneration. Under the resolution of the General Meeting of Shareholders, members of the Board of Directors may receive remuneration and reimbursement for expenses related to the performance of their functions as members of the Board of Directors. The amount of such remuneration and reimbursement is established by the General Meeting of Shareholders.

7.2. RISK MANAGEMENT

Risk management system

GRI 103-1
GRI 103-2

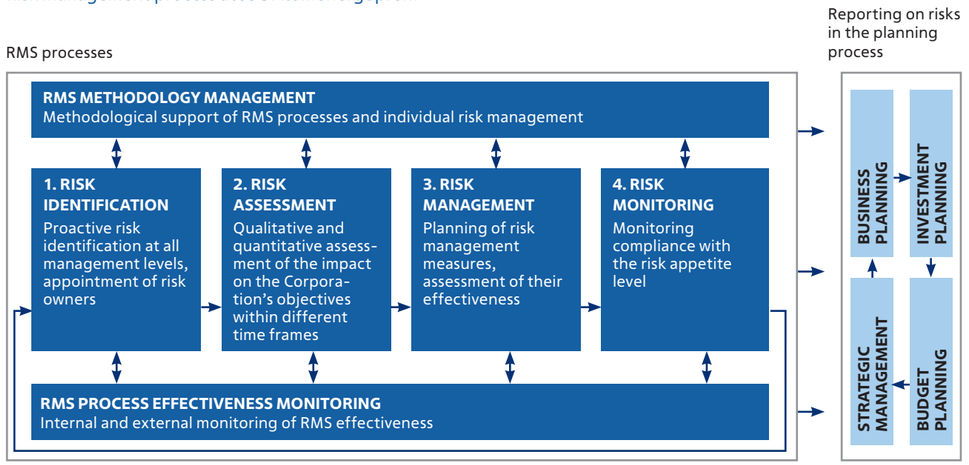
ROSATOM's industry-wide risk management system (RMS) is integrated into the Company's planning and management processes. The RMS is based on a continuous cyclical process of identifying, assessing and managing the risks that can affect JSC Atomenergoprom's short- and long-term performance and the implementation of its strategy. The RMS covers all of the Company's organisations.

The RMS is being developed in accordance with the approved Risk Management Development Programme for the period from 2019 through 2024.

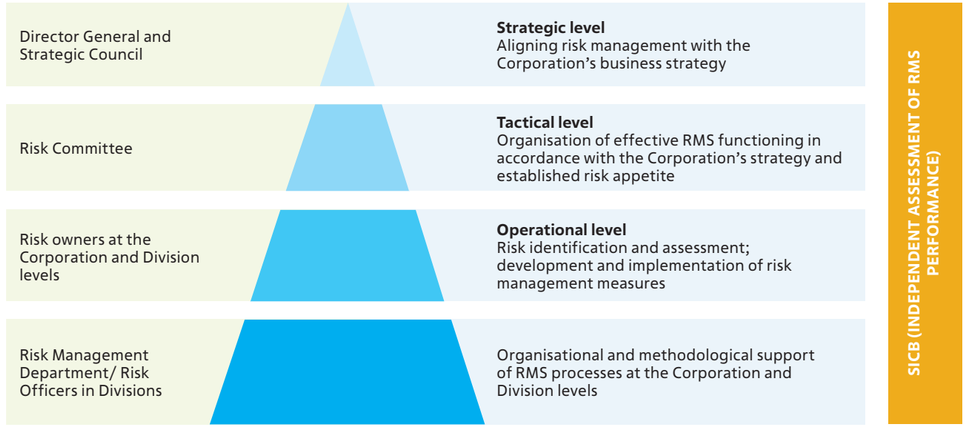
In 2021:

- An automated risk assessment and management system (IRMS) was piloted; it had been developed as part of project B-RM1-1 to build an Industry-Wide Risk Management System in ROSATOM (covering JSC Atomenergoprom and its organisations);
- A list of key risk indicators was compiled, including a description, the calculation algorithm and frequency, sources of information and thresholds (baseline, warning and response thresholds);
- Quantitative assessment of project risks (allowance for risks and uncertainties) was carried out in accordance with the methodology developed by the Company for pilot projects and in accordance with the approved assessment schedule for TCM NC accuracy class 3;
- A system for early response to risks related to national and federal projects was in place;
- Key risks affecting key financial and economic indicators (KPIs) of JSC Atomenergoprom were identified and assessed;
- Established risk appetite indicators were supplemented with sustainability indicators in order to identify, prioritise and assess key risks affecting the achievement of sustainable development goals.

Risk management process at JSC Atomenergoprom



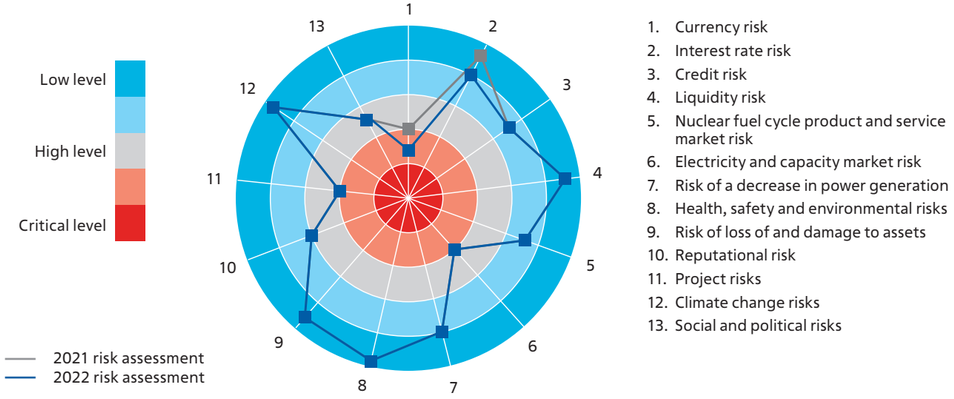
Organisational model of ROSATOM's risk management system applied in the Company



Key business risks[58]

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

Risk radar



1. Currency risk
2. Interest rate risk
3. Credit risk
4. Liquidity risk
5. Nuclear fuel cycle product and service market risk
6. Electricity and capacity market risk
7. Risk of a decrease in power generation
8. Health, safety and environmental risks
9. Risk of loss of and damage to assets
10. Reputational risk
11. Project risks
12. Climate change risks
13. Social and political risks

Comprehensive risk management measures largely offset the negative impact of external factors on the implementation of JSC Atomenergoprom's strategy.

Risk management outcomes in 2021

GRI 103-3

Change in estimated risk levels for 2022:

↗ increase ↘ decrease ○ no significant changes

[58] The annual report does not contain an exhaustive description of all risks that may affect the Company's operations; it only provides information on key risks.

The Company's strategic goals:

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

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
Financial risks			
1. Currency risk ↗ (Executives of the Company's Divisions))	Adverse changes in exchange rates	**Management approaches** — Setting the highest possible conversion rates when negotiating the terms of expense contracts; — Monitoring the terms of foreign currency payments under revenue contracts and expense contracts concluded as part of performance of revenue contracts; — Maintaining a balance of claims and liabilities denominated in foreign currencies (natural hedging); — Use of financial hedging instruments. **Results:** Foreign currency liabilities were met without raising additional funds to compensate for exchange rate fluctuations. Divergent trends in the exchange rates of currencies in which project financing, key items of capital expenditure and operating cash flows are denominated were taken into account. An optimal ratio of assets and liabilities denominated in the same currency was maintained.	1 2 3
2. Interest rate risk ↗ (ROSATOM's Treasury Department)	Adverse changes in interest rates, different timing of interest income and interest expenses	**Management approaches** — Maintaining a balance of interest income and interest expenses — in terms of timing and amounts; — Reasonable selection of interest rates (fixed or floating) for the expected maturity period. All things being equal, the Company prefers long-term fixed-rate loans with the option of penalty-free early repayment; — Floating-rate loans on which interest rates may be increased may be refinanced using the intra-group liquidity pool	1 2 3

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		Results: The Company maintains a stable long-term loan portfolio. The average interest rate on the total debt portfolio is maintained below 3.8% per annum, including by optimising the loan portfolio, increasing the share of long-term fixed-rate foreign-currency loans and raising subsidised financing. There was no significant increase in the risk level in 2021 due to the effective use of the risk management approaches described above. *For details, see the section 'Financial Management'*	
3. Credit risk ○ (ROSATOM's Treasury Department for banks; executives of the Company's organisations for other counterparties)	Failure by counterparties to fulfil their obligations in full and on time	**Management approaches** — Setting and monitoring limits for counterparty banks; — Using suretyship, guarantees, restrictions on advance payments in favour of external counterparties; — Monitoring the status of accounts receivable and the financial position of counterparties; — An internal counterparty solvency rating system. **Results:** Losses through the fault of counterparties were minimised.	1 2
4. Liquidity risk ○ (ROSATOM's Treasury Department / Heads of Divisions)	Lack of funds for the fulfilment of obligations by the Company and its organisations	**Management approaches** — Centralised cash management (cash pooling); — Rolling liquidity forecasts and cash flow budget; — Maintaining required amounts of open lines of credit with banks; — Reducing the period of keeping spare cash on bank deposits when this is advisable from an economic perspective; — Discussing matters related to state support with Russian federal executive authorities; — Active use of project financing instruments as part of implementation of projects and programmes by the Company and its organisations (for details, see the section 'Financial Management'). **Results:** The Company maintained sufficient liquidity to repay liabilities on time, preventing unacceptable losses and reputational risk. *For details, see the section 'Financial Management'.*	1 3

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
Commercial risks			
5. Nuclear fuel cycle (NFC) product and service market risk ○ (Executives of the relevant Divisions of the Company)	Adverse changes in the pricing environment and demand on markets for natural uranium and uranium conversion and enrichment services	**Management approaches** — Maintaining an optimal balance between market-focused and escalation pricing mechanisms (based on benchmark price inflation) in contracts; — Aligning pricing mechanisms used for procurement and those used in contracts with a high level of commodity risk; — Discussing the volume of future orders with customers in advance; — Embedding quantitative flexibility and options in contracts with suppliers to align purchase and sales volumes; — Providing supply guarantee mechanisms; — Improving the technical and economic characteristics of nuclear fuel; developing new types of fuel; — Promoting products in new market segments. **Results:** Although prices and demand on the markets for NFC products and services continued to stagnate, in 2021, the target for the 10-year portfolio of overseas orders on these markets was achieved. *For details, see the section 'International Business'.*	1 2 4
6. Electricity and capacity market risk ○ (Director General of JSC Rosenergoatom)	Adverse changes in electricity and capacity prices	**Management approaches** The risk depends exclusively on external factors. The risk cannot be hedged using financial instruments due to the low liquidity of the market. To reduce the risk, power supply divisions of JSC Rosenergoatom are actively engaging with the Association NP Market Council to obtain approval for amendments to the regulatory framework governing the wholesale electricity and capacity market and are negotiating with PJSC FGC UES and JSC SO UES in order to align the schedule of power grid equipment maintenance. **Results:** In 2021, like in previous periods, key drivers included electricity consumption in the first pricing zone and indexation of gas prices (with gas being the main type of fuel used by thermal power plants in the first pricing zone). Thus, in 2021, electricity consumption in the first pricing zone increased by 7% year on year, driving a 20% increase in bids on the day-ahead market, which caused a spike in prices on the day-ahead market.	1

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
Operational risks			
7. Risk of a decrease in power generation ○ (Director General of JSC Rosenergoatom)	Decrease in power generation due to equipment shutdowns and unavailability	**Management approaches** — Scheduled preventive maintenance and repairs at NPPs; — To improve NPP safety, reliability and resilience, prevent equipment failures, meet the load schedule, achieve the target for electricity and heat supply, and accelerate efforts to achieve key targets for electricity output and fulfil government orders, JSC Rosenergoatom has adopted and is using a special mode of operation to achieve the target for electricity output; — On an annual basis: Implementation of the NPP life extension programme and equipment upgrades to increase installed capacity and power generation at operating power units (including the possibility of power units operating at above nameplate capacity. **Results:** In 2021, nuclear power generation totalled 222.437 billion kWh. The rate of fulfilment of government orders (performance against the balance target set by the Federal Antimonopoly Service (FAS) of Russia) stood at 102.19%. Performance against the target stood at 101.14%. Electricity output exceeded the target mainly due to a reduction in the duration of scheduled repairs at NPP power units, including power units No. 1 and 4 of Balakovo NPP, power units No. 3 and 4 of Kursk NPP, power units No. 3 and 4 of Leningrad NPP, power unit No. 1 of Rostov NPP, etc. All incidents and equipment failures have been properly investigated. Corrective and preventive measures have been developed in order to address the root causes of the incidents and prevent their recurrence.	1
8. Health, safety and environmental (HSE) risks ○ (Executives of the Company's Divisions)	Major accidents/ incidents in nuclear enterprises	**Management approaches** — Comprehensive inspections in manufacturing enterprises, followed by the development and implementation of risk mitigation plans; — Occupational safety and health monitoring in nuclear organisations, including inspections and preventive visits, development of action plans and implementation of risk mitigation measures; — Measures to improve HSE performance in the enterprises, including measures to enhance occupational safety, reduce the impact of the Company's operations on the health of the local population and prevent irreversible changes in the natural environment in the towns and cities hosting nuclear power and nuclear industry enterprises; — Measures to upgrade process equipment and improve production processes in the enterprises; — Monitoring of compliance of operations with statutory limits on environmental and health impacts; — Monitoring of individual radiation risk exposure of employees and measures to reduce it; — Monitoring of the radiation level and the environmental situation in ROSATOM's regions of operation; — Constant readiness of emergency and incident response teams and equipment; — Special reserve funds formed by ROSATOM and its organisations to ensure safety at all stages of the life cycle of their production facilities; — Arranging civil liability insurance against damage resulting from accidents for enterprises that own hazardous industrial facilities; — Calculation and monitoring of indicators used for assessing the probability of potential negative impacts of industrial safety violations at hazard class 1 and 2 industrial facilities; — Timely updates to internal regulations of the organisations, as required by legislation and federal rules and standards; — Technical inspection of equipment used at hazardous industrial facilities; — Ensuring safe operation of hazardous industrial facilities of JSC Atomenergoprom's organisations; — Maintaining a high level of professionalism, accountability and safety culture among employees, including certification of operating personnel at hazardous industrial facilities; — Continuous monitoring of the use of personal protective equipment (including equipment designed to prevent the spread of COVID-19) by employees in the workplace; — Improvement of project management practices in the sphere of occupational safety and health. **Results:** Safe operation of JSC Atomenergoprom's organisations, including hazardous industrial facilities.	4
9. Risk of loss of and damage to assets ○ (Asset Protection Department of ROSATOM)	Corruption and other offences leading to a damage to/loss of assets	**Management approaches** An integrated industry-wide system for the prevention of corruption and other offences is in place in the Russian nuclear industry. **Results:** Pursuant to the National Anti-Corruption Plan for the period from 2021 through 2024 (Decree No. 478 of the President of the Russian Federation dated 16 August 2021), the Anti-Corruption Plan of ROSATOM and Its Organisations was approved for the relevant period; it supports corruption risk management, including the following focus areas: — Continuous assessment of corruption risks across all business processes implemented in the Company and all accounting events;	1 2

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		— Professional development of employees focused on combating corruption, with priority given to the following employee categories: – Employees newly hired by the Corporation and its organisations and appointed to positions involving responsibility for compliance with anti-corruption standards; – Executives that have been assigned responsibility for preventing corruption in the organisations; – Employees involved in the procurement of goods, work and services. — Introduction of online anti-corruption training based on mobile platforms accessible to every employee in the industry; — Reporting evidence of corruption and other offences, including through feedback mechanisms (the hotline); — Reviewing and updating industry-wide regulations on asset protection and combating corruption in line with updates to anti-corruption legislation; — Detection, timely prevention and settlement of conflicts of interest; — Prioritised implementation of industry-wide anti-corruption regulations in new businesses.	
10. Reputational risk ○ (Communications Department of ROSATOM and Heads of Divisions)	Changes in stakeholder perception of the trustworthiness and appeal of the Company and its organisations	**Management approaches** — Measures are taken to shape a positive public opinion on the development of the Company's technologies and projects (both nuclear and non-nuclear) through improved information transparency and open stakeholder engagement (including the functioning of an industry-wide public reporting system); — The transition of JSC Atomenergoprom's organisations to a single brand made an important contribution to enhancing the Company's reputation. This enables consistent positioning of the Company's organisations on the Russian and international markets, which, in turn, helps Russian nuclear organisations and their projects gain greater recognition from partners and customers; — The Company works continuously to improve the recognition and appeal of its HR brand (both in the industry and among prospective employees and within the expert community); — The Company continuously monitors and analyses news reports in the national and international media and information obtained during business meetings, industry conferences and workshops. Industry executives are promptly informed about key developments in the media space in Russia and abroad;	1 3

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		— The Company implements projects in the sphere of communication and the humanities in cooperation with foreign partners. It has successfully introduced the practice of holding online events in overseas organisations and virtual tours. The Company continuously monitors public opinion on NPP construction and information on the decisions of government and regulatory bodies on curtailment of nuclear power generation in the countries where the Company is implementing projects; — Technical tours and media tours of Russian nuclear facilities are arranged for foreign media representatives; — The Company maintains a presence on social media. The number of followers of the Corporation's official community pages on social media is growing steadily. The largest increase in the number of followers has been recorded on social media platforms focused on visual content; — JSC Atomenergoprom's representatives participate in international industry exhibitions as speakers/delegates; — The Company publishes printed materials (brochures, leaflets) to raise public awareness about the nuclear power industry. **Results:** According to the findings of opinion polls, in 2021, 77.4% of the Russian population supported the use of nuclear power. Over the past few years, this figure has remained consistently high. According to data in the Medialogia automated media monitoring and analysis system, in 2021, 94.1% of publications about the Russian nuclear industry were positive or neutral. *For details, see the sections 'Stakeholder Engagement' and 'Personnel Management'.*	
11. Project risk ○ (Executives of the Company's Divisions)	Changes in the macroeconomic indicators of the countries participating in the projects; contractors' failure to fulfil their commitments with regard to the schedule and quality of work to be performed	**Management approaches** Full-cycle risk management has been introduced in NPP construction projects; it includes risk identification and assessment, development and implementation of risk management measures, risk monitoring and updates to the risk register, and reporting, which enables effective risk monitoring and management. — Improving project management practices; — Regular monitoring and control of risk management as part of overseas projects; — Regular monitoring and control of achievement of key milestones, financial and physical targets for overseas projects; — Regular monitoring and communication with customers concerning the schedule for NPP maintenance and training of foreign NPP personnel abroad, as well as other matters related to the implementation of overseas projects;	1 3 4

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		— Improving project management and risk management systems; — Negotiating the main terms and conditions of contracts with customers in advance; — Developing risk maps for new business areas; — Implementing a corporate project management system; — Developing procedures (standardised solutions) for project risk management; — Implementing best project management practices (including ROSATOM's industry-wide risk management system and the TCM NC cost and schedule management methodology) and industry-wide guidelines for projects and investment activities in project companies; — Major steps are being taken both by shareholders and at the operational level to enhance risk-based project management. **Results:** The Company continuously improves the system for managing all stages of NPP construction, from front-end engineering design to the commissioning of power units. The Company carries out quantitative risk assessment for NPP construction projects (using the Monte Carlo method). Steps are being taken to develop and improve the project risk management system at all stages of project implementation: qualification of contractors, project management, systematic monitoring, etc. Risk management measures implemented by the Company have enabled it to avoid a negative impact on key performance indicators.	
12. Climate risk ↘ (Executives of the Company's Divisions)	Adverse climate change/impacts of natural disasters on the operations of the Company and its organisations; risk of environmental damage from the operation of nuclear facilities and other facilities in the industry	**Management approaches** — At the stage of NPP design, JSC Atomenergoprom carries out a comprehensive assessment of risks associated with the climatic characteristics of the region where the proposed NPP construction site is situated; — Calculations performed as part of an assessment of external impacts take into account the climatic characteristics of the customer country and form part of a probabilistic safety assessment; — The Company monitors compliance of its operations with statutory limits on environmental and health impacts; — Measures are developed and implemented in order to reduce greenhouse gas emissions from production operations; — The Company is developing wind power generation in order to increase the share of zero-carbon energy in the country's energy mix; — The environmental impact of NPPs is monitored at each stage of their life cycle (design, construction, operation and decommissioning). Special comprehensive measures forming part of a Comprehensive Plan for the Implementation of the Environmental Policy of ROSATOM and Its Organisations, which is updated on an annual basis, are implemented at NPPs. These measures help to predict and prevent emissions, accidents and their development and to minimise their impact; — The Company is improving technological solutions used to enhance the fuel efficiency of its facilities; — The Company has switched to higher-grade fuel oil (with lower sulphur content); — Painting techniques are being improved; — Efficient gas scrubbers and dust collectors are put into operation; — Sustainability declarations have been developed for transit container shipments via the Eurasian corridor and for the digital platform; — To maintain the balance of local ecosystems, all enterprises involved in various stages of the production process strictly comply with technological standards for natural uranium mining and processing. Active steps are being taken to reduce the relevant impacts and improve the environmental safety of the production cycle. **Results:** Following the completion of engineering surveys, appropriate design solutions are adopted for each NPP construction project taking into account the climatic characteristics of the region where the NPP will be built. Pollutant emissions into the atmosphere from NPPs do not exceed permitted limits and are significantly below the limits set by environmental regulators. The majority of pollutant emissions from NPPs are generated by start-up and backup boiler houses, boiler houses of healthcare centres and backup diesel generators, which are regularly started up for routine testing. In 2021, water discharge from NPPs was consistent with the water balance and electricity output; it totalled 90.8% of water consumption, which reflects satisfactory performance in terms of water use. Water use was within the limits set by environmental regulators. Household and industrial wastewater and storm water runoff at all NPPs were treated before being discharged into surface water bodies. Pollutant levels in wastewater discharged from NPPs into surface water bodies were monitored in accordance with regulations agreed and approved under the established procedure. JSC Atomenergoprom makes sure that all its operations are environmentally safe; nuclear power generation facilities produce virtually no CO or CO_2 emissions, helping to maintain the natural ecological balance and reduce the likelihood of adverse climate changes or natural anomalies.	1 4

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
		In 2021, the Company completed the construction and commissioned the Kochubeyevskaya WPP (210 MW), the Marchenkosvkaya WPP (120 MW), the Karmalinovskaya WPP (60 MW), the Bondarevskaya WPP (120 MW) and the Medvezhenskaya WPP (60 MW). The Company's portfolio of wind power projects increased by 460 MW (with commissioning scheduled for 2025–2027) and reached 1.7 GW. The capacity of the Company's WPPs totals 720 MW, with electricity output totalling 1.2 billion kWh. **Changes:** the risk level has decreased.	
13. Social and political risks in the regions of operation, including the risk of a deterioration in the epidemiological situation ↘ (ROSATOM and executives of the Company's Divisions)	Loss of public approval for the location of infrastructure facilities. Deteriorating epidemiological situation.	**Management approaches** JSC Atomenergoprom operates in a socially important sector of the economy. The Government of the Russian Federation makes a direct impact on JSC Atomenergoprom's operations by financing individual federal projects and federal target programmes. As a result, JSC Atomenergoprom and its organisations are characterised by a high level of financial resilience sufficient to withstand the negative economic consequences of social and regional risks. The Company engages with regional and municipal governments on matters related to promoting regional development, increasing regional tax revenue and maintaining social and economic stability in the regions. In order to reduce social risks in its regions of operation, the Company implements a set of measures (public consultations, engagement with non-governmental organisations and the media) to inform the general public about the operations of its regional manufacturing enterprises, plans for their future development and their stability, and the fact that its operations do not pose any environmental risks. Simultaneously, the Company conducts environmental upgrades in the back-end segment, introducing new RAW and SNF processing technologies and reducing the volume and radioactivity of waste. To prevent a deterioration in the epidemiological situation, the Company fully complies with all requirements for public sanitation and disease prevention amid the spread of the new coronavirus disease (COVID-19) and recommendations by the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor); in addition, employees are vaccinated. **Result:** the Company succeeded in maintaining a stable environment in its host towns and cities and ensuring operational continuity in its enterprises.	

