



# ATOM ENERGO PROM

ANNUAL REPORT / 2018

The cover of this report has been produced from a polymer composite material. JSC RPC Khimpromengineering (an organization of JSC Atomenergoprom), which operates under the UMATEX brand name, is Russia's leading manufacturer of polymer composite materials based on carbon fibre; it has large state-of-the-art production facilities.

Polymer composite materials based on carbon fibre have unique properties: they are light in weight and have a high strength and corrosion resistance. Due to these advantages, these materials are in demand in various industries: in the aircraft and automotive industry, shipbuilding, power generation, construction (including NPP construction), manufacture of consumer goods and sports gear, etc. An end user is offered a product that is lighter in weight and has a high level of strength and durability. The use of composite materials in vehicles helps to reduce fuel consumption by 6 to 8%. In the wind power industry, the use of composite blades with a carbon stiffener helps to improve the performance of a wind turbine. The use of composite materials in construction makes it possible to extend the service life of buildings and structures.

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1 JSC ATOMENERGOPROM  
TODAY

>70  
YEARS

History of organizations  
and enterprises forming part of  
JSC Atomenergoprom



## COMPANY OVERVIEW

### Joint-Stock Company Atomic Energy Power Corporation (JSC Atomenergoprom).

Primary state registration number (OGRN): 1077758081664.

State registration date: July 19, 2007.

State registration authority: Inter-District Inspectorate No. 46 of the Federal Tax Service in Moscow.

Location: 24 Bolshaya Ordynka Street, Moscow.

Tel.: +7 (495) 969-29-39.

Fax: +7 (495) 969-29-36.

Official website:

[www.atomenergoprom.ru](http://www.atomenergoprom.ru).

### 1. Shareholders of JSC Atomenergoprom

#### Holders of record of JSC Atomenergoprom as of December 31, 2018:

#### 1. State Atomic Energy Corporation Rosatom.

Location: 24 Bolshaya Ordynka Street, Moscow, 119017.

Status of the holder of record: shareholder.

Stake in the Company's authorized share capital: 94.45%.

Portion of voting shares held by the entity: 100%.

#### 2. Russian Federation represented by the Russian Ministry of Finance.

Location: 9 Ilyinka Street, Moscow, 109097.

Status of the holder of record: shareholder.

Stake in the Company's authorized share capital: 5.55%.

Portion of voting shares held by the entity: 0%.

### 2. Auditor of JSC Atomenergoprom

#### Full name: LLC Accountants and Business Advisors (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](mailto:fbk@fbk.ru).

JSC KPMG is the auditor for the summary consolidated IFRS financial statements for 2018.

### 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: 18, Bldg. 13, Stromynka Street, Moscow, 107996.

INN: 7705038503.

OGRN: 1027739216757.

Licence: 045-13976-000001.

Issue date: December 3, 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: October 28, 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

The Public Annual Report (hereinafter referred to as the Report) of JSC Atomenergoprom (hereinafter referred to as JSC Atomenergoprom or the Company) for 2018 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 2018. The Report also outlines the Company's achievements in the sphere of nuclear and radiation safety and environmental protection, its contribution to the development of its regions of operation, implementation of social policy and other aspects of sustainable development.

JSC Atomenergoprom issues reports on a yearly basis. The previous annual report was published in 2018. This Report covers the operating results of the Company and its organizations during the period from January 1 through December 31, 2018. It also discloses some information on and results of the entire Russian nuclear industry. 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 Public Reporting Policy of ROSATOM and the Public Reporting Standard of ROSATOM and its organizations;

- The International Integrated Reporting Framework of the International Integrated Reporting Council (The International <IR> Framework);

- The Global Reporting Initiative (GRI) Sustainability Reporting Standards: this Report has been prepared in accordance with individual GRI Standards listed in Appendix 1;

- The AA1000 AccountAbility Principles Standard;

- Federal Law No. 208-FZ on Joint-Stock Companies dated December 26, 1995;

- Regulations of the Central Bank of Russia No. 454-P on Disclosure of Information by Issuers of Issue-Grade Securities dated December 30, 2014.

### Process for determining the materiality of disclosures

The materiality of information was determined through the following process:

- A working group compiled a list of material topics related to the Company's operations;

- The Company's management, members of the working group preparing the Report and representatives of major stakeholder groups prioritized material topics (based on the assessment of materiality of each of the proposed topics);

- Following the 'two-stage filtering', a list of material topics to be disclosed in the Report was compiled.

As a result, a ranking map of material topics to be disclosed in the Report was prepared. The decision to include various GRI performance indicators and performance indicators stipulated in ROSATOM's Public Reporting Standard was based on the materiality of the topics to which the indicators are related. The boundaries of information disclosure on various topics were determined by the working group.

### Verification of reporting information

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

### 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 significantly from the forward-looking statements contained herein.

# ADDRESS BY THE CHAIR OF THE BOARD OF DIRECTORS



## *Dear colleagues and partners,*

Looking back on JSC Atomenergoprom's performance during the past year, we can say that the Company achieved impressive results.