Other risks

Licensing risks. JSC Atomenergoprom currently has all necessary licences. Where necessary, JSC Atomenergoprom can promptly obtain licences for new businesses and renew existing licences.

Logistical risks. Regions in which the core operations of JSC Atomenergoprom and its organisations are situated have well-developed infrastructure and transport links. JSC Atomenergoprom's organisations implement preventive measures to ensure reliable supplies: they maintain emergency stocks of materials and equipment, organise exercises for emergency response and recovery teams and implement other measures to ensure the continuity of production and logistical processes.

The following risks (threats and opportunities) have been selected in order to monitor other risks:

Threats:
- Risk of technologies developed by the Company becoming less competitive;
- Increased competition in the markets in which the Company operates;
- Utility companies losing confidence in the supply reliability of JSC Atomenergoprom's organisations;
- Growing stakeholder concerns or negative feedback from stakeholders;
- Loss of intellectual capital;
- A decrease in the employee satisfaction level.

Opportunities:
- Access to new markets;
- Use of regulatory incentives (interest rate subsidies);
- Development of new products or services through R&D and innovation;
- Opportunities for business diversification;
- More efficient production and distribution processes;
- Improved resource efficiency;
- Measures to improve energy efficiency;
- Use of supportive policy incentives (subsidising 'green' technologies, etc.).

The Supplier Code of Conduct[59] has been updated, and public consultations have been held with stakeholders, including foreign customers.

A supply chain monitoring system is in place, with a focus on monitoring compliance with sustainability requirements (media monitoring, questionnaire surveys, sustainability audit of suppliers).

[59] The Code has been implemented in JSC TENEX.

A questionnaire survey has been conducted among all suppliers of uranium products.

Two suppliers have undergone a sustainability audit.

Risk insurance

GRI 103-2

Risk insurance is one of the main risk management approaches used by JSC Atomenergoprom. To improve the reliability of insurance coverage, in 2021, the Company continued to cooperate with the insurance community in order to insure Russian operators against property risks. A significant share of liability of Russian NPPs for potential nuclear damage was transferred for reinsurance to the international pooling system[60]. This proves that the international nuclear insurance community acknowledges the safety and reliability of Russian NPPs to be adequate.

In 2022, the Company plans to continue to engage experts from the Russian Nuclear Insurance Pool and the international pooling system to audit key enterprises in the industry for insurance purposes.

Objectives for 2022 and for the medium term

The Company has developed an action plan for 2022 covering the key areas of the Risk Management Development Programme for the period from 2019 through 2024. This plan takes into account both external factors related to the requirements of foreign customers (NPP construction on time and on budget) and Russian government bodies and internal factors (the need to build an efficient risk management system aligned with global best practices).

The plan sets three key objectives for the development of risk management in the Russian nuclear industry:

- To develop an automated risk assessment and management system, which will, among other things, enable the Company to maintain and update a knowledge base of typical risks and risk management measures;
- To develop the risk management expert community in the industry;
- To adopt procedures (including initial assessment) for managing risks associated with projects and programmes in the sphere of new business development.

[60] The international pooling system (IPS) comprised of International Nuclear Insurance Pools is an unincorporated organisation representing the interests of nuclear insurance pools from 27 countries.

Plans for 2022 also include implementing the second stage of the project to develop the risk assessment and management system in accordance with instructions from JSC Atomenergoprom.

7.3. FINANCIAL MANAGEMENT

Key results in 2021:

- A total of about RUB 44 billion was saved through intra-group financing between 2010 and 2021.

Implementation of the financial strategy

Given the scale of JSC Atomenergoprom's business in Russia and abroad, the Company's management attaches special importance to the financial resilience of nuclear organisations in a changing environment. The financial strategy is an integral part of JSC Atomenergoprom's overall business strategy. The main aim of the financial strategy is to ensure the financial resilience of the Company and its organisations in a changing external environment and to maximise the efficiency of financing and financial risk management.

Key financial transactions of JSC Atomenergoprom have been centralised. Cash flow management is centralised through:

- A single industry-wide legal framework regulating financial management (including the Uniform Industry-Wide Financial Policy);
- Vertical integration of treasury departments in subsidiaries and affiliates, which are functionally accountable to ROSATOM's Treasury Department. The established treasury structure enables 100% control of funds in the industry;
- Concentration of principal treasury functions of nuclear organisations in ROSATOM's Treasury Department, which communicates with nuclear organisations in a shared information space and is essentially a liquidity management centre;
- An industry-wide automated system for recording treasury transactions (the Corporate Settlement Centre Information System), which enables the recording of all treasury transactions across the group on a daily basis.

Targets set for 2021 in the financial strategy in terms of engagement with banks, debt portfolio management as part of the day-to-day operations and projects of the Company and its organisations, and further centralisation of financial transactions were met. In order to improve the performance of the treasury functions, in 2021, the Company continued to work towards:

- Accumulating spare cash in the accounts of pool leaders[61];
- Improving the accuracy of payment scheduling (a rolling liquidity forecast);
- Maintaining a competitive cost of servicing of the consolidated debt portfolio;
- Centralising treasury transactions (complying with the financial policy);
- Introducing project financing instruments as part of project implementation by the Corporation and its organisations.

In 2021, the Company continued to work towards further centralisation of the treasury function, including the development of a Payment Factory at JSC Atomenergoprom. This project is aimed at further improving the performance of the treasury function in the industry.

A total of about RUB 44 billion was saved in the industry through intra-group financing between 2010 and 2021.

Green bonds

On 25 June 2021, JSC Atomenergoprom placed the first issue of 'green' exchange-traded bonds (series 001R-01) with a par value of RUB 10 billion. The issue was placed as part of the series 001R exchange-traded bond programme worth up to RUB 100 billion inclusive. The bonds in the issue have a par value of RUB 1,000 each and a maturity of five years.

This is the first placement of exchange-traded bonds by a Russian issuer to finance renewable energy sources. Proceeds from the bond placement have been used to refinance expenditure on the Wind Power programme.

The bonds were more than eight times oversubscribed. The initial coupon rate on the bonds was set in the range of 7.7-7.8% per annum. With a planned placement volume of RUB 10 billion, demand for the bonds eventually exceeded RUB 80 billion. As the bond issue was oversubscribed, the Company was able to lower the coupon rate to 7.5% per annum, which corresponds to an effective yield of 7.64%.

[61] A pool leader is an organisation of the Corporation on whose accounts spare cash is accumulated and subsequently redistributed between ROSATOM's organisations through loan agreements. The organisation performing the functions of a pool leader is appointed under the resolution of ROSATOM's executive bodies.

The ExpertRA rating agency acting as an independent verifier confirmed that the bond issue complied with the Green Bond Principles (GDP) of the International Capital Market Association (ICMA) and with the provisions of the Russian Green Finance Guidelines developed by VEB.RF. ExpertRA also assigned the ruAAA rating to the bond issue.

Parties to the transaction included all categories of investors, such as banks, managers, investment firms and insurance companies; it also generated demand from individuals.

In December 2021, JSC Atomenergoprom won the Cbonds Awards in the Green Bonds of the Year category.

Receiving and maintaining credit ratings

In the reporting year, JSC Atomenergoprom continued to take measures to maintain credit ratings assigned by the 'Big Three' international rating agencies (S&P, Moody's Investors Service and Fitch Ratings) and the national rating agency, JSC Expert RA.

As at 31 December 2021, JSC Atomenergoprom was rated at the level of Russia's sovereign credit ratings:

- BBB-/A-3 with a stable outlook by S&P;
- BBB with a stable outlook by Fitch Ratings;
- Baa3 with a stable outlook by the Moody's Investors Service international rating agency;
- ruAAA with a stable outlook by the national rating agency, JSC Expert RA.

Raising financing for day-to-day operations and for projects

As part of its day-to-day operations, the Company successfully maintained the average interest rate on its total debt portfolio[62] denominated in Russian roubles below 8.7% as at 31 December 2021. Despite the economic crisis caused by the COVID-19 pandemic, throughout 2021, the Company maintained sufficient liquidity to ensure that it and its organisations operate normally and fulfil their contractual obligations on time.

[62] Including the scope of ROSATOM.

JSC Atomenergoprom obtained funding on preferential terms for the implementation of digital transformation projects aimed at improving management efficiency in the nuclear industry and implementing domestically produced IT solutions that do not rely on imported technology as part of a subsidy programme run by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation pursuant to Decree No. 1598 of the Government of the Russian Federation dated 5 December 2019, with a total limit of RUB 2.635 billion. In addition, in 2021, JSC ZIO-Podolsk secured investment funding for equipment purchase and modernisation totalling RUB 973.4 million at a preferential rate as part of the corporate competitiveness improvement programme approved by Decree No. 191 of the Government of the Russian Federation dated 23 February 2019.

The Company continued to use suretyship to secure obligations of organisations in the industry to their counterparties. This measure helps to reduce both the cost of bank guarantees and the cost of financing raised by the Company (including interest expenses).

The Company continued to search for sources of financing for projects in traditional and new business areas:

- A project finance deal was closed as part of the project to build a 340 MW wind power plant. This is the first project involving the use of sustainable finance mechanisms: the price terms of the credit facility are linked with target indicators for the construction and operation stages. The use of this model is vitally important for the Corporation in the context of its efforts to accomplish long-term sustainable development objectives. The bank will provide RUB 40 billion for a 12-year period;
- As a follow-up to export credit support arrangements for ROSATOM's projects made with the French Export Credit Agency Bpifrance Assurance Export and formalised in the outcome document of the 26th session of the Franco-Russian Economic, Financial, Industrial and Trade Council (CEFIC) held on 21 December 2021, the Corporation continued to cooperate with the French Ministry for the Economy and Finance in order to develop a 'new mechanism' for financing its overseas NPP construction projects. Despite challenges posed by the pandemic, throughout 2021 the Corporation held talks with the Ministry, including a technical workshop for the French Ministry for the Economy and Finance (the Ministry), the French Export Credit Agency Bpifrance Assurance Export, banks and French industrial companies to present ROSATOM's current and future overseas NPP construction projects and project risk management mechanisms used at the investment and operation stages of project implementation;
- As part of the development of a concession model for the financing of construction of a pilot small nuclear power plant in the Sakha Republic (Yakutia), an agreement on the implementation of a zero-carbon nuclear power generation project in the Arctic zone of the Sakha Republic (Yakutia) was signed with the Ministry for the Development of the Russian Far East and Arctic and the Head of the Sakha Republic (Yakutia) at the 2021 Eastern Economic Forum. An interdepartmental working group was established in order to review matters related to a federal concession for the project; the group consists of representatives of ROSATOM and its organisations, the Ministry for the Development of the Russian Far East and Arctic, the Ministry of Economic Development and the Ministry of Energy of Russia;
- As part of the project to build the multipurpose fast neutron research reactor (MBIR), the first syndicated loan agreement in the nuclear industry based on the principles of the Project Finance Factory was signed (pursuant to Decree No. 158 of the Government of the Russian Federation dated 15 February 2018), with the target amount of funding to be raised from the banks totalling RUB 23.3 billion;
- A financial partner was selected as part of the Federal Project titled 'Infrastructure for the Management of Hazard Class 1 and 2 Waste' that is being implemented by ROSATOM. The project involves setting sustainable development targets, the achievement of which will result in a decrease in the cost of financing;
- The Company continued to take steps to promote project finance instruments in the industry, accumulate and share the relevant experience. This included holding several meetings of the industry-wide expert panel on the structuring of project finance in 2021;
- An interdepartmental working group on cooperation on strategic priorities and promising development areas formed jointly with the Autonomous Non-Profit Organisation Agency of Technological Development (the competent agency of the International Fund of Technological Development) continued to operate;
- A 'packaged' project finance solution was developed for investment projects of JSC Atomenergomash, which made it possible to set out specific, structured requirements of financial institutions in terms of the necessary materials and explanations concerning potential projects. The development of 'packaged' project finance solutions for ROSATOM's investment projects will be continued in 2022.

Plans for 2022 and for the medium term

- To roll out the Payment Factory project;
- To ensure a consistent payment discipline for intra-group financing;
- To improve the accuracy of medium-term cash flow planning;
- To prevent internal competition for credit resources between organisations;
- To continue to centralise cash management;
- To focus on maintaining relations with supporting banks as the most reliable partners providing accessible funds in terms of both volumes and cost;
- To fulfil all obligations (including covenants) to existing lenders and rating agencies;
- To discuss project financing arrangements in order to reduce recourse on the Company and minimise the use of its consolidated investment resources (including through the use of project financing instruments);
- To expand the range of financing instruments used by the Company (where it is economically feasible to do so) in order to reduce the cost of debt service and ensure timely and full financing of the investment programme of organisations in the industry on acceptable terms and conditions;
- To continue to discuss potential areas of cooperation in the sphere of digitisation with banks.

7.4. INVESTMENT MANAGEMENT

Key results in 2021:

- The investment programme was 76% completed (+3 p.p. compared to 2020).
- Return on the investment portfolio stood at 16.6% (+2.4 p.p. compared to 2020).

Key approaches to investment management

- A distributed system has been built for investment decision-making by the governing bodies of the Company and its organisations; it is aligned with the distribution of competence centres in the industry;
- A phase-gate approach is applied to project implementation, with decisions on key milestones made in a staged process;
- Key projects are monitored at the corporate level;
- Investment decisions related to day-to-day operations of assets are delegated to the Company's organisations in order to speed up the decision-making process;
- To improve the quality of investment decision-making, opinions of experts independent from the project initiator are taken into account;
- The Company's project portfolio is built as a set of projects of organisations in the industry for a year and for the medium term based on available investment resources and the required rate of return;
- Experts are engaged to perform an in-depth probabilistic risk analysis for significant projects; the findings of analysis are incorporated in the decision-making system;
- A comprehensive audit is conducted, which helps to formulate recommendations on how to improve project planning and implementation;
- Measures to raise external financing for projects are being developed.

Results in 2021

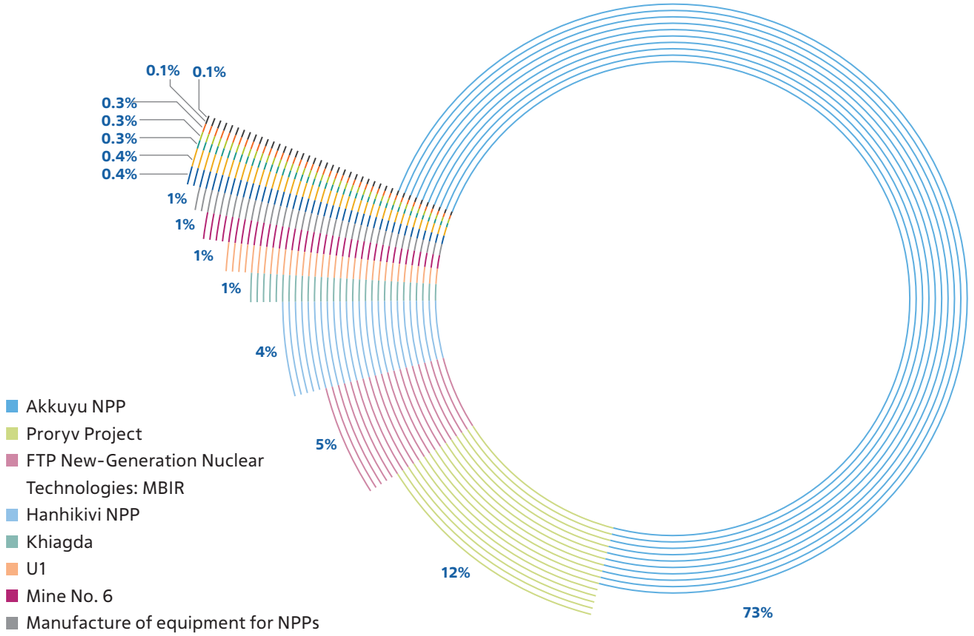
In 2021, the investment programme of the Russian nuclear industry was 76% completed[63].

Performance against the targets of the investment programme (including in the Divisions) increased by 3 percentage points compared to 2020 due to the gradual lifting of COVID-related restrictions.

[63] Including the investment programme of JSC Rosenergoatom. Deviation from the target was caused by a decline in activity amid COVID-related restrictions in 2021.

At the same time, overall return on the investment portfolio stood at 16.6%[64].

Breakdown of investments in significant projects[65]



[64] Calculated for the period from 2021 through 2099.

[65] Apart from NPP construction in Russia.

Measures to improve investment efficiency

In the reporting year, the basic project management principles applied during the implementation of federal projects by the Company and its organisations were formalised.

Measures to improve the maturity of project management in the Company's organisations were updated.

Employees in the industry continued to develop their competences at the Project Management School. 401 people underwent assessment and subsequent training in 2021.

Investment processes were adapted to remote work, with resolutions on projects and the portfolio reviewed, agreed and approved/signed off virtually.

The Investment Strategy tool was operationalised in Financial Responsibility Centre 2; this is an additional medium-term investment and project planning tool that forms part of the overall industry-wide investment strategy and contains information on focus areas of investment activities and organisations in the industry that are participating in them.

Project costs fully financed using proceeds from operating activities were reviewed in four Divisions. It was established that the relevant workload was insignificant; a list of subsequent necessary adjustments to planning mechanisms in the Divisions and steps required for scaling up the solution across the industry was compiled.

A summary of guidelines and regulations on project management in the industry was put into effect. It consolidates and supersedes previous documents on these matters taking into account discrepancies between various documents. In addition, it has considerably simplified the application of the local regulatory framework governing projects and investment activities.

The project to migrate the Sirius information system to a new software platform has been approved and is being implemented as planned.

Plans for 2022 and for the medium term

- To continue to develop project methodology on a systematic basis; to expand the scope of resources provided to project initiators by the specialised industry-wide centre;
- To align the medium-term investment planning mechanism (investment strategy) with strategic and budget planning tools and schedules;
- To expand the practical application of road maps in portfolio investment management;
- To adjust project execution plans in order to minimise the lag caused by restrictions imposed in 2021 in response to the pandemic;
- To increase the level of digitisation of projects and investment activities.

7.5. INTERNAL CONTROL SYSTEM

Key results in 2021:

- Inspections conducted in the Company and its organisations by supervisory government agencies did not reveal any major violations.
- Internal control performance was highly rated by internal* customers in the Company (with a score of 6.5 out of 7 against a target of 5.7).
- An Audit Committee was established under the Board of Directors of JSC Atomenergoprom.
- - A 'reasonable level of assurance' was expressed for the internal control and audit function in an international ranking**.

** Internal customers are the Company's business process owners that request internal audit services.*

*** The methodology of the Vigeo Eiris rating agency includes three levels of assurance: 'reasonable', 'moderate' and 'weak'.*

The internal control system in ROSATOM and its organisations (including JSC Atomenergoprom) is based on: GRI 103-2

- Russian laws and regulations;
- The IAEA requirements;
- The COSO model (The Committee of Sponsoring Organisations of the Treadway Commission);
- Guidelines for Internal Control Standards for the Public Sector by the Internal Control Standards Committee of the International Organisation of Supreme Audit Institutions (INTOSAI).

The Company's internal control system covers all organisations of JSC Atomenergoprom. The Company recognises the importance of building and improving the internal control system both in the parent company and in subsidiaries.

Key characteristics of the work of specialised internal control bodies (SICBs) in JSC Atomenergoprom's organisations, which perform internal control and audit functions in the Company, include the following:

- Preventive control and development of timely, comprehensive and practicable corrective measures;
- Efficient communication and cooperation with operating divisions at all stages of operations;
- Proactive change management;
- Growing demand from executives in the Company's organisations for advisory services provided by the SICBs.

Results in 2021

To assist the Board of Directors of JSC Atomenergoprom in fulfilling its corporate governance and control responsibilities with regard to the organisation's financial statements, its internal control and risk management systems, internal and external audit functions and the monitoring of the Company's financial and business operations, an Audit Committee was established under the Board of Directors of JSC Atomenergoprom in 2021.

In order to provide reasonable assurance regarding the achievement of the business goals of the Company and its organisations, the position of Chief Auditor of the Company was introduced.

The following measures were implemented in order to improve the internal control system in the Company and its organisations:

- The SICBs of the Company's organisations assumed greater responsibility by adopting a leadership model;
- Priorities for the development of control activities in terms of assisting the business in the achievement of sustainable development goals were determined;
- Control activities were focused on the implementation of federal projects and strategic programmes in which the Corporation and its organisations participate, with 78% of control activities focused on the achievement of strategic goals, including 17% focused on project implementation;
- Project audit techniques were mastered, and criteria were established for assessing project management performance;
- Employees of the SICBs underwent certification in accordance with the professional standard for internal auditors.

Outcomes of inspections conducted by the SICBs in the Company's organisations in 2021

In the reporting year, the SICBs conducted 444 inspections in the Company's organisations. Following the inspections, 1,946 corrective measures were developed and approved for implementation.

Based on the findings of inspections conducted in the reporting year, disciplinary sanctions were imposed on 328 employees of the Company's organisations, including 35 senior managers.

Stakeholder control

In 2021, a range of features and functionality for filing complaints regarding procurement processes conducted in accordance with the Company's Uniform Industrial Procurement Standard (the Regulations on Procurement) (UIPS) in electronic form on the relevant page on the official procurement website of the nuclear industry and on electronic trading platforms became operational. The Company continues to operate the Partner Special Monitoring and Analytics Unit designed for integrating ROSATOM's information systems in real time; it contains full information on complaints regarding procurement processes in the nuclear industry, as well as indicators for online monitoring of procurement procedures.

The Company continues to maintain a public information system for calculating the business reputation score of suppliers, which is one of the key risk assessment tools used in the course of procurement in the nuclear industry.

The Company carries out methodological work to produce recommendations and proposals for improving procurement processes in the nuclear industry based on the findings of investigation of complaints.

As part of training programmes, an online course titled 'Procurement Monitoring in the Nuclear Industry' was developed in cooperation with ROSATOM's Corporate Academy for the Procurement School run by the Academy. Webinars are held for employees of the procurement function and controllers; they are focused on the most frequent issues and irregularities in the sphere of procurement.

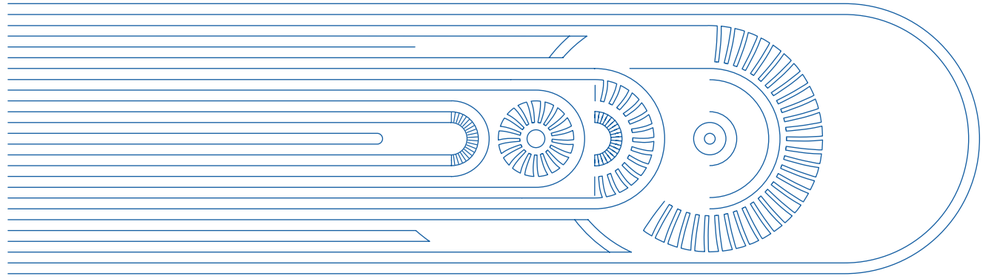
The Central Arbitration Committee and the arbitration committees of the Power Engineering and Fuel Divisions received 701 reports (complaints) from stakeholders regarding violations of procurement rules established by Russian legislation, the UIPS and other regulations of the Company and its organisations supporting the UIPS. 396 complaints

were investigated; 104 complaints (26.3% of the total number of investigated complaints) were deemed to be valid. Other complaints were withdrawn by complainants or were dismissed on the following grounds:

- Because the deadline for filing the complaint had expired;
- Because a similar complaint had been accepted for investigation or investigated by the Federal Antimonopoly Service;
- Because the complainant was not entitled to file a complaint (after the deadline for submitting bids has expired, complaints may only be filed by bidders that have submitted a bid);
- Because the defendant had taken corrective measures to address the violation before the complaint was investigated by an arbitration committee.

Systematic efforts of arbitration committees (including detailed explanations provided to customers/procurement authorities during the investigation of complaints concerning the nature of detected violations), the publication of biannual practice reviews and a library of arbitration practices maintained on the official procurement website of the nuclear industry helped to minimise the number of violations in the procurement process, which was reflected in a 25% decrease in the number of valid complaints as a percentage of the total number of purchases (from 0.19% in 2020 to 0.14% in 2021).

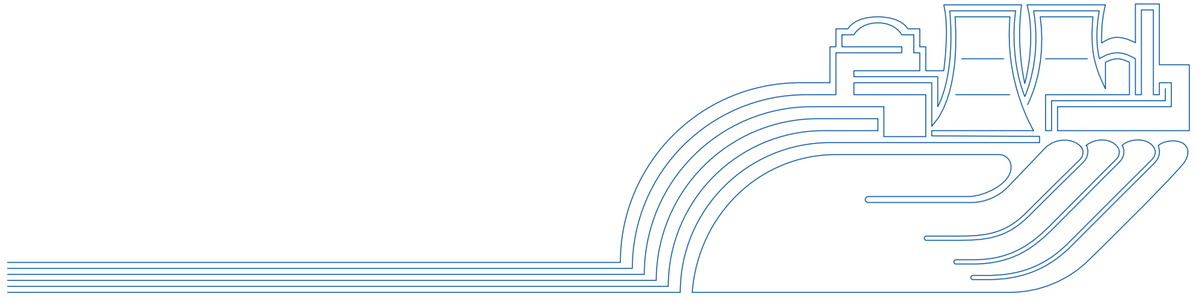
In addition, the Central Arbitration Committee reviewed 31 complaints related to the calculation of the business reputation score of suppliers (with five complaints deemed to be valid), reflecting a 20% increase compared to 2020.

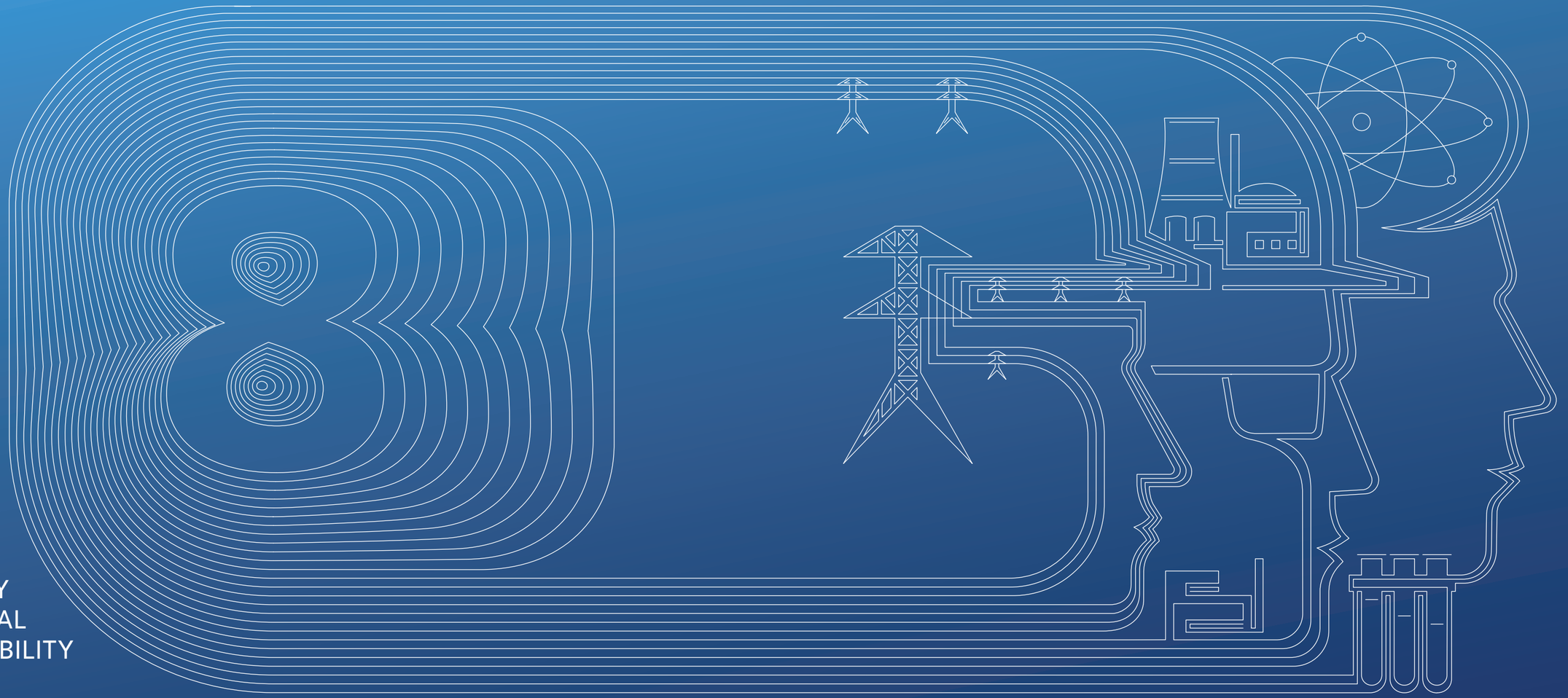


Plans for 2022

In 2022, efforts aimed at improving the performance of governance and internal control systems in the Corporation and its organisations and further enhancing control activities will involve implementing a set of measures, including the following:

- Rolling out project audit and strategic audit practices;
- Mastering strategic auditing techniques;
- Developing control activities with a focus on improving the maturity of the industry in the sphere of sustainable development;
- Digitisation of control activities;
- Automation of the information system for calculating the business reputation score;
- Creating a Q&A forum for suppliers;
- Developing a methodology for monitoring current procurement procedures.





HR POLICY AND SOCIAL RESPONSIBILITY

8.1. PERSONNEL MANAGEMENT

Key results in 2021:

- The average monthly salary totalled RUB 105,300.
- 29% of employees were aged under 35.
- 102 graduates of core universities were hired by the Company.

For JSC Atomenergoprom to achieve its strategic goals, it is necessary to fully unlock the potential of its employees. Accordingly, people are the Company's most important capital. The Company's HR policy prioritises the rapid development of competences, the ability to work in a new, changing environment and the training of leaders at all levels.

GRI 102-7
GRI 102-8

In 2021, JSC Atomenergoprom and its organisations employed 138,660 people[66]. 88,200 employees have a university degree. 1,489 employees are Candidates or Doctors of Sciences.

31% of the Company's employees are women and 69% are men.

The age of employees averaged 43.2 years.

29% of employees were aged under 35[67].

JSC Atomenergoprom's organisations operate in 50 regions of Russia and have a total of 139,500 employees[68].

ROSATOM's organisations with the highest headcount are situated in the following regions:

- Moscow and the Moscow Region: over 35,000 people;
- Saint Petersburg and the Leningrad Region: over 12,000 people;
- Sverdlovsk Region: over 9,000 people;
- Rostov Region: over 8,000 people;
- Nizhny Novgorod and Kursk Regions: over 7,000 people each.

[66] Average headcount.

[67] For details, see Appendix 2.

[68] No records are kept on the average number of employees and external part-timers in the overseas branches of the Company and its organisations; no breakdown by gender or age is provided for the overseas branches.

JSC Atomenergoprom's organisations operate in 28 foreign countries, where they employ 5,700 people[69] (4.2% of the Company's total headcount), with the highest headcount in the following countries:

- CIS countries (Belarus, Ukraine, Kazakhstan): over 2,800 people;
- Turkey: 1,800 people.

Personnel costs

In 2021, personnel costs totalled RUB 235.1 billion[70], up by 9.2% year on year. Costs per employee increased from RUB 1,533,000 in 2020 to RUB 1,686,600 in 2021 (up by 10%).

Structure of personnel costs, %

	2019	2020	2021
Payroll	74.6	74.9	74.9
Insurance contributions	21.0	20.9	20.3
Social and other expenses (including training)	4.4	4.2	4.8

Performance management

GRI 103-1
GRI 103-2

In order to standardise approaches to the development and implementation of the HR policy in the nuclear industry as part of a uniform governance approach, a performance management system has been introduced in the Company's organisations.

Responsibility for HR management in JSC Atomenergoprom lies with the Deputy Director General for HR of ROSATOM.

The current industry-wide performance management system ensures the continuity of the Company's long-term and operational goals and helps to align them with the goals and objectives of employees. The key performance indicators of JSC Atomenergoprom, as approved by the Supervisory Board, are decomposed from the top management level to the heads of industry organisations up to and including the sixth management level.

[69] No records are kept on the average number of employees and external part-timers in the overseas branches of the Company and its organisations; no breakdown by gender or age is provided for the overseas branches.

[70] Including payroll costs, social expenses, expenditure on personnel training, development and evaluation, and other personnel costs.

The industry-wide approach to performance management is based on standardised principles, which provide uniform criteria for decision-making on remuneration, horizontal and vertical movement of employees, their inclusion in succession plans and nomination as candidates for inclusion in the succession pool.

GRI 103-3

The performance management process is automated through an integrated industry-wide system, RECORD[71].

Remuneration system

The Company's current remuneration system:

- Provides competitive remuneration matching the level of remuneration in the best companies in Russia;
- Is result-based: the size of an employee's salary is linked to their efficiency, professionalism and achievement of key performance indicators (KPIs).

The Company has in place a flexible remuneration system which includes a variety of tools ensuring that employees achieve business targets and are closely focused on results.

In accordance with the requirements of the Integrated Industry-Wide Remuneration System and the Uniform Industry-Wide Performance Management Policy, the size of the annual bonus paid to employees depends on achieving KPI targets and reflects progress in achieving the key performance targets of the Company and its organisations.

KPIs of executives are based on strategic goals, priorities and key performance indicators; strategic objectives set for organisations are converted into KPI maps of their executives and cascaded down to business units and employees.

In 2021, the average monthly salary per employee of JSC Atomenergoprom increased by 10.6% compared to 2020 and totalled RUB 105,300 per month.

Executive succession pool

In order to ensure succession and train employees to be appointed to managerial positions, an executive succession pool (ESP) is being formed and developed in the Russian nuclear industry.

[71] For details, see: https://strana-rosatom.ru/2019/06/25/poshli-na-rekord/.

ESP members are included in the succession pool through the career and succession planning process. The ESP is divided into four levels in order to select development programmes that are best suited to the target positions of ESP members. The ESP level is determined based on the target position:

- ROSATOM's Assets and ROSATOM's Assets. Basic Level (top and senior executives);
- ROSATOM's Capital (middle-level executives);
- ROSATOM's Talents (promising specialists and junior executives).

Since the establishment of the executive succession pool, the number of its members has exceeded 5,400. 91.02% of ESP members were appointed to a new position by the end of 2021.

Number of ESP members with a breakdown by gender

	2019		2020		2021	
Gender	**Number**	**Share**	**Number**	**Share**	**Number**	**Share**
men	2,884	79%	3,918	78%	4,279	77%
women	765	21%	1,093	22%	1,186	23%

Appointments of ESP members to a new position, %[72]

	2019	2020	2021
Share of ESP members appointed to vacant top and senior executive positions (top 30 and top 1,000 executives in the industry)	67.5	68.17	70.37
Share of ESP members among senior, middle-level and junior executives appointed to a new (management) position	74.36	79.65	91.2

A special feature of succession pool development programmes is their practical focus. Future executives not only complete training modules, but also work on their own projects contributing to the achievement of strategic goals.

[72] Since 2018, the calculation of the indicator has changed: the promotion of succession pool members was assessed based on the number of ESP members appointed to new positions over the last three reporting years. In 2019, 2020 and 2021, the assessment focused on the share of promoted ESP members who had been included in the ESP in 2017, 2018 and 2019 respectively.

Training as part of ESP development programmes

ESP level	Development programme	Key training topics	Number of participants[73]		
			2019	2020	2021
Senior executives	ROSATOM's Assets	Shaping the Future, Virtuosos of Management, Communication in Times of Change, Marketing, Finance	324	368	391
	ROSATOM's Assets. Basic level	Strategy, Leadership and People Management, Change Management and Horizontal Interaction, Marketing, Finance	250	368	427
Middle-level executives	ROSATOM's Capital	Leadership and Project Management, Advanced Leadership Skills, Data Management, Situational Leadership	1,800	2,060	2,271
Junior executives	ROSATOM's Talents		1,956	2,215	2,376
Total			**4,330**	**5,011**	**5,465**

Successor assessment

GRI 404-2
GRI 103-3

In order to facilitate rapid competence development, which is one of the priorities of the Company's HR policy, an innovative approach to assessing high-potential employees has been introduced in the Russian nuclear industry. As part of this approach, executives are involved in talent pool assessment and have a greater personal responsibility for developing succession plans and reducing the duration and cost of assessments. The methodology is based on the best practices adopted in major international companies and was piloted in 2018. In 2021, the methodology was rolled out in 15 divisions in the industry (92 organisations), and 1,535 candidates for executive positions were evaluated by managers of enterprises and holding companies. Following the evaluation, each candidate received feedback providing them with a clear insight into their career prospects and recommendations for development.

[73] The number of participants included in the ESP is shown as a cumulative total for the period from 2017 through 2021.

Career counselling

GRI 404-2

To achieve ROSATOM's 2030 Vision of Being the Best in Unlocking Employees' Potential, in 2020, the Company launched a new service for employees: individual career counselling. 54 in-house specialists advise employees in the industry on their career tracks and career development plans. In 2021, 1,045 consultations were held in more than 70 organisations in the industry.

In 2021, the service was highly rated by employees (75% would recommend the service to their colleagues, and 89% are satisfied with the advice they have received).

Employee training

GRI 103-1

One of ROSATOM's strategic priorities is to become the best at unlocking employees' potential. Accordingly, the Company's HR policy prioritises competence development and employee training.

More than 116,400 employees of JSC Atomenergoprom and its organisations underwent training or retraining or completed professional development programmes in 2021.

The number of training hours per employee in JSC Atomenergoprom's organisations averaged 52.72 hours in 2021.

Annual average training hours per employee in JSC Atomenergoprom's organisations by employee category

Employee category	2019	2020	2021
Executives	55.8	60.2	81.4
Specialists and white-collar workers	30.7	34.8	50.7
Blue-collar workers	33.1	44.0	61.9

GRI 404-2

Traditionally, training for specialists and executives in the industry is provided primarily by the Corporate and Technical Academies of ROSATOM. Currently, both Academies are full partners of ROSATOM in the implementation of strategic objectives; they implement projects directly relevant to prioritised areas of business development.

The portfolio of ROSATOM's Corporate Academy comprises more than 500 training programmes, including those focused on training the participants of global projects, developing the executive succession pool, as well as training digital leaders, RPS leaders and entrepreneurial leaders responsible for developing new products. In addition, ROSATOM's Corporate Academy implements projects focused on promoting the employer brand among schoolchildren and students, recruiting talented graduates, developing the corporate culture in the field of digitisation and safety, developing employees' leadership potential, developing the competences of workers and engineers in accordance with WorldSkills standards, etc.

ROSATOM's Technical Academy specialises in continuing professional education and retraining of executives and specialists in the nuclear power industry. It is ROSATOM's educational, research and guidance centre focused on ensuring the safe use of nuclear energy, state security, operational and supporting processes. In addition, ROSATOM's Technical Academy is an international platform for knowledge sharing and competence development in the nuclear industry; it also acts as a technology integrator providing training for the personnel of nuclear power plants.

The portfolio of the Technical Academy comprises more than 300 continuing professional education programmes focused on nuclear and radiation safety, industrial safety, information security, occupational safety and health, NPP operation, design and construction, IT solutions that do not rely on imported technology, and a wide range of other topics.

GRI 403-5

In 2021, the Company continued to develop distance learning and e-learning formats. The share of distance learning in the industry reached 39%. 97% of training programmes run by the Corporate Academy and 67% of training programmes run by the Technical Academy were delivered online.

Digital competences and culture

To achieve technological leadership, the Company continued to take steps to improve digital literacy among both ROSATOM's employees and school and university students.

Key results included the following:

- A digital quiz was held in order to test critical knowledge in the industry.
- The amount of digital literacy training completed by ROSATOM's employees (measured as the number of participants multiplied by the number of completed courses) totalled 201,562 person-courses; more than 1,200 executives completed training focused on developing competences relevant to digital transformation.
- Online events focused on ROSATOM's technological development initiatives and projects were attended by more than 1 million people, with more than 30,000 people participating in in-person events.
- Joint programmes were launched with Moscow School of Management SKOLKOVO and Peter the Great St. Petersburg Polytechnic University: Digital Transformation Management and Digital Production Management.
- The Nuclear Agile industry club was launched for project managers from 150 organisations across the industry, including those in digital businesses.
- Training remains accessible on any device anywhere 24/7 through the RECORD Mobile training platform. The RECORD Mobile platform is available as both a mobile app and a web app. In 2021, users of the platform completed 1,051,116 training courses totalling 1,310,374 man-hours. The number of completed courses more than doubled compared to 2020. The user rating stands at 4.1 out of 5.
- The Company continued the rollout of the Employee's Personal Account, an online HR service for employees. It is now available in 75 organisations; 80,000 employees have already used the service. The user rating stands at 4.7 out of 5.
- The Company completed the implementation of the Digital Assistant Mark. This is a chatbot that is available in a mobile app; it enables employees to generate an online request and get a prompt response on popular services. The service is available in 75 organisations with a potential reach of 100,000 users. 16,000 employees have already used it. The user rating stands at 4.2 out of 5.).

Activities of Change Support Teams (CSTs)

The Corporation has a tradition of supporting 'bottom-up' initiatives and thus enabling talented employees to fulfil their potential.

CSTs comprise proactive employees who implement projects to drive changes. Participation in the CSTs not only enables them to put their ideas into practice, but also provides an informal channel for prompt and direct communication with industry executives. In turn, this provides employees with new career opportunities and becomes an effective tool for developing future leaders at the local level. To date, more than 100 change support teams have been formed, comprising about 2,500 employees from across ROSATOM. Further steps were taken to develop the competences of workers and engineers.

Currently, 92 projects are underway in the industry, including 43 new projects launched in 2021. They are being implemented by 86 teams comprising 1,500+ employees.

Protecting our employees (maintaining employment; providing safe working conditions; healthcare; training; working arrangements; sanitary and hygienic procedures)

During the pandemic, JSC Atomenergoprom managed not only to maintain the scope of its employee training and development programmes, but also to make a 'quantum leap' in the transition to digital resources and to create a fully fledged digital training environment. By converting some compulsory training programmes to a distance learning format, the Company avoided the risk of missing the deadlines for obtaining licences and work permits and ensured the continuity of its production processes.

Amid the pandemic, a major campaign was launched to help employees in the industry combat COVID-19. Regular webinars were held on the topics of COVID and anti-COVID measures, remote work, work-life balance and self-discipline; numerous leaflets and posters on compliance with anti-COVID measures were issued; Golden Rules of Safe Conduct were developed, and their active implementation was initiated at the local level; and a catalogue of best practices adopted in the industry was compiled. The Corporation improved the organisation of the COVID-19 vaccination process: it worked with the FMBA of Russia and representatives of regional governments to make vaccines available in all its regions of operation. These measures helped to curb the spread of COVID-19. As a result of these efforts, as at 31 December 2021, 87% of employees in the Russian nuclear industry had been vaccinated.

To ensure operational continuity in the industry, the Company continued to provide backups for all key jobs and arrange backup shifts for operating personnel.

JSC Atomenergoprom established special sanitary and hygienic procedures for employees in its enterprises, including regular contactless thermometry, monitoring of the use of face masks, social distancing, the use of sanitisers, disinfection of offices, common areas, industrial facilities and vehicles, as well as separating the flows of people at the entrances and in production facilities.

Participation of employees in external and industry-wide professional competitions

Leaders of Russia

In the reporting year, 17 representatives of nuclear organisations, including three girls, reached the super final of the Leaders of Russia competition, setting a new record.

WorldSkills and professional events

Employees in the nuclear industry achieved impressive results in professional events and competitions.

The Corporation's team (including representatives of JSC Atomenergoprom's organisations) topped the medal table of the WorldSkills Hi-Tech National Competition of Cross-Industry Skilled Professions for Workers in High-Technology Industries held in accordance with the WorldSkills methodology for the seventh time.

In 2021, more than 260 employees from 11 divisions in the industry, as well as students and professors from NRNU MEPhI took part in the competition. The team members won a total of 34 awards: 21 golds, nine silvers and four bronzes. This is the highest medal count in the history of the competition. In the age group competition, ROSATOM's team competed across 24 competences and won 16 golds, five silvers and three bronzes. ROSATOM's team also ranked first in the Lean Manufacturing competence, which was represented for the first time in the 8th National Competition of Cross-Industry Skilled Professions for Workers in High-Technology Industries, WorldSkills Hi-Tech 2021, in Ekaterinburg. The Optimisation and Productivity Competition was held for the first time.

The AtomSkills competition featured contestants and experts from 16 of ROSATOM's Divisions, specialists from a number of major industrial companies, as well as experts and students from more than 20 universities and educational institutions. A total of more than 1,100 specialists and experts from more than 30 regions of Russia took part in the competition. By 2021, the number of competences represented in the AtomSkills competition reached 37. In September, the team of ROSATOM and NRNU MEPhI competed in 10 out of 35 competences represented in the Digital Skills 2021 competition and won nine awards.

Participation in competitions held in accordance with the WorldSkills methodology and awards won in 2021

Competitions	Competences represented	Total medal count	Gold	Silver	Bronze
National competitions					
WorldSkills Hi-Tech 2021. Main age group	24	34	21	9	4
WorldSkills Hi-Tech Skills of the Wise 2021 (aged 50+)	24	24	16	5	3
	Total	**58**	**37**	**14**	**7**

ROSATOM's Person of the Year

2021 saw the largest award ceremony in the history of the industry-wide recognition programme, ROSATOM's Person of the Year. For the first time ever, the award ceremony was held for the finalists of two years: 2019 and 2020. During a two-day off-site event held in Sochi, awards were handed out to 800 finalists in 130 individual and team categories. The event was held in full compliance with all the relevant safety protocols and the requirements of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor).

Corporate volunteering

GRI 103-2

ROSATOM's approaches and principles of volunteering

The corporate volunteering programme was launched in the nuclear industry in 2018. ROSATOM has developed an integrated system for planning and implementing volunteer initiatives in the industry, which is based on the following principles:

- Alignment of projects with the needs of the region, taking into account the level of its social and economic development and non-profit organisations operating in the region;
- Alignment with the Sustainable Development Goals prioritised by the Company;
- Alignment with national development goals and regional practices;
- Alignment of initiatives with the mission and values of the organisation and expectations of key stakeholders;
- The focus of projects on providing long-term benefits to the region as a whole and improving the standard of living of a specific group of beneficiaries. These benefits must be clear and measurable.

As part of vertical management, a pool of industry-wide projects and standardised campaigns was formed, and general guidelines were prepared for all organisations in the nuclear industry.

In 2021, about 350 volunteer campaigns were conducted in the Company. The total number of volunteers at ROSATOM exceeds 5,500 people.

Prioritised areas of volunteer activity

The Company, jointly with volunteers from its key Divisions, has identified the following five main areas of volunteer activity:

- Environmental conservation (awareness campaigns, clean-ups, planting of seedlings, waste management);
- Supporting socially disadvantaged groups (low-income families, orphans, the elderly);
- Promoting a healthy lifestyle (blood donations, sporting events);
- Career guidance and mentoring (lessons in schools, guided tours for the general public, intellectual games, competitions);
- Intellectual volunteering (leveraging employees' professional skills in the regions of operation).

The programme to develop volunteering is targeted at several audiences: employees in the industry, local residents in the Company's regions of operation (including young people) and the business community.

In 2021, a system was built in the nuclear industry to identify, support and develop employees' volunteering practices; a comprehensive communications campaign was conducted in the industry media to promote the volunteering and corporate social responsibility (CSR) agenda; a training module was developed (it comprises over 100 hours of educational content focused on volunteering, the environmental culture and CSR); a two-day industry-wide online conference titled 'Corporate Volunteering in the Nuclear Industry' was held and was attended by 150 employees.

Projects were underway to develop 'green towns and cities'. They included a range of activities, such as environmental clean-ups, plogging campaigns, the collection of municipal solid waste, environmental flash mobs, lectures for children and students, environmental festivals in the Company's host towns and cities, development and distribution of communication materials, landscaping, and making promotional products from recycled materials. Most activities also involved elements of gamification.

As part of volunteer initiatives, special focus is given to career guidance projects. Volunteers from among the Company's employees engage not only with school and university students, but also with children from orphanages, disabled children and teenagers, as well as children from disadvantaged backgrounds. The Company also piloted an initiative to conduct thematic educational activities for students from Bolivia, with more than 500 people participating in the project.

In addition, as part of pro bono initiatives, training is provided for non-profit organisations and small businesses to enable them to find new solutions and tools for development. This will certainly contribute to improving infrastructure and the standard of living in towns and cities.

Employees of JSC Atomenergoprom's enterprises regularly participate in blood donation campaigns; this includes undergoing blood typing in order to join the bone marrow register. Blood donation campaigns are held regularly, with the number of donors increasing year by year.

During the year, the Company produced more than 350 publications on volunteering and the environmental culture and posted them on a thematic page for employees in the industry; an awareness marathon focused on environmentally responsible behaviour was conducted for young people on the dobroinrussia public page. In addition, in 2021, the Company partnered with the Association of Volunteer Centres to produce a course of lectures on environmental volunteering, which has been made publicly available.

The Company actively engages with various non-governmental organisations to shape a common agenda on volunteering, CSR and sustainable development. A council under the Russian Chamber of Commerce and Industry has developed a comprehensive programme to establish a social agenda at various levels. In addition, the development of a professional standard for CSR managers has been initiated.

Volunteer training

In 2021, the Company launched the first-ever corporate volunteer university, which provided training in key competences required by volunteers. 15 companies and more than 250 volunteers took part in a three-month training course. In addition, four cross-corporate meetings were held jointly with Metalloinvest, KFC, MTS and Russian Railways to enable corporate volunteers to share their experience.

The Company also developed a series of educational events for local residents in its regions of operation and for young people with a focus on social leadership, entrepreneurship, volunteering and social entrepreneurship, and produced communication materials to promote the environmental culture and responsible consumption.

Representatives of universities are involved in volunteer campaigns (for instance, more than 300 students of NRNU MEPhI take part in environmental field trips).

Grant competitions are held for non-profit organisations, educational institutions and volunteer communities. For instance, in Usolye-Sibirskoye, a grant competition was held, with 57 applications submitted, and an educational programme was implemented.

Employees' children are also involved in the environmental and volunteering agenda as part of family days (which are regularly attended by more than 200 children) and through special communication projects (the Clean Energy interactive game for the App Store, which has been downloaded by more than 2,000 people; comic strips, posters and videos).

Social policy

JSC Atomenergoprom's social policy is designed to:

- Make the Company more attractive as an employer;
- Recruit and integrate young professionals and highly skilled specialists;
- Increase employee loyalty;
- Increase the efficiency of social expenditure.

Benefits provided to employees and retirees are aligned with the Uniform Industry-Wide Social Policy, which is based on standardised corporate social programmes.

Key corporate social programmes of JSC Atomenergoprom, RUB million

GRI 403-6

	2019	2020	2021
Voluntary health insurance	1,454.2	1,586.0	1,855.4
Accident and illness insurance	52.5	54.7	77.4
Health resort treatment and recreation for employees and their children, including:	739.8	416.8	729.6
health resort and rehabilitation treatment for employees	600.1	357.8	546.5
health resort treatment and recreation for children	139.7	59.0	183.1
Provision of housing for employees	491.2	614.3	532.6
Private pension plans	269.2	357.6	397.8
Support for retirees	967.0	893.4	874.9
Catering arrangements	54.2	355.2	412.0
Sporting and cultural events	1,031.4	1,034.4	1,042.9
Assistance to employees	841.9	936.5	1,089.2
Other	–	–	–
Total:	**5,901.5**	**6,249.0**	**7,011.8**

The Company is actively developing a corporate social programme focused on employee well-being, which was launched in the industry in 2020; its main goal is to improve the quality of employees' life. The programme includes measures to promote employees' physical, emotional, social, professional and financial well-being: health days (including those focused on healthy eating and lifestyle improvement), consultations and webinars conducted by medical specialists, webinars on financial literacy, a mental health support line, as well as opportunities to participate in charity work and other social initiatives.

GRI 402-1

Collective bargaining agreements cover 84.8% of employees in JSC Atomenergoprom's enterprises.

The Company notifies its employees of operational changes within the time frame stipulated in the Labour Code of the Russian Federation; accordingly, these time frames are not stipulated/the relevant information is not duplicated in collective bargaining agreements.

Due to the pandemic and the relevant restrictions on public events, in 2021, most sports and fitness activities continued to be conducted online.

The biggest sporting event of 2021 was the Running Race of Nuclear Towns and Cities; its participants included over 9,000 employees and members of their families, as well as residents of 50 towns and cities where nuclear organisations operate in six countries. They ran a total of 45,000 kilometres.

GRI 401-2

Compensation and benefits under corporate social programmes implemented by the Company are provided to full-time employees.

GRI 102-41
GRI 103-3

JSC Atomenergoprom adheres to an Industry-Wide Agreement on Nuclear Power, Industry and Science for 2018–2020 (the Agreement), which has been renewed until the end of 2022. The Agreement is based on the established practice of social partnership in the nuclear industry and is aimed at implementing the Integrated Standardised Remuneration System, the Uniform Industry-Wide Social Policy and the Occupational Health and Safety Management System.

The Agreement prioritises the protection of employees' life and health (see also the section 'Occupational Safety and Health'). Employers, jointly with the Russian Trade Union of Nuclear Power and Industry Workers, maintain records and analyse employee morbidity, including the results of periodic medical examinations and sick leave, and develop a comprehensive health improvement programme titled Health. The Agreement incorporates the opportunities provided by the legislation on special assessment of working conditions (SAWC) and establishes an additional mechanism for cooperating with the trade union in carrying out SAWC and analysing its findings.

Recruiting young professionals

GRI 103-1

JSC Atomenergoprom attaches great importance to working with young professionals and recruiting talented young people into the nuclear industry.

To encourage promising young specialists to work in the industry, the Company actively participates in federal events and projects: a nationwide student competition, Your Move; the Big Break All-Russian Competition for Schoolchildren; an academic competition, I'm a Professional; the CASE-IN International Engineering Competition; the Career Time nationwide campaign, including the Golden Internship competition; Internships 2.0; joint events held in cooperation with the Sirius Educational Centre, the Talent and Success Foundation and the Russian Znanie Society. The total number of participants of these projects exceeds 14 million people.

In 2021, ROSATOM conducted an industry-wide survey, The Path of the Youth in the Nuclear Industry, among more than 2,000 young employees and line managers. The Corporation also hosted the Forum of Youth Community Leaders and the ROSATOM Youth Congress.

As part of the programme to promote student construction teams in the nuclear industry, in 2021, more than 1,800 students from specialised educational institutions in the Russian Federation and the Republic of Belarus worked in 145 student construction teams (SCTs).

The Company continued to organise work placements for students from specialised educational institutions: more than 1,000 students completed internships in the Company's organisations in 2021.

In 2021, JSC Atomenergoprom's organisations hired 102 university graduates who had studied under arrangements with the Company's organisations.

Overall, JSC Atomenergoprom's organisations hired 537 graduates in 2021.

International cooperation in education

ROSATOM and JSC Atomenergoprom successfully export Russian nuclear education to potentially attractive markets. International students attend NRNU MEPhI, as well as core universities and partner universities.

In 2021, about 2,200 foreign students from 65 countries, including Armenia, Vietnam, Rwanda, Bolivia, Uzbekistan, Turkey, Bangladesh, Jordan, Egypt, Algeria, Nigeria, Kenya, Kazakhstan, Congo, Ethiopia, Hungary, Serbia, Bulgaria, South Africa, Ghana and other countries studied at Russian universities.

Core universities in the nuclear industry (NRNU MEPhI, Tomsk Polytechnic University, Saint Petersburg State University, Lomonosov Moscow State University) continue successful cooperation on joint educational programmes with foreign universities in partner countries, with NRNU MEPhI running more than 10 programmes.

Since 2019, the first overseas branch of NRNU MEPhI has been operating in the Republic of Uzbekistan. In 2021, the Tashkent Branch of NRNU MEPhI successfully conducted the third enrolment campaign. 100 people passed entrance exams and enrolled as first-year students, with more than three applicants competing for each place. In the 2021/2022 academic year, 262 people are studying at the Tashkent Branch of NRNU MEPhI as part of four Bachelor's degree programmes supported through government grants of the Republic of Uzbekistan.

Developing mutually beneficial cooperation aimed at providing JSC Atomenergoprom's partner countries with highly skilled specialists, as well as creating efficient national infrastructure for managing and regulating the programme for the peaceful use of nuclear energy are a priority for the industry.

Human rights

GRI 103-1
GRI 103-2

JSC Atomenergoprom actively supports and complies with employment standards pursuant to the legislation of the Russian Federation, industry-wide and internal regulations, and the Industry-Wide Agreement on Nuclear Power, Industry and Science.

The Industry-Wide Agreement on Nuclear Power, Industry and Science and the Company's internal regulations contain no provisions barring people from being employed in the industry on the grounds of gender, ethnicity, background, the level of personal wealth, marital or social status, position, age, place of residence, attitude towards religion, political opinions or membership of public associations.

The Company's top priorities in the sphere of employment rights and human rights are to provide a workplace environment that poses no risks to employees' lives or health and to promote a responsible approach to occupational health and safety at all management levels.

The Company and its organisations support freedom of association, recognise employees' inalienable right to collective bargaining and the right of each employee to collective representation of their interests, and respect employees' right to membership in organisations aimed at safeguarding and promoting their interests.

The Company and its organisations have adopted a responsible approach to respecting the rights and promoting the well-being of local communities in their regions of operation, cooperate with government bodies and treat local residents in their regions of operation with respect.

GRI 102-17

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

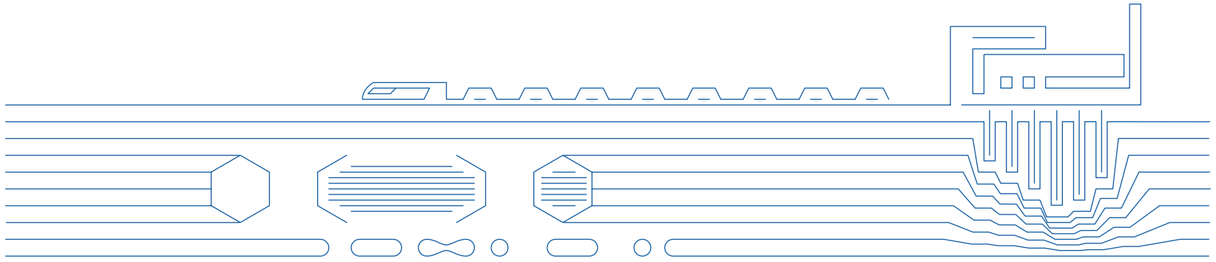
Code of Ethics[74]

GRI 102-16

ROSATOM and JSC Atomenergoprom have adopted a Code of Ethics and Professional Conduct for Employees. The Code of Ethics communicates the key values of the nuclear industry and defines the relevant ethical principles of employee conduct when interacting with a wide range of external and internal stakeholders. The rules of conduct set out in the Code concern combating corruption, protecting the Company's resources, property and information, occupational health and safety, industrial and environmental safety, conflict prevention and resolving conflicts of interest, as well as maintaining the corporate image.

Plans for 2022 and for the medium term:

- To create an environment for continuous development;
- To shape an open culture and encourage employee involvement;
- To develop a safety culture aligned with the Vision Zero paradigm (*for details, see the section 'Nuclear and Radiation Safety; Occupational Safety and Health'*);
- To improve the quality of employees' life and promote a healthy lifestyle;
- To continue to top the rankings of the best employers;
- To develop an online training system and increasing the number of employees covered by training programmes.



[74] https://rosatom.ru/upload/iblock/d08/d08a5dc6dedea5cf251f81e14f8742d7.pdf .

8.2. DEVELOPING THE REGIONS WHERE NUCLEAR FACILITIES ARE LOCATED

GRI 103-1

JSC Atomenergoprom contributes to the social and economic development of the towns and cities where nuclear facilities are located in a number of ways. The Company makes a significant contribution to the energy security of a number of regions and is also a major taxpayer making tax payments to budgets of all levels. The Company makes a substantial economic impact on its regions of operation by creating a significant number of skilled jobs in the nuclear and related industries, providing not only employment, but also decent working conditions and remuneration.

Tax payments by JSC Atomenergoprom to budgets of different levels in the Russian Federation.

Level of the budget system	For 2019	For 2020	For 2021	Deviation, %
Federal	100,479	114,341	132,343	15.74%
Regional	67,726	94,799	72,276	-23.76%
Local	374	347	309	-11.10%
TOTAL:	**168,579**	**209,487**	**204,928**	**-2.18%**

Ensuring the energy security of Russian regions

Nuclear power generation accounted for 19.7% of the total electricity output (20.3% in 2020). If this amount of electricity was generated by conventional power generation equipment, it would produce significant greenhouse gas emissions. In fact, in 2021, the Company's operations helped to prevent greenhouse gas emissions totalling 109 million tonnes of CO_2 equivalent.

Share of nuclear power generation in electricity output in integrated power systems (IPS) of Russia

	Russia*	IPS	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 at JSC Rosenergoatom, billion kWh	222.4	222.2	109.4	33.0	40.2	31.7	7.8	0
Share of nuclear power generation at JSC Rosenergoatom, %	19.7	19.9	42.8	29.8	34.8	28.8	3.0	0

** Including isolated power systems (including Bilibino NPP and the FTNPP).*

Generating employment through NPP construction

Employment in key NPP construction projects as at 31 December 2021

NPP	Actual headcount, including contractor organisations, persons	Including employees recruited from local communities, persons*	Number of local building contractors engaged in construction in 2020 and 2021
Kursk NPP-2 (Russia)	8,267	7,529**	—
Belarusian NPP	3,687	1,900	20
Rooppur NPP (Bangladesh)	25,969	20,794	—
El Dabaa NPP (Egypt)	1,503	1,348	4
Paks NPP (Hungary)	298	206	5

** Employees who are nationals of the countries where the NPPs are being built.*

*** The figure for Kursk NPP-2 represents the number of employees who are Russian nationals.*

The construction and commissioning of nuclear facilities, including NPP power units, creates new jobs, as enterprises often hire employees from the local community. For example, about 20,000 local residents were employed in 2020 and 2021 as part of the Rooppur NPP project.

Urban infrastructure development

GRI 203-2

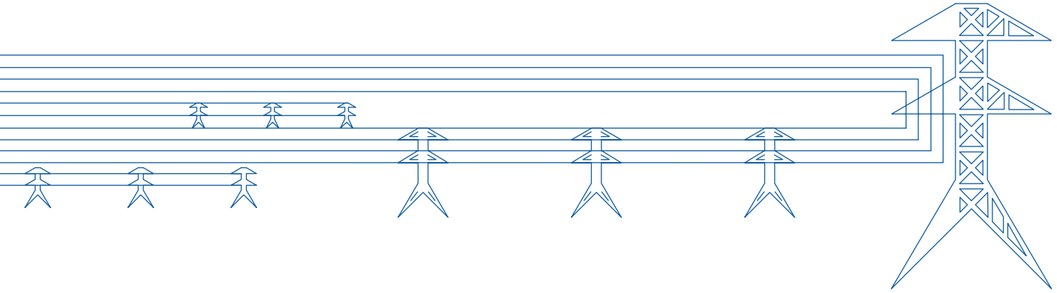
The Company contributes to the development of both nuclear towns and cities and other municipalities by improving the efficiency of urban management through the application of the Lean Smart City technological solution. This project is managed by JSC Rusatom Infrastructure Solutions. The Smart City digital platform is designed to improve the efficiency of urban management. By the end of 2021, digital services forming part of the Smart City platform had been rolled out in 36 towns and cities, including 18 of ROSATOM's host towns and cities. Overall, more than 600,000 people across the country used the Smart City services in 2021.

In the reporting year, the Company joined programmes to digitise regional and municipal segments of federal systems and their components based on an integrated digital platform of the Russian Federation, GosTech, and the Federal State Information System Integrated Information Platform of the National Data Management System.

In 2021, the Company launched a project to develop urban digital applications in the town of Glazov for the benefit of and with assistance from local communities in order to reduce the digital divide by making digital services more accessible to the public, small and medium-sized businesses.

In 2021, JSC Rusatom Infrastructure Solutions put the Digital Water Supply and Sewerage System, a new product for managing the water supply system, on the market and piloted it in Glazov.

In 2022, the Company plans to launch a product called 'Digital Heat Supply' on the market.



8.3. STAKEHOLDER ENGAGEMENT

Key results in 2021:

- 77.4% of the population in Russia support the use of nuclear energy.
- 20 Nuclear Energy Information Centres in Russia.
- Viewership of channels broadcasting the Strana ROSATOM TV programme in various regions of Russia totals 12.2 million people.

Approaches to stakeholder engagement

GRI 102-40
GRI 102-42
GRI 102-43

Due to the scale and special characteristics of its business, JSC Atomenergoprom has a wide range of stakeholders in Russia and globally.

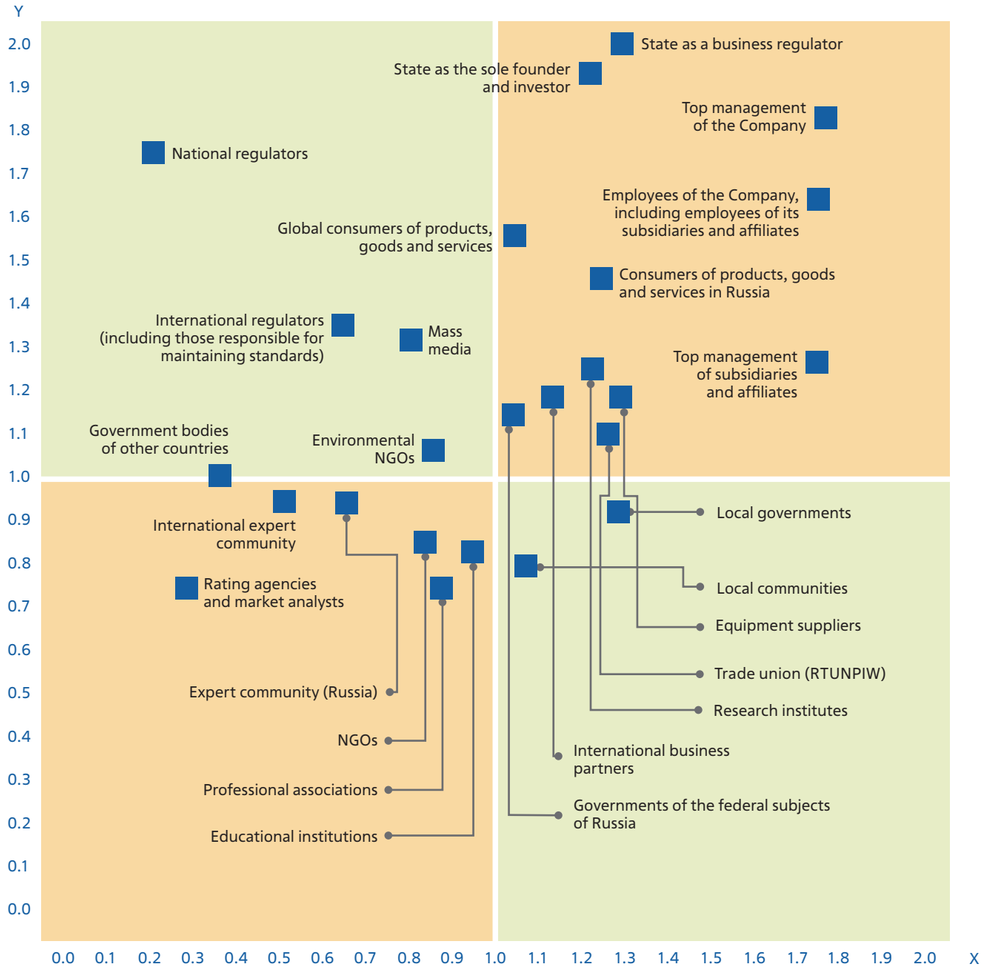
Targeted stakeholder engagement is aimed at achieving strategic goals and gaining public acceptance for nuclear power development.

The Company promotes systematic and constructive stakeholder engagement across all areas of its business and conducts communication and information campaigns for the general public.

Fundamental principles underlying stakeholder engagement are as follows:

- Respect for and accommodation of the interests of all participants;
- Open and productive cooperation;
- Timely provision of complete information on the Company's activities;
- Striving to provide specific benefits to all participants;
- Fulfilment of obligations.

Stakeholder map[75]



X — impact of the Company on the stakeholder Y — stakeholder's impact on the Company

[75] The list of stakeholders is compiled based on the scale of the Company's impact on stakeholders and/or their impact on the Company.

Nuclear Energy Information Centres[76]

The objective of Nuclear Energy Information Centres (NEICs) is to raise awareness among local communities about the operation of the nuclear industry and prospects for the development of nuclear power and radiation technologies, make professions in the industry more prestigious, promote science, innovative technologies and technical education, and cooperate with the professional scientific community in promoting science.

In 2021, the NEIC network comprised 20 centres in Russia, including the Atomarium in Sochi, as well as centres in Belarus (Minsk) and Kazakhstan (Nur-Sultan). In 2021, they were visited by more than 160,000 people. The Centres held 2,000 events and 11 large-scale KSTATI Science Festivals. Every year, the Information Centres implement more than 4,000 projects; since 2008, events hosted by the Centres have been attended by a total of more than 3 million people.

The KSTATI Science Festivals hosted by the NEICs are a series of annual offline events held in their host towns and cities, including webcasts and teleconferences with partners and universities. In 2021, webcasts and teleconferences became an integral part of all KSTATI Science Festivals. The Science Festivals help to integrate the NEIC audiences across all towns and cities into a single community, with 2,000 to 5,000 people participating in these events in person and dozens of thousands of viewers of all ages watching them online.

In 2021, NEIC employees assisted in organising and running large-scale federal projects, including the Homo Science festival to mark the 800th anniversary of the foundation of Nizhny Novgorod, the NAUKA 0+ science festival, a special voyage to the North Pole for children titled 'Icebreaker of Knowledge. Homo Science Project', and the Mendeleev Expedition to Lake Baikal. NEIC events were held in the Smena, Artek and Orlyonok Russian Children's Centres and the Sirius Educational Centre.

Two new projects were launched in 2021: the Atomic Workshop, which is a series of interactive activities focused on nuclear power and innovative technologies, and NEIC OPEN, weekly programmes run across the NEIC network which include lectures by famous experts, popular science talk shows, teleconferences with other regions, intellectual, board and team games, as well as workshops for people of all ages.

[76] http://www.myatom.ru.

Industry media

To inform employees and other stakeholders about news and key events in the Russian nuclear industry, a range of corporate media outlets operates under the common brand name *Strana ROSATOM* ('The Country of ROSATOM'):

A newspaper (published weekly in all enterprises in the Russian nuclear industry, with a circulation of 59,000 copies and a readership of more than 300,000 people);

A TV programme (aired weekly in 24 towns and cities where nuclear organisations operate; the viewership of the channels broadcasting the programme totals 12.17 million people; in 2020, the viewership totalled 7.3 million people).

In 2022, the Company plans to broadcast weekly programmes in 24 nuclear towns and cities, with the viewership of the channels broadcasting the programme expected to exceed 12 million people.

Nuclear Kids

GRI 413-1

Nuclear Kids (NucKids) (http://www.nuckids.ru/) is an annual international charitable art project for children from nuclear towns and cities across Russia, as well as children of employees of overseas nuclear enterprises partnered with the Company.

Since its launch, the project has covered 24 countries. Many NucKids alumni study and work at famous universities, such as the Russian Institute of Theatre Arts (GITIS), the Moscow Art Theatre School, the Russian State University of Cinematography (VGIK), the Oleg Tabakov Studio and the Sergey Zhenovach Theatre Art Studio. They perform in films and work in show business and in the Company's Divisions.

Despite the global pandemic, in 2021, the summer session of the project was launched offline with participants from Russia and Hungary (71 people). Under the supervision of professional choreographers, directors, voice coaches and singing teachers, a musical titled 'Atomic Love' was produced. It was premiered at the Music Theatre of the Republic of Karelia in Petrozavodsk; the tour then continued in Saint Petersburg and concluded in Moscow on the main stage of the Et Cetera Theatre directed by Alexander Kalyagin.

The central themes of the musical were science, friendship and love. The winter session of the project was launched in Sochi on the stage of the Presidential Lyceum in the Sirius federal territory and concluded in the assembly hall of ROSATOM in Moscow. A musical titled 'Winter Fairy Tale 2021' was staged in Sochi within two weeks and was performed 22 times. A subtitled live broadcast was arranged for viewers in Hungary, Belarus, India and Bangladesh.

Opinion polls

GRI 103-3

ROSATOM and JSC Atomenergoprom analyse the public perception of the development of nuclear power in Russia on an annual basis and adjust their communication with stakeholders accordingly.

According to an independent opinion survey by the Levada-Centre[77], 77.4% of the Russian population supported the use of nuclear power (75.2% in 2020; over the past few years, the figure has remained consistently high).

— Do you think that nuclear power should be actively developed, maintained at the current level, phased out or completely abandoned?

Actively developed	54.0%
Maintained at the current level	23.4%
Phased out	4.6%
Completely abandoned	7.4%
I do not know	10.6%

— Do you agree with the following statement: 'Nuclear power is a "green", environmentally friendly type of power generation'?

I completely agree	21.0%
I partly agree	38.4%
I partly disagree	20.3%
I completely disagree	11.1%
I do not know	9.2%

[77] The survey was conducted on 12–23 February 2022 across a representative sample of the Russian population consisting of 3,944 people aged 18 and older.

9

SAFE
OPERATION

9.1. NUCLEAR AND RADIATION SAFETY; OCCUPATIONAL SAFETY AND HEALTH

GRI 102-44

Key results in 2021:

- There were no events rated at level 1 or higher on the INES scale.
- The injury frequency rate and the lost time injury frequency rate (LTIFR) stood at 0.24 and 0.07 respectively.
- Individual radiation risk was calculated for 40,000 people using the IRAW system.

GRI 103-1
GRI 103-2

The Company's main objective in the area of nuclear and radiation safety is to ensure ongoing accident-free operation of existing nuclear facilities and other facilities posing nuclear and radiation hazards, safely manage radioactive waste, improve the culture of safe operation of nuclear facilities, and implement modern safety management systems.

Measures aimed at ensuring nuclear and radiation safety are a priority for the Company and its key stakeholders. All of the Company's organisations are directly involved in ensuring nuclear and radiation safety. Key organisations include JSC Atomredmetzoloto, JSC Atomenergomash, JSC Rosenergoatom, JSC TVEL and JSC Science and Innovations.

Licensing of operations in the nuclear power industry, as well as supervision of day-to-day operations of design, construction and operating organisations is the responsibility of an independent government body, namely the Federal Environmental, Industrial and Nuclear Supervision Service of Russia (Rostekhnadzor).

Nuclear and radiation safety management functions in the nuclear industry are performed by ROSATOM and the following of its divisions:

- The General Inspectorate participates in the preparation of proposals for shaping the government policy on nuclear and radiation safety, implements measures to ensure the safety of nuclear facilities and monitors safety in the organisations of the Corporation;
- The Nuclear and Radiation Safety, Licensing and Permitting Department ensures that personnel and equipment are ready to respond to emergencies at nuclear facilities and monitors the implementation of emergency prevention measures;
- The Directorate for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning plays a leading role in the management of government programmes aimed at addressing 'nuclear legacy' issues;
- The Technical Regulation Department updates the system of technical specifications for the safe use of nuclear energy.

Nuclear and radiation safety at nuclear facilities

In the reporting year, the Company ensured sustainable operation of nuclear enterprises. There were no incidents involving radiation leaks. Limits on employee radiation exposure were not exceeded.

In 2021, due to the deteriorating epidemiological situation and the risk of spread of COVID-19, some of the targeted inspections organised by the General Inspectorate and other divisions of the Corporation, including inspections in JSC Atomenergoprom's enterprises, were carried out remotely.

Nuclear power plants

Over the past 24 years, no events rated at level 1 or higher on the international INES scale have been detected at Russian nuclear power plants[78].

In 2021, there were 34 deviations rated at level 0 and out of scale. JSC Rosenergoatom performed a thorough analysis of all deviations. Their causes were identified: most of the deviations were caused by failures of thermal and electrical equipment due to manufacturing defects which had not been detected during the installation and adjustment of the equipment. In accordance with the INES Scale User's Manual, the Company rated each event that had occurred and developed corrective measures to prevent similar failures in the future.

Changes in the number of deviations in NPP operation according to the INES scale

	2019	2020	2021
Total, including:	38	24	34
Level 0 and out of scale	38	24	34
Level 1	0	0	0

[78] Level 1 and 0 deviations do not pose a risk to employees operating the facilities, the local population or the environment.

Physical protection of nuclear facilities

GRI 103-2

The security and physical protection of nuclear facilities posing nuclear and radiation hazards and of nuclear and radioactive materials used and stored by the Company, including during their transportation, complies with Russian legislation and the Convention on the Physical Protection of Nuclear Material and is aligned with the recommendations of the International Atomic Energy Agency.

The main mechanisms for ensuring physical protection and anti-terrorism security are as follows:

- Monitoring of the physical protection and anti-terrorism security of facilities (premises) by the relevant departments;
- Ensuring the reliable operation of existing physical protection and security equipment at facilities, as well as its scheduled modernisation and improvement;
- Strict compliance with the requirements of federal and industry-wide regulations.

As part of departmental monitoring, in accordance with the Consolidated Plan of Inspection Activities, 11 inspections of the physical protection of nuclear materials, nuclear facilities and nuclear material storage sites were conducted in 2021 in the Corporation's organisations, including JSC Atomenergoprom. This included inspections of their anti-terrorism security status.

In the context of measures taken to prevent the entry and spread of the new coronavirus infection (COVID-19), targeted inspections forming part of departmental monitoring in the Company's organisations did not involve site visits by the Company's employees; instead, they were conducted by security specialists of these organisations.

The findings of all inspections were documented in reports; progress on measures to eliminate the deficiencies identified in the course of inspections and implement the recommendations from the commissions is being monitored.

Measures taken in cooperation with the Federal Security Service of Russia, the Federal National Guard Service and the Ministry of Internal Affairs of Russia made it possible to prevent unlawful acts against nuclear facilities.

In 2021, there were no violations of access control or internal security regulations at the Company's facilities resulting in the theft of nuclear materials, terrorist acts or sabotage at nuclear facilities.

Industry-Wide Radiation Monitoring System

GRI 103–2

The Industry-Wide Radiation Monitoring System (IRMS) is in operation in the Russian nuclear industry; it is a functional subsystem of the Integrated State Automated Radiation Monitoring System in Russia. The IRMS includes:

- The departmental information and analysis centre (DIAC), which integrates data from local radiation monitoring systems at facilities posing nuclear and radiation hazards, including on-site subsoil condition monitoring (OSCM) and the industry-wide automated radiation monitoring system (IARMS);
- 30 local radiation monitoring systems operating in ROSATOM's organisations included in potential radiation hazard categories 1 and 2.

The local radiation monitoring systems in ROSATOM's organisations perform regular radiation monitoring in buffer areas and radiation control areas, including:

- Continuous automated monitoring of the gamma radiation dose rate through the ARMS (a total of 417 monitoring stations are integrated into the IARMS, including 106 stations located at industrial sites and 311 stations in buffer areas and radiation control areas);
- Periodic monitoring of the gamma radiation dose rate using portable and mobile equipment, dosimeters, radiometers and spectrometers, as well as on-site monitoring of the annual gamma radiation dose in buffer areas and radiation control areas using accumulating dosimeters: 1,124 stations monitoring the gamma radiation exposure dose rate (EDR)/ambient dose equivalent rate that are not part of the IARMS, and 63 monitoring routes where the gamma radiation EDR and contamination with alpha and beta particles are measured;
- Periodic monitoring (using portable, mobile and fixed equipment) of radionuclide content in various components of the natural environment: in the lowest layer of the atmosphere, atmospheric precipitation, soil, surface water bodies into which liquid effluents are discharged and hydrologically connected water bodies, bottom sediments, aquatic organisms, groundwater, vegetation, as well as in locally produced food products and fodder. For this purpose, 2,869 monitoring stations and 1,415 OSCM wells were used in 2021.

In 2021, radiation levels in the areas where nuclear organisations are located were within the range of natural background radiation. Real-time data from automated radiation monitoring stations are available on the website at http://www.russianatom.ru.

Amid the ongoing development of the nuclear industry, the government and society have heightened expectations for the safety of technologies used in the industry. One of the ways to improve safety is to enhance the quality and reliability of environmental monitoring. ROSATOM has adopted the IRMS development programme for the period from 2021 through 2030, which will enable the Corporation to expand the IRMS system and improve the accuracy of real-time data on radiation levels in the areas where nuclear facilities are located.

Emergency preparedness

GRI 103–1
GRI 103–2

In order to ensure the safe operation of the nuclear industry and protect employees, the local population and areas against the possible impacts of accidents (emergencies), nuclear organisations operate 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).

762 operational training exercises were conducted in 2021, including 18 command post exercises, 16 tabletop exercises and 438 emergency drills.

In 2021, the needs of enterprises and organisations in the industry for special cargo transportation were fully met. All shipments of nuclear materials fully complied with established requirements. An industry-wide automated system for safe transportation of radioactive substances (ASST-RS) was deployed. Work was continued to produce and upgrade special vehicles and equip them with modern automated security systems.

Occupational safety and health

GRI 103–1
GRI 103–2
GRI 403–1

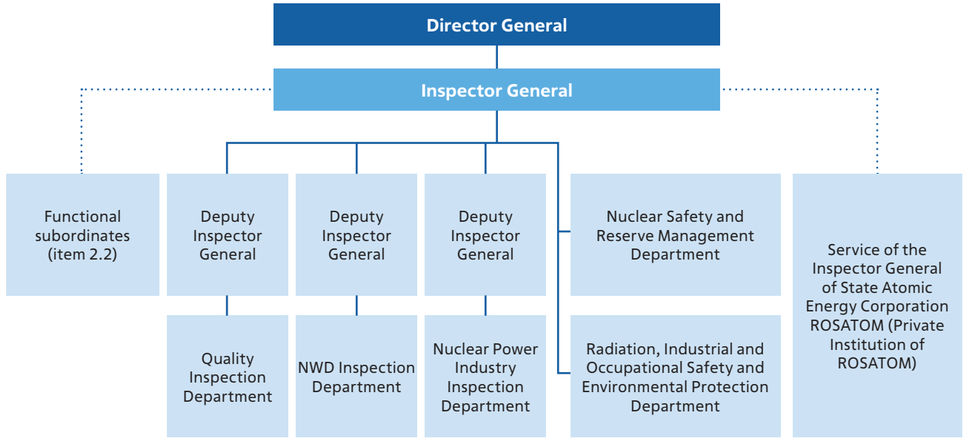
One of the fundamental priorities for JSC Atomenergoprom is to protect the life and health of employees in the industry. Internal regulations adopted in the Company and its organisations (primarily the Uniform Industry-Wide Policy on Occupational Safety and Health) are aimed at preventing workplace accidents and occupational diseases, systematically monitoring working conditions and occupational safety performance, ensuring the safety and protecting the health not only of the Company's employees, but also of employees of contractors and subcontractors involved in the operation of nuclear facilities.

The Company and its organisations recognise their responsibility for the safety of production processes, occupational safety and health, given that the rapid development of the nuclear power industry makes it crucially important to guarantee compliance with fundamental principles whereby priority is given to protecting employees' life and health and enhancing the protection of people and the environment against radiation exposure.

Since 2019, ROSATOM has been involved in the Vision Zero international campaign and seeks to achieve a zero injury rate in nuclear organisations.

Responsibility for ensuring safety[79] of the use of nuclear energy for civilian and defence purposes by organisations of JSC Atomenergoprom in the course of their operations has been assigned to the Inspector General of ROSATOM. GRI 103–2

Diagram of safety management (including occupational safety) in the Company through ROSATOM's divisions



[79] Safety means nuclear, radiation, industrial and fire safety, the safety of hydraulic structures, occupational safety and health, and environmental protection.

Key functions of the Corporation's Inspector General include the following:

- Timely and full detection of non-compliance with Russian laws and local regulations of ROSATOM and the Company on occupational safety and health;
- Responsibility for the exercise of powers and performance of functions related to nuclear and radiation safety by the Corporation and the Company as a government regulator controlling the use of nuclear energy, as well as the functions of a regulator in the sphere of industrial and fire safety, the safety of hydraulic structures, occupational safety and health and environmental protection in ROSATOM's organisations (including the Company and its organisations);
- Ensuring that the Corporation has in place the relevant methodological framework which is complete and of appropriate quality and is aligned with Russian occupational safety laws.

GRI 103–3

The performance of the Inspector General is evaluated annually based on indicators specified in the approved KPI map. Key indicators include the reduction in the severity of injuries at facilities of the Corporation's organisations, including contractors (average, against the previous three years as a baseline period).

GRI 103–2
GRI 403–1
GRI 403–3

The Corporation has adopted the Uniform Industry-Wide Policy on Occupational Safety and Health[80], which applies to JSC Atomenergoprom and its organisations and stipulates the goals, key principles and obligations in the field of occupational safety and health. Its principles underpin the occupational safety and health management systems used by the organisations of ROSATOM and JSC Atomenergoprom.

The key principles underlying occupational safety initiatives of the Company and its organisations include the following:

- Giving priority to employees' lives and health over operational performance;
- Continuously improving performance and enhancing employees' safety competences;
- Planning and implementing measures aimed at reducing injury and occupational disease rates;
- Systematically providing employees with state-of-the-art personal protective equipment to protect them against occupational hazards;
- Disclosing material information on occupational safety and health initiatives;
- Setting uniform occupational safety and health requirements aligned with Russian laws and regulations and global expertise;
- Seeking to ensure that all employees of the Company and its organisations are aware that compliance with occupational safety requirements is an integral part of their work.

[80] https://rosatom.ru/upload/iblock/74a/74a0da78404893d842f5cc1136de08c7.pdf.

Managing occupational safety and health risks

GRI 403-2

The Uniform Industry-Wide Guidelines on Occupational Risk Management in ROSATOM's Organisations have been put into effect as part of the industry-wide occupational safety and health management system. This document is aimed at identifying workplace hazards, assessing occupational risk levels and developing corrective measures to reduce occupational risks.

Occupational risks in the Company's organisations are managed as follows:

1) Identifying hazards in the workplace;
2) Assessing occupational risk levels in the workplace;
3) Developing measures to reduce occupational risk levels.

Occupational risk levels are assessed for each workplace. Occupational risk management commissions are established in the organisations. Members of employees' professional associations (where such associations exist) are involved in the work of the commissions. Members of the commissions are trained in occupational risk management.

The results of hazards identification are formalised in the organisation's Safety Hazard Register. The occupational risk level is assessed by the Company's organisations for each identified hazard in the following order:

1) Assessing the level of occupational risk;
2) Assessing the acceptability of the occupational risk level (acceptable, tolerable, unacceptable).

An occupational risk assessment card is generated for each workplace.

Based on the risk assessment results, the organisation develops an action plan to improve the effectiveness of existing and implement additional occupational risk management measures. The occupational risk management commission annually reviews the findings of the monitoring of occupational risk assessment and management activities in order to ensure that all measures at the planning and implementation stages have been implemented in full and on time. Based on the results of the annual review, a plan of corrective actions (measures) is formed, which is aimed at improving the effectiveness of occupational risk management.

The Corporation has set up and operates a hotline to receive employees' enquiries and reports concerning working conditions and occupational safety and health.

Accidents are investigated by commissions set up in the Company's organisations in accordance with the Labour Code and Decree No. 73 of the Government of the Russian Federation dated 24 October 2002. Depending on the severity of the accident, a government labour inspector, representatives of Rostekhnadzor (if the accident occurred at a hazardous production facility), executive authorities, insurance companies and the Social Insurance Fund take part in the work of the commission. Following the investigation, the commission draws up a form N-1 report (if the accident is related to production operations and is required to be registered and recorded in the organisation) or a free-form report (if the accident is not related to production operations and is not required to be registered or recorded in the organisation); based on the findings of the investigation, the organisation issues an order stipulating measures to prevent similar accidents.

Safety culture

GRI 403-4

In terms of a safety culture, the Company and its organisations focus on shaping and developing those characteristics of their operations and individual employee behaviour that help to maintain an acceptable safety level, protect people and the environment against the negative impacts of their operations and ensure that employees of the Corporation and its organisations are committed to safety as the main goal and are guided by fundamental safety principles.

Every year, ROSATOM's Technical Academy hosts the International Safety Culture School, while ROSATOM's Corporate Academy is implementing a project to promote a culture of safe behaviour in nuclear enterprises. The Corporation also hosts annual Safety Days attended by the Company's representatives; these events are focused on the status and development of safety culture.

In 2021, the Corporation adopted the Safety Culture Declaration setting out the key principles of safe behaviour:

- 'Be a leader';
- 'Speak up and take action';
- 'Assess the risks and act safely';
- 'Raise your qualifications'.

In 2020, the Uniform Industry-Wide Guidelines on Occupational Risk Management in Nuclear Organisations were put into effect as part of the industry-wide occupational safety and health management system. This document is aimed at identifying workplace hazards, assessing occupational risk levels and developing corrective measures to reduce occupational risks.

GRI 403–4

An Occupational Safety and Health Management System was introduced in the industry in 2009. It is an important element of mutual obligations taken on by the Corporation and the Company, the Russian Union of Employers in the Nuclear Industry, Power and Science and the Russian Trade Union of Nuclear Power and Industry Workers. These obligations are set out in the Industry-Wide Agreement on Nuclear Power, Industry and Science for 2018–2020. The Industry-Wide Agreement prioritises the protection of employees' life and health (see the sections 'Occupational Safety and Health' and 'Social Policy'). Employers, in cooperation with the trade union, keep records and analyse employee morbidity, including the results of periodic medical examinations and sick leave. The findings of this analysis inform a comprehensive health improvement programme titled Health.

The Agreement also incorporates the opportunities provided by the new laws on special assessment of working conditions (SAWC) and establishes an additional mechanism for cooperating with the trade union in carrying out SAWC and analysing its findings. Leading enterprises in the industry have undergone certification of compliance of their occupational safety and health management systems with the OHSAS 18001 international standard[81].

GRI 403–7

The requirements of the occupational health and safety management system (OHSMS) are binding on suppliers and contractors operating at the Company's facilities. Contractors also undertake to comply with occupational safety and health legislation and to ensure compliance by their subcontractors. The Company does not impose any other occupational safety and health requirements on suppliers and contractors.

GRI 102–12

In 2019, the Russian nuclear industry joined the Vision Zero international campaign to achieve a zero occupational injury rate in its organisations. A Club of Safety Culture Leaders has been established in the nuclear industry to enable ROSATOM's organisations to share experience and best practices in the field of industrial safety, employees' safe behaviour and achieving the goals of the Vision Zero framework (the zero injury rate concept). The Club's mission is to combine our knowledge and global expertise and leverage them to help nuclear organisations in Russia create a strong safety culture, and to promote the principles of leadership and safe behaviour.

To create a system encouraging each employee to consciously behave in a safe way, and to prevent fatalities and serious injuries in nuclear organisations, the industry-wide Council for a Culture of Safe Behaviour[82] (hereinafter referred to as the Council) chaired by the Director General of the Corporation has been established, and a project titled 'Development of a Culture of Safe Behaviour at ROSATOM' has been launched. The Council is made up of industry executives, representatives of the Russian Trade Union of Nuclear Power and Industry Workers and directors of the enterprises included in the pilot safety culture development project. Five companies of JSC Atomenergoprom have joined the project.

[81] Further details are available at: https://rosatom.ru/sustainability/menedzhment-bezopasnosti-truda-i-okhrany-zdorovya/index.php?sphrase_id=2949762.
[82] Order No. 1/914-P of ROSATOM dated 30 August 2019.

The objectives of the Council include approving a zero injury strategy aligned with the principles of the Vision Zero international campaign, reviewing the experience of Russian and foreign organisations in achieving a zero occupational injury rate and approving an action plan to ensure safe behaviour of employees at work, to encourage and disseminate best industry practices of developing a safety culture. The first meeting of the Council was held on 14 July 2021 and was attended by both Council members and invitees from nuclear organisations where the project is being implemented (chief engineers of pilot enterprises and their deputies; heads of occupational safety and health departments of the pilot enterprises; heads of HR departments of the pilot enterprises; employees involved in the project (project managers, coordinators, working group leaders, heads of pilot divisions, working group members); representatives of the Change Support Team and youth representatives; safety culture officers in the pilot enterprises). The project involves actively using an employee engagement tool at all stages, from diagnostic assessment of maturity of the safety culture using interviews, focus groups, surveys and other techniques, to implementing road maps for selected areas in each enterprise. Each enterprise participating in the pilot project builds an employee training system focused on accident prevention and develops communications enabling a dialogue with employees and engaging them in a culture of safe behaviour.

Occupational safety indicators of JSC Atomenergoprom in 2021

Number of people injured in accidents	16[83]
Number of man-hours worked	223,995,822[84]
Number of fatalities	2
Number of serious injuries	9
Number of people newly diagnosed with an occupational disease	6
Fatality rate (per 1,000,000 hours)	0.009
Fatality rate (per 200,000 hours)	0.002
Serious injury rate (per 1,000,000 hours)	0.04
Serious injury rate (per 200,000 hours)	0.008
Reported occupational injury rate (per 1,000,000 hours)	0.071
Reported occupational injury rate (per 200,000 hours)	0.014
Occupational disease rate (per 1,000,000 hours)	0.022
Occupational disease rate (per 200,000 hours)	0,004
Number of people injured in accidents in contractor organisations[85]	3

The injury rate in contractor organisations is relatively low due to cooperation between the occupational safety functions of customer organisations and contractors, as well as stricter safety requirements for contractors performing work at the production sites in the industry.

Three people were injured in contractor organisations in 2021 (two minor accidents and one fatality). GRI 403-9

Causes of the accidents included: GRI 103-3

- Inadequate work organisation;
- Negligence on the part of the victims.

A total of six people were newly diagnosed with occupational diseases in 2021, including: GRI 403–10

- Four people in JSC Atomredmetzoloto (PJSC PIMCU);
- Two people in JSC TVEL (JSC Siberian Chemical Plant).

The occupational disease risk remains high in PJSC PIMCU.

The risk of injuries remains high for employees involved in the operation and maintenance of process equipment, and for those employees who do not follow safety precautions when moving around the premises of an organisation.

The main occupational hazards posing a high risk of occupational diseases include general and local impacts of vibration on the body and noise exposure affecting hearing.

In addition to the injury frequency rate (FR), JSC Atomenergoprom also uses the lost time injury frequency rate (LTIFR), which enables it to benchmark the injury rate in the Corporation against that of other companies and countries. The LTIFR has been included in the KPI maps of all Division executives.

[83] Excluding four people injured in road traffic accidents and those whose health has deteriorated, and three people injured in accidents that are still under investigation.
[84] Excluding man-hours in 50 organisations due to lack of data.
[85] No data are available on man-hours worked or newly diagnosed occupational diseases in contractor organisations.

The LTIFR reference value for the Divisions, units, holding companies and the Company as a whole has been set at 0.5, which is a good result for any company in any country in the world.

Average LTIFR values achieved in Divisions, units and holding companies within ROSATOM over the previous three years have been accepted as baseline (initial, to be improved) values for those Divisions, units and holding companies.

The LTIFR targets are set individually for the Divisions, units and holding companies within the Corporation but do not exceed the baseline values.

LTIFR in JSC Atomenergoprom's divisions between 2019 and 2021

Division	2019	2020	2021
Mining	0.22	0	0.22
Fuel	0.02	0.02	0.05
Mechanical Engineering	0.14	0.07	0.07
Power Engineering	0.04	0.03	0.04
Innovation Management Unit	0	0.07	0.06
Total across the Company	**0.095**	**0.066**	**0.07**

To reduce the injury rates in its organisations, the Company will implement measures focused on improving production processes, developing a safety culture and enhancing controls.

Analysis of accident investigation records showed that the main causes of accidents included inadequate work organisation and violation of safety requirements and occupational safety instructions by the victims. This was due to shortcomings in the work of the management team during the preparatory phase of the work:

- Poor quality of designs and technical documentation (lack of a sufficient list of health and safety requirements);
- Poor preparation of workplaces;
- Failure to comply with operational procedures;
- Shift assignments being issued without due regard to all safety requirements;
- Lack of executive supervision of work;
- Inadequate personnel training.

Radiation exposure of employees

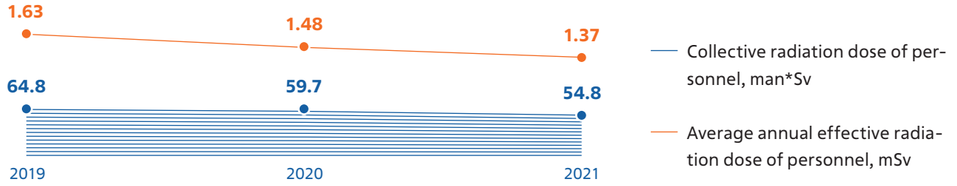
Ionising radiation is an occupational hazard specific to JSC Atomenergoprom's enterprises. Radiation safety criteria for personnel are laid down in the Radiation Safety Standards (NRB-99/2009), the Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010) and other regulations. Most enterprises in the industry provide workplace conditions that fully meet the requirements set out in these documents.

Average annual effective radiation dose for employees

As at 31 December 2021, 40,028 people (group A personnel) in the organisations of JSC Atomenergoprom were under individual radiation exposure monitoring. This figure increased by 1.0% compared to 2020.

In 2021, the average annual effective radiation dose for JSC Atomenergoprom's employees totalled 1.37 mSv. The average effective and collective radiation doses for personnel remain low and tend to decrease.

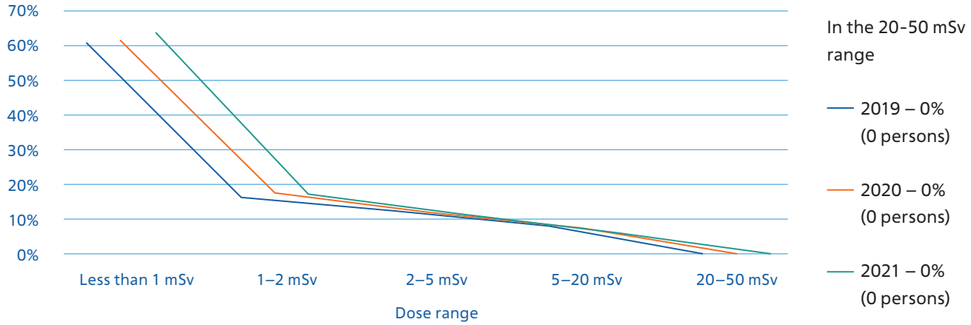
Average annual effective radiation dose for employees



The statutory limit on radiation exposure of employees was not exceeded in 2021. There were no persons with a total effective dose of more than 100 mSv over five consecutive years (from 2017 through 2021). The annual dose limit of 50 mSv was not exceeded.

In the structure of radiation exposure of employees, the share of employees with doses ranging between 2 mSv and 20 mSv tends to decrease (from ~22% in 2019 to 18% in 2021).

Distribution of group A personnel by dose range, %



Individual radiation risks

In 2021, the Company continued to monitor radiation risks for group A personnel using the IRAW (individual risk assessment workstation) occupational radiation risk assessment system. Individual risk was calculated for 40,028 people. The vast majority of group A employees work in the conditions of acceptable occupational risk. For 625 people (1.56% of the total number of employees included in the IRAW system), individual risk exceeded the standard value of 10^{-3}. The high-risk group comprises mainly industry veterans, whose average age exceeds 60 years.

Changes in the key indicators of the IRAW system, %

	2019	2020	2021
Share of employees exposed to negligible and acceptable occupational risk	98.32	98.36	98.44
Share of employees in the high-risk group	1.68	1.64	1.56
Share of employees in the industry undergoing individual radiation exposure monitoring and included in the IRAW system	99.8	100.0	100.0

In 2021, the average individual radiation risk across the Company stood at $7.7 \cdot 10^{-5}$. Over the past three years, the average individual radiation risk across JSC Atomenergoprom did not exceed 8% of the standard value, and the maximum individual risk has been decreasing steadily.

Fire safety

The fire situation at the Company's facilities is stable. In 2021, there were no fires at facilities under construction in the industry.

In 2021, four fires occurred at facilities operated by ROSATOM that are included in the consolidated budget of JSC Atomenergoprom. No harm to the life or health of personnel was caused, and there were no violations of the limits or conditions of safe operation of the facilities. The cost of damage from fires in the Company's enterprises totalled RUB 93,700.

Incidents of fires at the Company's facilities are listed below:

- PJSC PIMCU, 8 March 2021: a fire broke out in the sauna room of the decontamination station; the fire was caused by faulty electrical wiring posing a fire hazard. There were no injured persons; the cost of damage totalled RUB 7,500.
- PJSC PIMCU, 18 May 2021: a fire broke out in an industrial building; the fire was caused by a faulty electric cable posing a fire hazard. There were no injured persons. The cost of damage totalled RUB 79,200.
- Branch of JSC RIR, 27 December 2021: spontaneous combustion of coal occurred in a warehouse. There were no injured persons or damage to property.
- PJSC PIMCU, 29 December 2021: a fuel tanker caught fire at the site of the Urtuyskoye open-pit mine; the fire was caused by faulty electrical equipment in the vehicle posing a fire hazard. There were no injured persons; the cost of damage totalled RUB 7,000.

9.2. ENVIRONMENTAL SAFETY

GRI 102-11

Environmental safety and environmental protection management

GRI 103-1

The environmental footprint of the nuclear power industry is substantially smaller than that of carbon-based power generation using fossil fuels. Nuclear power generation produces virtually no emissions of hazardous chemicals into the atmosphere, including those that destroy the ozone layer or contribute to the greenhouse effect.

JSC Atomenergoprom and its organisations operate responsibly in accordance with the following principles:

- Giving priority to preserving natural ecosystems;
- Making use of the latest scientific achievements and ensuring environmental safety as a mandatory requirement;
- Ensuring transparency and making information about the environmental aspects of operations publicly available.

GRI 103-2

The goals and initiatives of ROSATOM and JSC Atomenergoprom in the field of environmental safety and environmental protection are stipulated in the Uniform Industry-Wide Environmental Policy of the Corporation.

An important tool for the implementation of the environmental policy is a three-year Comprehensive Implementation Plan. In 2019, the Company approved the Comprehensive Plan for the period from 2019 through 2021, which includes organisational, operational and technical measures to be implemented by organisations in the Russian nuclear industry.

In order to improve environmental safety and the efficiency of environmental protection measures, environmental management, quality management, occupational health and safety management and energy management systems are being implemented in environmentally relevant organisations.

Responsibility for supervising the activities of the Corporation and JSC Atomenergoprom in the field of environmental safety and environmental protection lies with the Inspector General of ROSATOM.

Financing of environmental measures

GRI 103-2

JSC Atomenergoprom's environmental costs, RUB billion

Expenditure on environmental measures	11.72
Fixed asset investment for environmental purposes	1.05
Total	**12.77**

Environmental charges and fines

In 2021, charges for the negative environmental impact totalled RUB 89.2 million, including charges for allowable emissions and discharges of pollutants and disposal of industrial and consumer waste totalling RUB 28.9 million (32.4%), and charges for excess emissions and discharges totalling RUB 60.3 million (67.6%).

Charges for the negative environmental impact in 2021, RUB million

Charges for allowable emissions (discharges) of pollutants (disposal of industrial and consumer waste), total, including:	**28.9**
into water bodies	3.8
into the atmosphere	2.4
for the disposal of industrial and consumer waste	22.7
Charges for excess emissions (discharges) of pollutants (disposal of industrial and consumer waste), total, including:	**60.3**
into water bodies	7.8
into the atmosphere	8.6
for the disposal of industrial and consumer waste	43.9
Charges for allowable and excess emissions (discharges) of pollutants (disposal of industrial and consumer waste), total	**89.2**

GRI 103-3

In 2021, government supervision agencies in the field of natural resource management detected 17 violations in the organisations of JSC Atomenergoprom, for which they imposed administrative penalties in the form of fines[86].

Fines levied on JSC Atomenergoprom's organisations for environmental non-compliance totalled RUB 2.3 million.

GRI 307-1

The violations detected by the government supervision agencies did not necessitate restrictions on production or business operations of the organisations and did not cause any significant harm to the environment.

[86] The violations are attributed to the year in which the fine was paid.

Pollutant emissions into the atmosphere

All organisations of JSC Atomenergoprom are directly involved in managing the radiation impact on the environment, including significant organisations managing the Company's divisions, such as JSC Atomenergomash, JSC Rosenergoatom, JSC TVEL, JSC Atomredmetzoloto, etc.

In 2021, pollutant emissions into the atmosphere from the Company's enterprises totalled 30,900 tonnes; the pollutant capture rate reached 91.6%. Nuclear organisations (including those of JSC Atomenergoprom) accounted for 0.2% of the total volume of emissions in the Russian Federation in 2021.

GRI 305-7

Pollutant emissions into the atmosphere in 2021[87], '000 tonnes

Total,	30.9
including:	
Particulate emissions	11.8
NO_x emissions	6.2
SO_2 emissions	9.0
CO emissions	2.4
Hydrocarbon emissions,	1.2
including:	
Methane emissions	0.1
Volatile organic compounds	0.9
Other gaseous and liquid compounds	0.3

[87] Pollutant emissions are reported by the Company's organisations using chemical analysis methods or automatic gas analysers. Hereinafter in Section 9.2, changes in the figures are not reflected, as no statistics were kept on organisations within the scope of JSC Atomenergoprom under IFRS until 2021.

Pollutant emissions from individual groups of pollution sources, '000 tonnes

	From fuel combustion for electricity and heat generation	From production and other processes
Particulate matter	11.2	0.6
NO_x	5.4	0.8
SO_2	8.3	0.7
CO	1.8	0.6
Hydrocarbons, including volatile organic compounds (excluding methane)	0.01	1.1

Emissions of major ozone-depleting substances, tonnes of chlorofluorocarbon-11 equivalent[88]

GRI 305-6

Substance	2021
Dichlorodifluoromethane (Freon 12)	72.24
Chlorodifluoromethane (Freon 22)	0.05
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.00
Chlorotrifluoromethane (Freon 13)	164.21
Tetrafluoromethane (Freon 14)	6.24
Total	**242.74**

Initiatives to reduce harmful emissions into the air

In order to reduce pollutant emissions into the atmosphere by nuclear organisations, an Action Plan to Minimise the Negative Impact of ROSATOM on the Environment until 2025 was developed in 2021. Key measures implemented in JSC Atomenergoprom's enterprises as part of this plan included the following:

— JSC Chepetsk Mechanical Plant (JSC TVEL) overhauled the VT13/1 and VT13/2 gas scrubbers in building 503 of workshop No. 5, which enabled a 45.6% reduction in calcium dichloride emissions, and the V80 gas scrubber in building 715 of workshop No. 80, which enabled a 39.9% reduction in particulate emissions and helped to increase the average pollutant removal efficiency of the gas scrubber to 94.0% in 2021;

[88] The data are presented taking into account the ozone depletion potential of substances under the Montreal Protocol on Substances that Deplete the Ozone Layer. The calculations have been made for those ozone-depleting substances that are reported in Form 2-TP (Air) as specific pollutants.

- JSC ZIO-Podolsk (JSC Atomenergomash) equipped a shot blasting chamber with an efficient gas scrubber, which reduced pollutant emissions by 2.5 tonnes per year;
- JSC SSC RIAR (JSC Science and Innovations) put into operation gas scrubbers installed on process equipment at trial facilities, which enabled the removal of 95% of wood dust from air;
- The Krasnokamensk branch of JSC RIR (JSC Rusatom Infrastructure Solutions) upgraded the ash collector, which improved ash collection efficiency by 99.4% and reduced specific ash emissions into the atmosphere from 67 g/s to 8 g/s;
- JSC Experimental and Design Organisation GIDROPRESS (JSC Atomenergomash) optimised the operating mode of boilers in the boiler house to minimise specific fuel consumption during heat generation by boilers, which reduced pollutant emissions into the atmosphere by 4%;
- The Pilot and Demonstration Engineering Centre (PDEC) (JSC Rosenergoatom) upgraded the auxiliary power supply system; this involved replacing diesel generators, which reduced the number of stationary sources of harmful (pollutant) emissions into the atmosphere and annual gross pollutant emissions by 60% and 20% respectively.

Greenhouse gas emissions

Climate change is recognised as one of the biggest problems facing the international community, businesses and citizens. The Russian Government ratified the Paris Agreement on Climate Change, whereby the participating countries commit themselves to reducing greenhouse gas emissions.

GRI 103–2

In order to meet the international legal commitments of the Russian Federation on climate and minimise risks associated with the operations of ROSATOM and JSC Atomenergoprom, a greenhouse gas emissions accounting system is being developed in the Russian nuclear industry:

- In 2019, a framework high-level document was developed and approved: the Regulations on a System for Accounting for Greenhouse Gas Emissions Generated by the Operations of Organisations in the Russian Nuclear Industry;
- In 2020, the Uniform Industry-Wide Guidelines for Accounting for Greenhouse Gas Emissions from Nuclear Organisations were developed.

GRI 103–1

Executives of the Company's Divisions are the owners of climate risks. (*See the section 'Risk Management' for details*).

Gross greenhouse gas emissions by JSC Atomenergoprom's organisations, tonnes[89]

Substance	2021
Carbon dioxide[90]	3,178.286
Methane	105.344
Nitrous oxide	0
Trifluoromethane	0
Perfluoromethane	124.806
Perfluoroethane	0
Sulphur hexafluoride	0
Total	**3,408.436**

ROSATOM's organisations accounted for 0.04% of total greenhouse gas emissions in Russia (in CO_2 equivalent), or 0.946 million tonnes of CO_2 equivalent.

Greenhouse gas emissions from CHPPs/ thermal power plants (TPPs)

The holding company JSC RIR and its branches account for greenhouse gas emissions using a calculation method based on instructions and guidelines for quantifying greenhouse gas emissions by organisations carrying out economic and other activities in the Russian Federation, as approved by Order No. 300 of the Ministry of Natural Resources and Environment of Russia dated 30 June 2015.

Under the methodology, CO_2 emissions from stationary fuel combustion are quantified using a calculation method depending on fuel consumption.

Specific CO_2 emissions from CHPPs/TPPs, kg CO_2/MWh

Branch name	2019	2020	2021	Comments
Novouralsk branch of JSC RIR	2,370	2,095	2,197	An increase compared to the previous period in 2021 was caused by the wider use of small steam boilers with higher specific emission levels, which was necessitated by a significant drop in outdoor temperatures in winter.

[89] Quantitative estimates of greenhouse gas emissions are based on data obtained from 2-TP (Air) statistical observation forms.

[90] The data are presented using a coefficient of 1.57 calculated by converting CO to CO_2 based on molar mass.

Branch name	2019	2020	2021	Comments
Glazov branch of JSC RIR	1,599	1,509	1,562	An increase compared to the previous period in 2021 was caused by the wider use of hot water boilers with higher specific emission levels, which was necessitated by a significant drop in outdoor temperatures in winter.
LLC RIAR-GENERATION	1,727	1,611	1,584	A decrease in specific CO_2 emissions was related to improved boiler performance and lower specific consumption of fuel equivalent (SCFE).
Seversk branch of JSC RIR	1,840	1,840	1,735	The reduction in emissions was due to lower electricity output in 2021 compared to 2020.
Krasnokamensk branch of JSC RIR	1,390	1,434	1,429	The reduction in emissions was due to lower electricity output in 2021 compared to 2020.
Ozersk branch of JSC RIR	–	–	1,316	As JSC RIR acquired the CHPP in 2021, data for 2019 and 2020 and part of the data for 2021 are not available. Specific emissions for 2021 have been calculated for the period from September through December.
Total across JSC RIR[91]	**1,617**	**1,617**	**2,115**	**Total specific indicators have been calculated by dividing total annual greenhouse gas emissions by total electricity output.**

Specific emissions of other pollutants: SO_2, NOx, particulate matter, mercury, etc. (excluding CO_2) from CHPPs/TPPs, g/MWh

Branch name	2019	2020	2021	Comments
Novouralsk branch of JSC RIR	1,821	1,331	2,223	An increase compared to the previous period in 2021 was caused by the wider use of small steam boilers with higher specific emission levels, which was necessitated by a significant drop in outdoor temperatures in winter.
Glazov branch of JSC RIR	3,520	2,464	2,544	An increase compared to the previous period in 2021 was caused by the wider use of hot water boilers with higher specific emission levels, which was necessitated by a significant drop in outdoor temperatures in winter.
LLC RIAR-GENERATION	4,022	5,770	5,652	A decrease in specific pollutant emissions was related to improved boiler performance and lower specific consumption of fuel equivalent (SCFE).
Seversk branch of JSC RIR	4,488	5,186	3,821	A decrease in specific pollutant emissions was related to improved boiler performance and lower specific consumption of fuel equivalent (SCFE).
Krasnokamensk branch of JSC RIR	9,290	10,978	10,742	A year-on-year reduction in specific pollutant emissions into the atmosphere was related to the improved ash collection efficiency due to the upgrade of electrostatic precipitators, timely and high-quality maintenance and repairs of the ash collection system, and an increase in electricity output.
Ozersk branch of JSC RIR	–	–	6,869	As JSC RIR acquired the CHPP in 2021, data for 2019 and 2020 and part of the data for 2021 are not available. Specific emissions for 2021 have been calculated for the period from September through December.
Total across JSC RIR[92]	**4,025**	**4,264**	**2,438**	**Total specific indicators have been calculated by dividing total annual pollutant emissions by total electricity output.**

Planned commissioning of CHPP/TPP capacities, MW

Branch name	2022	2023	2024	Comments	Total investment, RUB million
Novouralsk branch of JSC RIR	–	–	–	No capacity commissioning planned.	–
Glazov branch of JSC RIR	–	–	+ 4.9	Restart of mothballed capacities	21.67
LLC RIAR-GENERATION	–	–	–	No capacity commissioning planned.	–
Seversk branch of JSC RIR	+100	–	–	Simultaneous decommissioning of two turbine units is scheduled for 2022: -50 MW (TA-6), -100 MW (TA-12). The commissioning of TA-13 in 2022 is hindered by Decree No. 86 of the Government of the Russian Federation dated 30 January 2021, whereby turbine units No. 6 and No. 12 may be decommissioned no earlier than 21 months from the date of filing an application for equipment decommissioning. To date, a proposal has been initiated to amend Decree No. 86 of the Government of the Russian Federation to enable the decommissioning of turbine units No. 12 and No. 6 earlier than 21 months from the date of the application for equipment decommissioning. Applications for the decommissioning of turbine units No. 6 and No. 12 have been submitted.	109.35
Krasnokamensk branch of JSC RIR	–	–	–	No capacity commissioning planned.	–
Ozersk branch of JSC RIR	–	–	–	No capacity commissioning planned.	

[91] Specific indicators are not aggregated.

[92] Specific indicators are not aggregated.

Branch name	2022	2023	2024	Comments	Total investment, RUB million
PJSC Quadra – Power Generation	–	–	–	As PJSC Quadra – Power Generation was acquired by JSC RIR in 1Q 2022, the exact power generation capacity is still to be determined.	
Total across JSC RIR	**+ 100**	**–**	**+ 4.9**	**–**	**131.02**

Installed capacity of CHPPs/TPPs, MW

Branch name	2021
Novouralsk branch of JSC RIR	24.9
Glazov branch of JSC RIR	24.9
LLC RIAR-GENERATION	20.5
Seversk branch of JSC RIR	449
Krasnokamensk branch of JSC RIR	410
Ozersk branch of JSC RIR	256
Total across JSC RIR	1,185.3

Impact on local flora and fauna

GRI 103–1

The high quality of the natural environment is a vital prerequisite for the existence of mankind on Earth. Global environmental problems, such as the greenhouse effect and associated irreversible climate change, the depletion of the ozone layer and a rising level of toxic substances in the environment, ultimately lead to a reduction of biodiversity on the planet.

The Company's industrial facilities, like any man-made facilities, can have an impact on biodiversity at all stages of their life cycle. The construction of industrial facilities, including adjacent facilities and associated infrastructure, such as roads, bridges, power lines, dams, reservoirs, etc., disturbs the habitats of various biological species. The operation of the facilities may also cause changes in the natural environment at the location of the facility and its infrastructure or in the basin of water bodies, in the case of energy facilities.

In terms of environmental performance, nuclear power is much more advantageous than thermal power, since nuclear power plants consume no oxygen and emit no harmful chemicals into the atmosphere, which benefits living organisms, including humans. At the same time, the nuclear industry, and primarily nuclear power plants, are subjected to close scrutiny by various environmental organisations, the general public and the media due to the potential radiation impact of nuclear power plants on the environment.

In the Russian Federation, there are currently no criteria for quantitative assessment of the radiation impact on flora and fauna, and in the vast majority of cases the assessment of such impacts is viewed as supplementary to the setting of hygienic standards.

Nuclear organisations operating nuclear facilities regularly monitor radionuclide content in local agricultural products, wild-growing foods (berries, mushrooms, etc.) and fodder growing in radiation control areas, as well as in fish and other aquatic organisms living in cooling ponds at NPPs. The specific activity of dose-forming radionuclides is monitored in food products. Regional offices of the Russian Federal Biomedical Agency (FMBA) conduct independent radiation monitoring of the environment and locally produced food; radiation monitoring of abiotic components of the environment is carried out by the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet).

GRI 103–3

The results of long-term radiation monitoring show that the content of radioactive substances in various types of crops corresponds to the background radiation level, that the species composition of flora and fauna is practically unchanged, with no hazards that can affect their existence, and that the growth rate of the amount of dead wood is within permissible limits.

In addition, the close proximity of NPPs to nature reserves also provides evidence of biodiversity conservation at their locations. The Lapland State Nature Reserve is located within a 30-kilometre radius of Kola NPP, and 16 nature monuments and 33 wildlife sanctuaries are located within a 30-kilometre radius of Kalinin NPP. This shows that the radiation impact of nuclear technologies and production facilities on the natural environment poses no danger to living organisms or their habitat and, accordingly, cannot be assessed as negative.

In order to preserve biodiversity, in the course of their operations ROSATOM and the Company adhere to the 'avoid – reduce – restore – offset' principle. Prior to making a decision on the construction of a facility, an environmental impact assessment is carried out, which involves collecting background information on the state of ecosystems at the proposed site (including the state of valuable and protected species of flora and fauna). This information is taken into account when choosing a site for production facilities, and alternative options for project implementation are considered, if necessary.

GRI 304–3

The main approach to biodiversity conservation during the operational phase includes measures to prevent the degradation of natural ecosystems as a result of operations. Measures aimed at preserving the diversity of flora and fauna include the following:

- Equipping tailings ponds with bird deterrents to prevent birds from landing on the water surface;
- Equipping water intake facilities with fish screens in order to prevent young fish from swimming or getting drawn into them;
- Equipping transformer substations, their components and operating mechanisms with special devices (fences, casings, etc.) to prevent animals from entering the premises of the substation and getting into these units and mechanisms;
- Installing bird diverters on power lines;
- Maintaining fences along the perimeter of industrial sites in good condition, including in order to prevent animals from entering the premises;
- Ensuring that motor vehicles and special machinery travel on paved roads and providing special parking lots for them;
- Using machines and mechanisms that are in good condition, with adjusted fuel fittings preventing losses of fuel and lubricants and their spills onto the ground and vegetation;
- Measures to protect the atmosphere;
- Arranging waste accumulation sites compliant with technical and sanitary standards; removing waste and transporting it to designated locations in a timely manner;
- Implementing fire prevention measures to ensure that industrial sites comply with fire safety requirements;
- Measures to provide protection against noise exposure (using equipment that is less noisy; more effective soundproofing, etc.);
- Lighting of industrial sites at night.

To compensate for the impact of their operations, in 2021, JSC Atomenergoprom's organisations took steps to replenish aquatic wildlife:

- JSC Siberian Chemical Plant stocked the Tom River with peled (0.37 tonnes of fry);
- At Beloyarsk NPP, the Beloyarsk Reservoir was stocked with bighead carp, grass carp and black carp (428,000 fry);
- At Kalinin NPP, the Udomlya Reservoir was stocked with black carp (82,700 fry);
- At Smolensk NPP, the cooling pond was stocked with silver carp, black carp and grass carp (91,300 fry);
- At Rostov NPP, the cooling pond was stocked with silver carp, black carp and European carp (3 tonnes of fry);
- At Kursk NPP, the cooling pond was stocked with silver carp (4.5 tonnes of fry).

Restoration of disturbed land

In 2021, nuclear organisations implemented a set of measures to restore the productivity and economic value of disturbed lands and improve the environment. In the reporting year, the area of rehabilitated (restored) land totalled 0.10 hectares. No land was reclaimed for forest plantations; reforestation activities in the Company's organisations were carried out by JSC Dalur on an area of 59.7 hectares.

Land rehabilitation in the Company's organisations, hectares

GRI 103-3
GRI 304-3

Organisation	2019	2020	2021
JSC Lunnoye	10.76	0.00	0.00
JSC ZIO-Podolsk	0.07	0.04	0.1
JSC Siberian Chemical Plant	11.30	32.9	0.00
Total	**22.13**	**32.94**	**0.1**

Industrial and consumer waste management

GRI 103-1

As an environmentally responsible company, JSC Atomenergoprom recognises the high importance of industrial and consumer waste management. Companies managed by JSC Atomenergoprom include JSC Rusatom Greenway, which has been established as the industry-wide environmental integrator for industrial and consumer waste management. JSC Rusatom Greenway operates in accordance with the uniform industry-wide environmental policy of ROSATOM and JSC Atomenergoprom; it complies with international environmental standards and adheres to the principles of transparency and openness in the course of its operations. The main rules of the industry-wide environmental policy are as follows:

- Compliance with regulatory requirements and standards for environmental safety and environmental protection;
- Taking into account environmental factors and assessing potential negative environmental impacts in the course of planning and operations as a priority and a mandatory requirement;
- A science-based approach to making environmentally significant decisions.

GRI 103-2
GRI 103-3

In 2021, the Company's organisations generated 23.5 million tonnes of industrial and consumer waste. 99.98% of the generated waste is hazard class 4 and 5 waste (low-hazardous and virtually non-hazardous waste). At the same time, industrial and consumer waste generated in nuclear organisations accounted for 0.5% of the total volume of waste generation in Russia in 2021. Most of the waste is class 5 waste, which is the least hazardous.

97.7% of waste generated and received by JSC Atomenergoprom's organisations was recycled and treated.

Industrial and consumer waste management in 2021, '000 tonnes

Amount at the beginning of the reporting year	Waste generated and received during the year	Recycling and treatment of generated and received waste		Transferred to third-party organisations	Storage in enterprises	Amount at the end of the reporting year
		Amount	%			
442,195.114	23,503.583	22,966.723	97.7	123.734	430.672	442,841.679

In 2021, JSC Atomenergoprom did not transport, import, export or process waste classified as 'hazardous' according to Annexes I, II, III, and VIII of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

GRI 306-3
GRI 306-4
GRI 306-5

Industrial and consumer waste management[93] by hazard class in 2021, '000 tonnes

Waste hazard class	Amount at the beginning of the year	Waste generated and received in the reporting year	Recycling of generated and received waste		Treatment of generated and received waste		Transfer of waste to third-party organisations	Waste storage at the sites operated by the Company in the reporting year, '000 tonnes		Amount at the end of the year
			'000 tonnes	%	'000 tonnes	%		Total	Including burial	
Class 1	0.011	0.259	0.000	0.00	0.0	0.00	0.260	0.00004	0.00000	0.010
Class 2	0.055	1.132	0.000	0.00	0.937	99.89	0.238	0.002	0.000	0.012
Class 3	0.636	5.053	0.092	0.00	0.0005	0.05	5.199	0.003	0.00002	0.398
Class 4	4,440.090	43.634	0.105	0.0005	0.0003	0.03	40.286	18.381	2.389	4,440.943
Class 5	437,754.322	23,453.505	22,965.588	99.99	0.0	0.00	77.751	412.287	124.172	438,040.315
TOTAL	**442,195.114**	**23,503.583**	**22,965.785**	**97.7**	**0.938**	**0.004**	**123.734**	**430.672**	**126.561**	**442,481.679**

[93] As from 1 January 2015, the term 'use' as a type of industrial and consumer waste management was legally replaced by the term 'recycling'; however, the scope of the concept has not changed. According to the definition given in Article 1 of Law No. 89-FZ, recycling is the use of waste for the manufacture of goods (products), performance of work and provision of services. According to this definition, reprocessing and reuse are waste recycling options.

Emissions and discharges of radionuclides

Radionuclide emissions

The total activity of radionuclides released into the atmosphere by JSC Atomenergoprom's enterprises in 2021 amounted to $1.88 \cdot 10^{15}$ Bq.

Beta-emitting radionuclides accounted for 70.10% of the total activity ($1.32 \cdot 10^{15}$ Bq).

Actual and permitted emissions of radionuclides by JSC Atomenergoprom's enterprises in 2021

Type of radionuclides	Permitted emission, Bq	Actual emission, Bq	Percentage of the permitted level
Alpha-emitting	$5.40 \cdot 10^{15}$	$5.62 \cdot 10^{14}$	10.41
Beta-emitting	$2.92 \cdot 10^{21}$	$1.32 \cdot 10^{15}$	0.00005

In 2021, actual emissions of uranium nuclides from some emission sources in PJSC NCCP exceeded the permitted level. This was due to longer running hours of ventilation equipment. Radionuclide emissions into the atmosphere did exceed the total maximum permitted level in 2021.

Radionuclide discharges

In 2021, JSC Atomenergoprom's organisations discharged 24.8 million m^3 of wastewater with a total activity of $5.50 \cdot 10^{13}$ Bq into the open drainage system.

Actual and permitted radionuclide discharge by enterprises in the industry in 2021

Type of radionuclides	Permitted discharge, Bq	Actual discharge, Bq	Percentage of the permitted level
Alpha-emitting	1.05·1011	2.42·1010	22.97
Beta-emitting	2.04·1015	5.50·1013	2.70

In 2021, radionuclide discharges did not exceed permitted levels.

Contaminated sites and their remediation

At year-end 2021, the area of contaminated sites in JSC Atomenergoprom's enterprises totalled 25.62 sq. km, including:

- 24.56 sq. km at industrial sites,
- 0.55 sq. km in buffer areas,
- 0.51 sq. km in radiation control areas.

Radioactive contamination is caused mainly by caesium-137 and strontium-90 nuclides, as well as natural uranium and its decay products.

In 2021, no site remediation was carried out in the enterprises of JSC Atomenergoprom.

Water use

GRI 303-1

The nuclear industry is a major water user. The systematic approach to water use management is underpinned by water accounting data covering all water resources used in the industry (surface water, groundwater, reused and recycled water). Furthermore, industrial facilities are designed and their locations are selected with due regard for uneven geographical distribution of natural water resources. Wastewater quality assurance approaches and methods used by the Company are based on scientific research and are aimed at preserving the natural water quality and minimising pollutant discharges into water bodies, thus ensuring the sustainability of aquatic ecosystems in the regions of operation.

Water withdrawal and discharge for the needs of the Company's enterprises is regulated by water use agreements and fully complies with prescribed limits.

Sustainable use of water resources is achieved through:

- The use of water recycling and reuse systems;
- Wastewater treatment using mechanical, biological, and physical and chemical methods;
- Minimising freshwater consumption in regions with access to seawater;
- Continuous monitoring of wastewater quality and compliance with statutory limits;
- The implementation of investment projects focused on the construction and renovation of wastewater treatment facilities and water supply networks.

In 2021, water withdrawal from natural sources by nuclear organisations made up 8.1% of the total water withdrawal in the Russian Federation[94]. The main water consumers among the Company's organisations and enterprises are Leningrad NPP and Kola NPP (75.6% of the total water withdrawal). At the same time, all water withdrawn from water bodies by the NPPs (more than 99%) is used for operational needs (cooling of the processing medium in turbine condensers and heat exchangers) and is returned to water bodies without any contamination.

In the reporting year, water withdrawal by JSC Atomenergoprom's organisations totalled 4,883.1 million m³.

GRI 303-3

Total water withdrawal, million m³

Seawater	2,665.7
Fresh surface water, including rivers, marshes and lakes[95]	2,140.1
Groundwater	65.8
Rainwater	2.1
Water from third-party organisations	9.4
Total	**4,883.1**

JSC Atomenergoprom's regions of operation do not suffer from water shortage. The volume of water used by JSC Atomenergoprom's organisations in water recycling and reuse systems totalled 37,781.0 million m³ in 2021.

Volume of recycled and reused water in 2021

Total volume of recycled and reused water, million m³	37,781.0
Water withdrawal, million m³ (% of recycled and reused water)	4,883.1 (12.9%)
Total, million m³	42,664.1
Share of recycled and reused water in water withdrawal, %	773.7

The volume of water used by JSC Atomenergoprom's organisations for their own needs in 2021 totalled 4,818.7 million m³.

[94] Calculated based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2020.

[95] Taking into account water received from water supply companies.

GRI 303-5

Water consumption for own needs, million m³

Type of consumption	2021
Drinking and sanitary purposes	25.8
Operational needs	4,759.7
Other types	33.2
Total	**4,818.7**

Wastewater discharge

GRI 303–2

As an environmentally responsible company, JSC Atomenergoprom attaches great importance to the management of waste and discharges into water bodies.

GRI 103–2

The Company applies legal and regulatory requirements when assessing the quality of wastewater discharges.

GRI 103–3

In 2021, wastewater discharge by the Company's organisations totalled 4,210.5 million m3, with clean water compliant with regulatory requirements accounting for 96.3% of the total volume, while the share of treated wastewater compliant with regulatory requirements and contaminated wastewater stood at 0.5% and 3.2% respectively. Clean water compliant with regulatory requirements accounts for more than 95% of the total wastewater discharge; therefore, wastewater discharge by the Company's organisations does not have any significant impact on water bodies and related habitats of local flora and fauna.

Contaminated wastewater discharge by nuclear organisations accounted for 1.3% of the total volume of discharges in Russia in 2021[96].

Total wastewater discharge in 2021, million m³

Water category	Indicator
Clean water compliant with regulatory requirements	4,052.7
Treated wastewater compliant with regulatory requirements	22.6
Contaminated wastewater	135.2
TOTAL	**4,210.5**

[96] Calculated based on data provided in the Government Report on the Status and Protection of the Environment of the Russian Federation in 2020.

Pollutant content in wastewater in 2021, kg

Pollutant	Amount
Chemical oxygen demand	13,615,208.852
Suspended matter	1,670,753.000
Phosphates (phosphorus contained)	26,401.000
Hexavalent chromium	24.898
Trivalent chromium	42.754
Manganese	605.761
Iron	21,164.468
Nickel	52.203
Copper	365.581
Zinc	493.985
Molybdenum	457.754
Lead	3.074

Initiatives to reduce discharges of harmful substances into water bodies

GRI 303–2

In order to reduce the discharge of pollutants into water bodies by the Corporation's organisations, in 2021, an Action Plan to Minimise the Negative Impact on the Environment until 2025 was developed. Key measures implemented by JSC Atomenergoprom's organisations as part of this plan included the following:

- JSC SSC RIAR (JSC Science and Innovations) built local facilities for the treatment of storm water runoff, meltwater and industrial wastewater, which helped to reduce wastewater contamination with petroleum products and prevent the discharge of untreated wastewater from electroplating operations;
- JSC Isotope (JSC Rusatom Healthcare) replaced biological treatment facilities for domestic and industrial wastewater with more modern facilities, which resulted in a 13% increase in wastewater treatment efficiency (from 85% to 98%);
- At Balakovo NPP, firefighting water supply, utility and drinking water supply, sewerage and industrial and storm water runoff drainage networks were upgraded at the industrial site and construction facilities; this involved replacing the existing steel pipeline with a polyethylene one, which reduced water losses during consumption and reduced waste generation by increasing the service life of the pipeline;

- At Novovoronezh NPP, the circulation pump (TsN-5) of the onshore pumping station was upgraded, which enabled a reduction in annual water consumption and a reduction in the consumption of water withdrawn from the Don River from 32,000 m^3/hour to 19,000 m^3/hour;
- At Kalinin NPP, a project was implemented to introduce automatic monitoring of petroleum product content in wastewater, which helped to prevent the risk of petroleum product content in wastewater exceeding the statutory limit (0.05 mg/l).

Environmental impact forecast, plans for 2022 and for the medium term

The organisations of JSC Atomenergoprom will continue to systematically reduce the negative environmental impact and take steps to prevent climate change as part of the Action Plan to Minimise the Negative Impact of ROSATOM on the Environment until 2025. In addition, the following steps will be taken:

- Maintaining fixed asset investment related to environmental protection at the current level;
- Continuing to pursue the policy of sustainable use of natural resources and implementing a number of measures to reduce the discharge of contaminated wastewater;
- Further reducing hazardous waste generation;
- Expanding and improving radiation and chemical monitoring systems in the areas where the Corporation's organisations are located;
- Developing plans in JSC Atomenergoprom's organisations for the decommissioning of PCB-containing equipment and the transfer of such equipment (including waste) for decontamination/disposal.

With regard to greenhouse gas emissions, in 2022 and 2023, the Company plans to compile an inventory of sources of greenhouse gas emissions, which will serve as a basis for a quantitative assessment of total greenhouse gas emissions across JSC Atomenergoprom.

With regard to the use of ozone-depleting substances, the Company plans to gradually replace industrial and household refrigeration appliances and air conditioners in its organisations with modern ozone-friendly equipment.

Improving energy efficiency

Energy conservation is an important prerequisite for the efficient use of JSC Atomenergoprom's energy resources, making it more competitive and reducing the negative impact on the environment. An energy conservation and energy efficiency improvement programme for the period from 2018 to 2022 is being implemented in the Russian nuclear industry. GRI 103–1 GRI 103–2

Responsibility for implementing the energy efficiency policy in ROSATOM and JSC Atomenergoprom lies with the Economic Analysis and Operational Efficiency Management Department.

An Energy Conservation and Energy Efficiency Improvement Programme of ROSATOM for the period from 2018 through 2022 has been approved in the nuclear industry by Order No. 1/1205-P of the Director General of ROSATOM dated 23 October 2018. GRI 103–3

The Programme is aimed at:

1. Systematisation and continued implementation of energy conservation and energy efficiency initiatives by ROSATOM's organisations;
2. Annual reduction of energy consumption in accordance with the targets of the Government Programme of the Russian Federation 'Development of the Nuclear Power and Industry Complex' approved by Decree No. 506-12 of the Government of the Russian Federation dated 2 June 2014.

Objectives of the Programme include:

1. Increasing the sustainable use of heat and electricity by introducing energy-saving technologies and equipment, and reducing the environmental footprint;
2. Achieving an annual reduction in energy consumption by ROSATOM's organisations (under comparable conditions) against the base year.

Results in 2021[97]

Data on energy consumption and energy cost allocation with a breakdown by Division and complex are shown in the tables below.

[97] According to the reports of nuclear organisations in the Corporation's information system (the Automated Energy Efficiency Management System, hereinafter referred to as the AEEMS).

Energy consumption by JSC Atomenergoprom in physical terms in 2021 (reduction against 2020 as the base year)

Division/complex	Heat		Water		Electricity		Other (gas, fuel oil)	
	Actual consumption under comparable conditions, '000 Gcal	%	Actual consumption under comparable conditions, '000 m³	%	Actual consumption under comparable conditions, '000 kWh	%	Actual consumption under comparable conditions, tonnes of fuel equivalent	%
JSC Atomredmetzoloto	598.06	0.10	3,777.57	0.00	476,907.81	1.31	–	–
JSC Atomenergomash	55.66	-10.2	1,358.74	38.97	154,796.86	5.05	66,800.45	1.67
JSC Rosenergoatom	404.57	3.62	1,185,646.27	0.47	970,350.70	2.43	–	–
Other	2,302.06	1.47	544,752.90	3.60	3,134,611.18	0.76	1,903,140.14	0.81
Total across JSC Atomenergoprom	**3,360.37**	**1.32**	**1,735,535.49**	**1.52**	**4,736,666.54**	**1.31**	**1,969,940.59**	**0.84**

Total energy costs in the organisations of JSC Atomenergoprom (excluding VAT) between 2019 and 2021 (under comparable conditions, in 2020 prices)

Division/complex	During the reporting period under comparable conditions		
	in 2015 prices, RUB billion		in 2020 prices, RUB billion
	2019	2020	2021[98]
JSC Atomredmetzoloto	1.60	1.57	1.88
JSC Atomenergomash	0.81	0.77	1.05
JSC Rosenergoatom	1.91	1.77	2.30
Other	15.07	14.45	18.57
Total across JSC Atomenergoprom	**19.4**	**18.56**	**23.81**

GRI 302-4

In 2021, cumulative energy savings in the Russian nuclear industry against 2020 as the base year under comparable conditions totalled 0.96%. In monetary terms, the savings totalled RUB 0.23 billion (excluding VAT).

[98] The increase was due to the transition to a new base year (2020) and the expansion of the reporting scope.

Savings by JSC Atomenergoprom's enterprises in physical terms totalled 901,283.16 GJ, with the following breakdown by energy resource:

Energy savings in JSC Atomenergoprom, GJ

Heat	187,819.76
Electricity	226,272.31
Other energy resources	487,191.09
Total	**901,283.16**

Energy cost savings in JSC Atomenergoprom's organisations for 2019 and 2020 (against 2015 as the base year, excluding VAT) and for 2021 (against 2020 as the base year, excluding VAT)

Division/complex	2019		2020		2021[99]	
	RUB million	%	RUB million	%	RUB million	%
JSC Atomredmetzoloto	197.19	10.95	227.60	12.64	23.24	1.22
JSC Atomenergomash	138.07	14.48	187.35	19.65	31.11	2.86
JSC Rosenergoatom[100]	95.94	4.78	90.40	4.86	12.74	0.55
Other	1,304.63	7.92	1,163.43	7.45	164.88	0.88
Total	**1,735.83**	**8.17**	**1,668.77**	**8.25**	**231.98**	**0.96**

Sustainable development projects

To promote energy-efficient devices, in 2021, JSC Khiagda continued to implement a project focused on the production of high-performance lighting solutions. The aim of the project is to replace low-efficiency light sources with high-performance LED light sources; this will help to reduce the negative environmental impact thanks to lower energy consumption and cut expenditure on the procurement of light sources (funds previously budgeted for the purchase of lighting products have been used to the purchase accessory components). The payback period of the project totals one year. Economic benefits are derived from the fact that the cost of lighting products manufactured in-house is 2.5 times lower than that of similar lamps available on the market.

[99] The decrease was due to the transition to a new base year (2020).

[100] A reduction in savings in RUB million accompanying an increase in savings as a percentage (in 2020 compared to 2019) was due to the revision of indicators for the base year at some NPPs (Beloyarsk, Kalinin, Kursk and Novovoronezh NPPs).

The Company's organisations have implemented most elements of an energy management system compliant with the ISO 50001 international standard (the organisations of JSC Rosenergoatom and JSC TVEL have obtained international certificates; organisations in other Divisions have implemented individual elements of the system).

The Company's organisations use the AEEMS information system for reporting on energy conservation and improvement of energy efficiency.

Number of JSC Atomenergoprom's organisations covered by the AEEMS

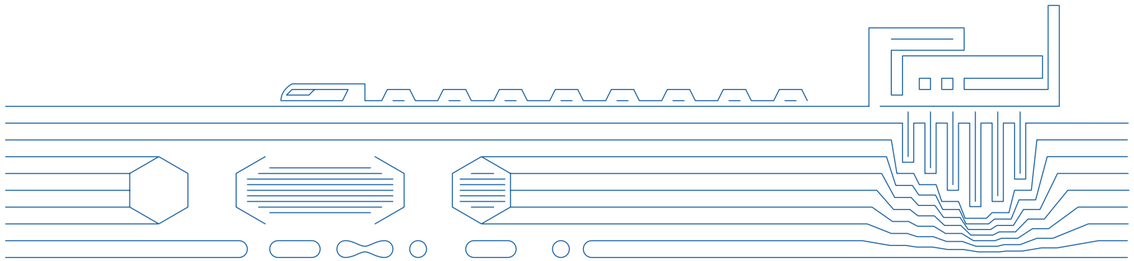
Plans for 2022 and for the medium term

In order to achieve the energy conservation target of 1.0% set for 2022 in accordance with the Government Programme 'Development of the Nuclear Power and Industry Complex', the following differentiated energy conservation targets have been set and included in the KPI maps of executives of the Company's Divisions/complexes (against 2020 as the baseline):

Division/complex	Energy conservation targets for 2021 (%)
JSC Atomredmetzoloto	1.50
JSC Atomenergomash	2.00
JSC Rosenergoatom	0.30
JSC Science and Innovations	0.40
JSC RIR	1.00
Other	from 0.60 to 4.10

Between 2022 and 2027, the Company plans to:

- Develop and approve the Energy Conservation and Energy Efficiency Improvement Programme for the period from 2023 through 2027 in 2022;
- Monitor progress on scheduled energy audits in the Company's organisations;
- Monitor updates to Energy Conservation Programmes approved by the Company's organisations with energy costs exceeding RUB 50 million per year for the next five years following the completion of the current Programmes;
- Assess the outcomes of energy conservation measures implemented by the organisations on an annual basis (assign industry ratings);
- Maintain the energy efficiency management and energy management systems implemented in the industry and continuously improve their performance;
- Develop energy efficiency measures to increase the level of industry maturity in the field of sustainable development;
- Continuously improve the range of functions in the AEEMS information system, including updating the scope of reporting in the Company's organisations.



APPENDICES

Appendix 1. GRI Content Index

GRI 102-44
GRI 102-47
GRI 102-55

№	Indicator	Section	Comments
GRI 101: Foundation (2016)			
GRI 102: General Disclosures (2016)	**Organisational profile**		
	102-1 Name of the organisation	Section ‘Company Profile’, p. 6-7	
	102-2 Activities, brands, products, and services	Section ‘JSC Atomenergoprom Today’, p. 14 Section 2.3. ‘Markets Served by Atomenergoprom’, p. 43 Section 5.2. ‘Business Diversification’, p. 102	
	102-3 Location of headquarters	Section ‘Company Profile’, p. 6-7	
	102-4 Location of operations	Section 3.1. ‘International Business’, p. 62	
	102-5 Ownership and legal form	Section ‘Company Profile’, p. 6-7	Form of ownership: ownership by state-owned corporations.
	102-6 Markets served	Section 2.3. ‘Markets Served by Atomenergoprom’, p. 43 Section 3.1. ‘International Business’, p. 62 Section 5.2. ‘Business Diversification’, p. 102	
	102-7 Scale of the organisation	Section ‘JSC Atomenergoprom Today’, p. 14 Section ‘Key Results in 2021’, p. 18 Section ‘Financial and Economic Performance’, p. 19 Section 8.1. ‘Personnel Management’, p. 162	The Report covers a total of 162 organisations.
	102-8 Information on employees and other workers	Section 8.1. ‘Personnel Management’, p. 162 Appendix 2, p. 246	
	102-9 Supply chain	Section ‘JSC Atomenergoprom Today’, p. 14 Section 2.3. ‘Markets Served by Atomenergoprom’, p. 43	
	102-10 Significant changes to the organisation and its supply chain	Section 7.1. ‘Corporate Governance’, p. 130	
	102-11 Precautionary Principle or approach	Section 9.2. ‘Environmental Safety’, p. 205	
	102-12 External initiatives	Section 2.2. ‘Sustainable Development Management’, p. 36 Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 199	
	102-13 Membership of associations	-	Membership in associations is maintained through the participation of JSC Atomenergoprom’s organisations. More specifically, NIKIET is a member of the Russian National Committee of the World Energy Council (an association of companies in the fuel and energy sector); a number of JSC Atomenergoprom’s organisations are members of the World Nuclear Association.
Strategy			
	102-14 Statement from senior decision-maker	Section ‘Message from the Management’, p. 12-13	
Ethics and integrity			
	102-16 Values, principles, standards, and norms of behaviour	Section 8.1. ‘Personnel Management’, p. 179	
	102-17 Mechanisms for advice and concerns about ethics	Section 8.1. ‘Personnel Management’, p. 179	

№	Indicator	Section	Comments
Governance			
	102-18 Governance structure	Section 7.1 ‘Corporate Governance’, ‘Internal Control and Audit’, p. 125	–
	102-22 Composition of the highest governance body and its committees	Section 7.1. ‘Corporate Governance’, p. 125	
	102-34 Nature and total number of critical concerns	Section 7.1. ‘Corporate Governance’, p. 128	
	102-35 Remuneration policies	Section 7.1. ‘Corporate Governance’, p. 131	
Stakeholder engagement			
	102-40 List of stakeholder groups	Section 8.3. ‘Stakeholder Engagement’, pp. 182-183	
	102-41 Collective bargaining agreements	Section 8.1. ‘Personnel Management’, p. 176	
	102-42 Identifying and selecting stakeholders	Section 8.3. ‘Stakeholder Engagement’, p. 182	
	102-43 Approach to stakeholder engagement	Section 8.3. ‘Stakeholder Engagement’, p. 182	No stakeholder engagement was undertaken specifically as part of the report preparation process.
	102-44 Key topics and concerns raised	Appendix 2. ‘GRI Content Index’, pp. 230-245	
Report profile			
	102-45 Entities included in the consolidated financial statements	—	JSC Atomenergoprom’s report covers all organisations included in its financial statements under IFRS. Material subsidiaries included in the financial statements under IFRS are listed in note 38 thereto.
	102-46 Defining report content and topic Boundaries	Section ‘Report Profile’, p. 8	The Reporting Principles set out in the GRI Standards are reflected in ROSATOM’s Uniform Industry-Wide Policy on Public Reporting.
	102-47 List of material topics	Section ‘Report Profile’, p. 9	
	102-48 Restatements of information	Section ‘Key Results in 2021’, p. 18	
	102-49 Changes in reporting	Section ‘Report Profile’, p. 9	Significant changes in the scope of financial statements under IFRS are described in note 7 thereto.
	102-50 Reporting period	Section ‘Report Profile’, p. 8	
	102-51 Date of most recent report	Section ‘Report Profile’, p. 8	JSC Atomenergoprom’s Report for 2020 was published on 31 May 2021.
	102-52 Reporting cycle	Section ‘Report Profile’, p. 8	
	102-53 Contact point for questions regarding the report	Section ‘Contact Details’, p. 251	
	102-54 Claims of reporting in accordance with the GRI Standards	Section ‘Report Profile’, p. 8	
	102-55 GRI content index	Appendix 1, p. 230-245	
	102-56 External assurance	Section ‘Report Profile’, p. 9	The Company’s policy with regard to seeking external assurance is set out in the Uniform Industry-Wide Methodological Guidelines on Public Reporting of ROSATOM and Its Organisations. The external assurance report is available on the website at https://report.rosatom.ru/aep

№	Indicator	Section	Comments
Material topics			
2. Nuclear and radiation safety			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	
	103-2 The management approach and its components	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	Most organisations that have a trade union cell have an occupational health and safety committee.
	103-3 Evaluation of the management approach	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	
GRI 416: Customer Health and Safety (2016)	416-2 Incidents of non-compliance concerning the health and safety impacts of products and services		There were no incidents of non-compliance concerning the impacts of products and services on customer health and safety.
3. Prospects for the development of the nuclear power industry			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 2.1. 'Business Strategy until 2030', p. 32	
	103-2 The management approach and its components	Section 2.1. 'Business Strategy until 2030', p. 32	
	103-3 Evaluation of the management approach	Section 2.1. 'Business Strategy until 2030', pp. 30–32	
6. Emergency preparedness			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	
	103-2 The management approach and its components	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	
	103-3 Evaluation of the management approach	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	
10. Business development and diversification			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 5.2. 'Business Diversification', p. 102	
	103-2 The management approach and its components	Section 5.2. 'Business Diversification', p. 102	
	103-3 Evaluation of the management approach	Section 5.2. 'Business Diversification', p. 102	
11. Development of international business and international cooperation			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 3.1. 'International Business', p. 62	
	103-2 The management approach and its components	Section 3.1. 'International Business', p. 62	
	103-3 Evaluation of the management approach	Section 3.1. 'International Business', p. 62	
13. Traditional and new markets			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 2.3. 'Markets Served by Atomenergoprom', p. 42	
	103-2 The management approach and its components	Section 2.3. 'Markets Served by Atomenergoprom', p. 42	
	103-3 Evaluation of the management approach	Section 2.3. 'Markets Served by Atomenergoprom', p. 42	
14. Financial and economic performance			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 7.3. 'Financial Management', p. 146 Section 7.4. 'Investment Management', p. 146	
	103-2 The management approach and its components	Section 7.3. 'Financial Management', p. 146 Section 7.4. 'Investment Management', p. 152	

№	Indicator	Section	Comments
	103-3 Evaluation of the management approach	Section 7.3. ‘Financial Management’, p. 146 Section 7.4. ‘Investment Management’, p. 152	
GRI 201: Economic Performance (2016)	201-4 Financial assistance received from government	Section ‘Company Profile’, p. 6	In 2021, JSC Atomenergoprom did not receive any financial assistance from the government or government-funded loans.
15. Innovation and scientific and technological advancement			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 5.1. ‘Research and Innovations’, p. 98	
	103-2 The management approach and its components	Section 5.1. ‘Research and Innovations’, p. 98	
	103-3 Evaluation of the management approach	Section 5.1. ‘Research and Innovations’, p. 98	
16. Business risks and opportunities			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 7.2. ‘Risk Management’, p. 132	
	103-2 The management approach and its components	Section 7.2. ‘Risk Management’, p. 132	
	103-3 Evaluation of the management approach	Section 7.2. ‘Risk Management’, p. 132	
17. Digital products and contribution to the digitisation of the Russian economy			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 6.1. ‘Uniform Digital Strategy’, p. 114	
	103-2 The management approach and its components	Section 6.1. ‘Uniform Digital Strategy’, p. 114	
	103-3 Evaluation of the management approach	Section 6.1. ‘Uniform Digital Strategy’, p. 114	

№	Indicator	Section	Comments
18. Performance of the Company’s Divisions			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 4.1. ‘Mining Division’, p. 72 Section 4.2. ‘Fuel Division’, p. 78 Section 4.3. ‘Mechanical Engineering Division’, p. 84 Section 4.4. ‘Power Engineering Division’, p. 90	
	103-2 The management approach and its components	Section 2.1. ‘Business Strategy until 2030’, p. 32	
	103-3 Evaluation of the management approach	Section 4.1. ‘Mining Division’, p. 72 Section 4.2. ‘Fuel Division’, p. 78 Section 4.3. ‘Mechanical Engineering Division’, p. 84 Section 4.4. ‘Power Engineering Division’, p. 90	
21. Developing the regions where nuclear facilities are located. Social and economic impacts			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.2. ‘Developing the Regions Where Nuclear Facilities Are Located’, p. 180	
	103-2 The management approach and its components	Section 8.2. ‘Developing the Regions Where Nuclear Facilities Are Located’, p. 180	
	103-3 Evaluation of the management approach	Section 8.2. ‘Developing the Regions Where Nuclear Facilities Are Located’, p. 180	
GRI 203: Indirect Economic Impacts (2016)	203-2 Significant indirect economic impacts	Section 8.2. ‘Developing the Regions Where Nuclear Facilities Are Located’, p. 180	
22. Provision of access to energy			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.2. ‘Developing the Regions Where Nuclear Facilities Are Located’, p. 180 Section 4.4. ‘Power Engineering Division’, p. 90	

№	Indicator	Section	Comments
	103-2 The management approach and its components	Section 8.2. ‘Developing the Regions Where Nuclear Facilities Are Located’, p. 180 Section 4.4. ‘Power Engineering Division’, p. 90	
	103-3 Evaluation of the management approach	Section 4.4. ‘Power Engineering Division’, p. 90	
23. Occupational health and safety			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 190	
	103-2 The management approach and its components	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 190	
	103-3 Evaluation of the management approach	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 190	
GRI 403 Occupational Health and Safety	403-1 Occupational health and safety management system	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, pp. 194, 196	The requirements of the occupational health and safety management system are binding on all employees and all persons who are on the premises of the organisation, in its buildings and structures. The relevant regulations are listed in section 11 of the Uniform Industry-Wide Guidelines for Developing and Improving an Occupational Health and Safety Management System in ROSATOM’s Organisations.
	403-2 Hazard identification, risk assessment, and incident investigation	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 197	
	403-3 Occupational health services	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 196	
	403-4 Worker participation, consultation, and communication on occupational health and safety	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, pp. 198-199	The operation of occupational health and safety committees (commissions) is governed by section 6.3. ‘Occupational Safety and Health Committee (Commission)’ of the Uniform Industry-Wide Guidelines for Developing and Improving an Occupational Health and Safety Management System in ROSATOM’s Organisations.
	403-5 Worker training on occupational health and safety	Section 8.1. ‘Personnel Management’, pp. 168, 176	
	403-6 Promotion of worker health	Section 8.1. ‘Personnel Management’, p. 175	
	403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 199	
	403-9 Work-related injuries	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 201	The indicator has been disclosed in part; injury rates are not disclosed for contractor organisations, as no records of hours worked by contractors are kept.
	403-10 Work-related ill health	Section 9.1. ‘Nuclear and Radiation Safety; Occupational Safety and Health’, p. 201	The indicator has been disclosed in part. No data are collected and no records are kept on occupational diseases of employees in contractor organisations. No records are kept on the number of fatalities as a result of work-related ill health.
24. Personnel management, social policy, corporate culture and volunteering			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.1. ‘Personnel Management’, p. 163	
	103-2 The management approach and its components	Section 8.1. ‘Personnel Management’, p. 163	
	103-3 Evaluation of the management approach	Section 8.1. ‘Personnel Management’, p. 165	

№	Indicator	Section	Comments
GRI 401: Employment	401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	Section 8.1. 'Personnel Management', p. 176	Equal benefits are provided to full-time employees of the organisations. There are restrictions on benefits provided to: - Employees who have a second job (they are only entitled to voluntary health insurance and accident insurance if these are not provided at their main place of employment); - Seasonal and temporary workers; - Those employed under independent contractor agreements.
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.1. 'Personnel Management', p. 163	
	103-2 The management approach and its components	Section 8.1. 'Personnel Management', p. 163	
	103-3 Evaluation of the management approach	Section 8.1. 'Personnel Management', p. 165	
GRI 402 Labour/ Management Relations	402-1 Minimum notice periods regarding operational changes	Section 8.1. 'Personnel Management', p. 175	The Company fully complies with the requirements of the law concerning the minimum notice periods regarding significant changes.
27. Radiation impact on the environment			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190	
	103-3 Evaluation of the management approach	Section 9.1. 'Nuclear and Radiation Safety; Occupational Safety and Health', p. 190 Section 9.2. 'Environmental Safety', p. 207	
GRI 304: Biodiversity (2016)	304-3 Habitats protected or restored	Section 9.2. 'Environmental Safety', pp. 153-154	There are no partnerships with third parties to protect or restore habitat areas.
28. Development of technologies improving the quality of people's lives and/or reducing the environmental footprint			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.2. 'Developing the Regions Where Nuclear Facilities Are Located', p. 180 Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 8.2. 'Developing the Regions Where Nuclear Facilities Are Located', p. 180 Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 8.2. 'Developing the Regions Where Nuclear Facilities Are Located', p. 180 Section 9.2. 'Environmental Safety', p. 207	
GRI 413: Local Communities	413-1 Operations with local community engagement, impact assessments, and development programmes	8.3. 'Stakeholder Engagement', p. 186	JSC Atomenergoprom and its organisations do not have any separate arrangements with their regions of operation. Local community engagement forms part of ROSATOM's stakeholder engagement.
29. Emissions into the atmosphere			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.2. 'Environmental Safety', pp. 205	
	103-2 The management approach and its components	Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 9.2. 'Environmental Safety', p. 207	
GRI 305: Emissions (2016)	305-7 Nitrogen oxides (NO_x), sulphur oxides (SO_x), and other significant air emissions	Section 9.2. 'Environmental Safety', p. 208	There are no emissions of persistent organic pollutants or hazardous air pollutants.

№	Indicator	Section	Comments
30. Management of effluents and waste			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 9.2. 'Environmental Safety', p. 207	
GRI 303: Water and Effluents (2018)	303-1 A description of how the organisation interacts with water, including how and where water is withdrawn, consumed, and discharged	Section 9.2. 'Environmental Safety', p. 220	
	303-2 Management of water discharge-related impacts	Section 9.2. 'Environmental Safety', p. 222-223	
	303-3 Water withdrawal	Section 9.2. 'Environmental Safety', p. 221	
	303-5 Water consumption	Section 9.2. 'Environmental Safety', p. 222	The Company does not draw formation water or other types of water produced during the production, processing or use of any raw materials. Seawater is included in the 'Other' category.
GRI 306: Waste (2020)	306-1 Waste generation and significant waste-related impacts	Section 9.2. 'Environmental Safety', p. 204	The largest amount of waste is generated as a result of uranium mining by the Company's Mining Division.
	306-2 Management of significant waste-related impacts	Section 9.2. 'Environmental Safety', p. 204	Municipal solid waste is transferred to the relevant regional operators, which operate in accordance with the Russian legislation.
	306-3 Waste generated	Section 9.2. 'Environmental Safety', p. 218	
	306-4 Waste diverted from disposal	Section 9.2. 'Environmental Safety', p. 218	Disclosures 306-4 and 306-5 are provided in part, with no breakdown by waste management methods stipulated in the GRI Standards. Data on waste management are disclosed with a breakdown by waste management method as listed in the statistical reporting form 2-TP (Waste), due to a lack of waste management accounting practices aligned with the GRI 306 Standard (2020) in Russia.
	306-5 Waste directed to disposal	Section 9.2. 'Environmental Safety', p. 218	
31. Compliance with environmental and technical standards			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 9.2. 'Environmental Safety', p. 207	
GRI 307: Environmental Compliance (2016)	307-1 Non-compliance with environmental laws and regulations	Section 9.2. 'Environmental Safety', p. 207	
32. Energy efficiency			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 9.2. 'Environmental Safety', p. 207	
GRI 302: Energy (2016)	302-4 Reduction of energy consumption	Section 9.2. 'Environmental Safety', p. 226	

№	Indicator	Section	Comments
33. Management of disturbed and contaminated areas			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 9.2. 'Environmental Safety', p. 207	
GRI 304: Biodiversity (2016)	304-3 Habitats protected or restored	Section 9.2. 'Environmental Safety', p. 217	There are no partnerships with third parties to protect or restore habitat areas.
34. Climate action and climate risks			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 2.2. 'Sustainable Development Management', pp. 37-38 Section 9.2. 'Environmental Safety', p. 205	
	103-2 The management approach and its components	Section 2.2. 'Sustainable Development Management', pp. 37-38 Section 9.2. 'Environmental Safety', p. 206	
	103-3 Evaluation of the management approach	Section 2.2. 'Sustainable Development Management', pp. 37-38 Section 9.2. 'Environmental Safety', p. 207	
GRI 305: Emissions (2016)	305-6 Emissions of ozone-depleting substances (ODS)	Section 9.2. 'Environmental Safety', p. 209	The Company did not export or import ODS.
35. Respect for human rights			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.1. 'Personnel Management', p. 179	
	103-2 The management approach and its components	Section 8.1. 'Personnel Management', p. 179	
	103-3 Evaluation of the management approach	Section 8.1. 'Personnel Management', p. 179	
GRI 406: Non-discrimination (2016)	406-1 Incidents of discrimination and corrective actions taken		No incidents of discrimination were recorded in 2021.
37. Continuity and maintaining the talent pipeline in the industry			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.1. 'Personnel Management', p. 167	
	103-2 The management approach and its components	Section 8.1. 'Personnel Management', p. 167	
	103-3 Evaluation of the management approach	Section 8.1. 'Personnel Management', p. 166	
GRI 404: Training and Education (2016)	404-2 Programmes for upgrading employee skills and transition assistance programmes	Section 8.1. 'Personnel Management', pp. 166-167	
38. Youth and education policy; cooperation with universities			
GRI 103: Management Approach (2016)	103-1 Explanation of the material topic and its Boundary	Section 8.1. 'Personnel Management', p. 177	
	103-2 The management approach and its components	Section 8.1. 'Personnel Management', p. 177	
	103-3 Evaluation of the management approach	Section 8.1. 'Personnel Management', p. 177	

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Appendix 2. Total number of employees of JSC Atomenergoprom in the Russian Federation as at 31 December 2021[101]

Region where the organisation is located	TOTAL, including:	employees on the payroll	external part-time employees	men	women	permanent employees	temporary employees
Total	**139,514**	**136,373**	**3,141**	**93,444**	**46,070**	**132,587**	**6,927**
Moscow	25,909	24,747	1,162	15,966	9,943	23,902	2,007
Saint Petersburg	3,613	3,235	378	2,045	1,568	3,406	207
Arkhangelsk Region	1	1	0	1	0	1	0
Belgorod Region	8	8	0	6	2	8	0
Vladimir Region	2,842	2,474	368	1,201	1,641	2,794	48
Volgograd Region	11	11	0	11	0	0	11
Vologda Region	1	0	1	0	1	1	0
Voronezh Region	6,145	6,111	34	4,666	1,479	6,024	121
Zabaykalsky Territory	6,597	6,229	368	4,501	2,096	6,404	193
Ivanovo Region	21	13	8	13	8	16	5
Irkutsk Region	1,127	1,115	12	797	330	1,059	68
Kaliningrad Region	613	612	1	502	111	301	312
Kaluga Region	44	41	3	31	13	42	2
Krasnodar Territory	15	12	3	10	5	14	1
Krasnoyarsk Territory	3,432	3,368	64	2,429	1,003	2,789	643
Kurgan Region	716	716	0	587	129	534	182
Kursk Region	7,599	7,554	45	5,705	1,894	7,092	507
Leningrad Region	8,597	8,487	110	6,024	2,573	8,366	231
Lipetsk Region	3	3	0	2	1	3	0
Moscow Region	10,008	9,866	142	6,412	3,596	9,800	208
Murmansk Region	3,878	3,856	22	2,862	1,016	3,723	155
Nizhny Novgorod Region	7,085	7,048	37	3,750	3,335	6,797	288
Novgorod Region	15	15	0	11	4	14	1
Novosibirsk Region	1,895	1,864	31	1,228	667	1,842	53
Omsk Region	4	4	0	0	4	1	3
Orenburg Region	48	47	1	42	6	16	32
Oryol Region	5	5	0	5	0	5	0
Penza Region	12	11	1	7	5	12	0
Primorsky Territory	1	0	1	1	0	1	0
Republic of Bashkortostan	20	20	0	11	9	17	3
Republic of Buryatia	485	485	0	439	46	378	107
Republic of Karelia	1,360	1,341	19	916	444	1,323	37
Republic of Mordovia	174	174	0	103	71	173	1
Sakha Republic	71	67	4	63	8	67	4
Republic of Tatarstan	499	494	5	315	184	491	8
Rostov Region	8,366	8,340	26	6,079	2,287	8,136	230
Samara Region	9	9	0	9	0	9	0
Saratov Region	5,451	5,438	13	4,162	1,289	5,359	92
Sverdlovsk Region	9,143	9,017	126	6,188	2,955	8,928	215
Smolensk Region	5,531	5,502	29	3,714	1,817	5,439	92
Stavropol Territory	31	30	1	22	9	30	1
Tver Region	5,282	5,265	17	3,416	1,866	5,129	153
Tomsk Region	5,360	5,326	34	3,819	1,541	5,003	357
Tula Region	4	4	0	2	2	4	0
Tyumen Region	1	1	0	0	1	1	0
Udmurt Republic	4,541	4,506	35	3,237	1,304	4,436	105
Ulyanovsk Region	567	546	21	411	156	489	78
Chelyabinsk Region	1,606	1,591	15	1,178	428	1,451	155
Chukotka Autonomous District	763	760	3	542	221	752	11
Yaroslavl Region	5	4	1	3	2	5	0

Total headcount (core employees + external part-time employees) as at 31 December 2021 (in the Russian Federation), persons

Permanent employees		Temporary employees		Full-time employees		Part-time employees	
men	women	men	women	men	women	men	women
89,133	43,454	4,311	2,616	90,382	42,555	3,062	3,515

[101] No records are kept on the average number of employees and external part-timers in the overseas branches of the Company and its organisations; no breakdown by gender or age is provided for the overseas branches.

Appendix 3. Summary consolidated financial statements based on consolidated financial statements for the year ended 31 December 2021 and the independent auditors' report

Feedback Form

Dear readers,

You have read the annual report of JSC Atomenergoprom, 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 Company's reports by completing the questionnaire below.

Please return the completed form by mail to the Communications Department or to the Treasury Department at 24 Bolshaya Ordynka Street, Moscow, 119017 or by email (EAMamy@rosatom.ru).

1. Please assess the Report using the following criteria:

Accuracy and objectivity

	Excellent		Good		Satisfactory		Poor

Completeness and relevance of information

	Excellent		Good		Satisfactory		Poor

Report structure, ease of reference, wording

	Excellent		Good		Satisfactory		Poor

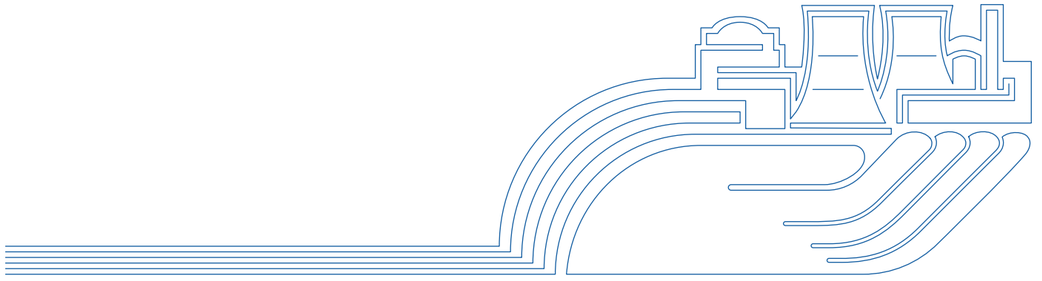
2. Please specify which sections of the Report you have found to be relevant and useful:

3. What 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 JSC Atomenergoprom or ROSATOM		Representative of a customer/consumer of goods and services
	Employee of an organisation forming part of JSC Atomenergoprom or ROSATOM		Representative of a business partner
	Representative of the federal government		Representative of a non-governmental organisation
	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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