The Company's financial position remains stable and robust. Its revenue under IFRS increased by 3% year on year to RUB 769.5 billion. EBITDA reached RUB 296.8 billion. Profit under IFRS for the reporting period totalled RUB 207.7 billion.

JSC Atomenergoprom continues to increase nuclear power generation every year. In 2018, electricity output at 37 power units of 10 operating NPPs in Russia totalled 204.3 billion kWh, or almost 19% of the country's total electricity output. It is also worth noting that nuclear power generation makes a significant positive impact on the environment. The operation of all Russian-design NPPs globally helps to prevent carbon emissions totalling 556 million tonnes per year.

In addition to boosting power generation, the Company continues to implement its NPP construction programme in Russia. The reporting year saw the start of operation of power unit No. 4 of Rostov NPP and power unit No. 1 of Leningrad NPP-2. Concreting started at the construction site of power unit No. 1 of Kursk NPP-2.

The real highlight of the year was the start of the first criticality stage at the reactor units of the Akademik

Lomonosov floating power plant as part of comprehensive testing. The floating NPP is an innovative Russian solution designed to provide power supply in the Far North, on islands and in other remote areas. After it is put into operation, the power plant will supply electricity and heat to thousands of people and to industrial enterprises in Chukotka. The Company's foreign partners have also expressed considerable interest in the floating NPP.

In 2018, a Uniform Digital Strategy was developed and approved in the nuclear industry. It incorporates global expertise, current trends in the sphere of technology, ROSATOM's competitive advantages and growth areas. JSC Atomenergoprom will actively participate in the implementation of the digital strategy in order to become more competitive and develop new products.

Throughout the year, nuclear facilities operated safely and reliably. Safety will remain our top priority in the future.

I would like to thank all employees of JSC Atomenergoprom and our partners for fruitful cooperation and wish them every success in 2019!

Chair of the Board of Directors  
of JSC Atomenergoprom  
**Ekaterina Lyakhova**

# ADDRESS BY THE DIRECTOR



## *Dear colleagues and partners,*

In 2018, JSC Atomenergoprom continued to work towards attaining its strategic goals.

There were a number of major achievements in the international arena. Russia and China signed a package of strategic documents, including intergovernmental protocols and framework contracts for the construction of power units No. 7 and 8 of Tianwan NPP and power units of No. 3 and 4 of Xudabao NPP.

Following the signing of an intergovernmental agreement on NPP construction in Uzbekistan, an official ceremony was held in October 2018 to mark the launch of the project. The event heralded the start of an engineering survey aimed at selecting the site for the construction of the future NPP. The project will involve building two power units equipped with VVER-1200 reactors.

Under previously concluded contracts, we completed the power start-up of power unit No. 4 at Tianwan NPP in China. Concreting started at the sites of power unit No. 2 of Rooppur NPP in Bangladesh and power unit No. 1 of Akkuyu NPP in Turkey.

In the reporting year, the Company actively developed new product lines.

A contract was signed for the construction of a Nuclear Research and Technology Centre in Zambia.

In the sphere of nuclear medicine, a concession agreement was signed on the construction and operation of the

radiology department building of the East Siberian Cancer Centre in Irkutsk. An agreement was signed on the construction of a nuclear medicine centre in Malaysia.

JSC Atomenergoprom is actively developing the Russian wind power market. In 2018, construction of a 150 MW pilot wind power plant in Adygea and a wind turbine and component factory in Volgograd was underway.

In 2018, the Company launched a new major project in the sphere of industrial waste processing. JSC Atomenergoprom has state-of-the-art technology, manufacturing infrastructure and managerial capabilities required for its successful implementation. This project will enable a significant improvement in environmental safety in Russia.

These and other products and services offered by JSC Atomenergoprom make an important contribution to achieving the UN Sustainable Development Goals, improving the quality of people's lives and their well-being and preserving the global environment.

I would like to express my sincere thanks to the Company's employees and partners, and I hope that in 2019, we will continue to enjoy shared success!

Director of JSC Atomenergoprom  
**Kirill Komarov**

## JSC ATOMENERGOPROM TODAY

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

JSC Atomenergoprom is an organization of State Atomic Energy Corporation Rosatom (ROSATOM). ROSATOM pursues the governmental policy and ensures unity of management of the nuclear industry and sustainability of the nuclear power generation complex; it develops Russia's innovative potential in the nuclear industry, oversees the nuclear-powered icebreaker fleet and ensures nuclear and radiation safety. ROSATOM is tasked with fulfilling Russia's international commitments related to the peaceful use of nuclear energy and maintaining the non-proliferation regime. ROSATOM aims to contribute to the federal target programmes promoting the development of the nuclear industry, fostering the development of nuclear power and strengthening Russia's competitive position on the global market for nuclear technologies.

No relation exists between the defence industry and civilian operations of ROSATOM, including business operations of JSC Atomenergoprom. Therefore, the operations of JSC Atomenergoprom as a company consolidating civilian assets of the Russian nuclear industry are completely separate from the state defence order.

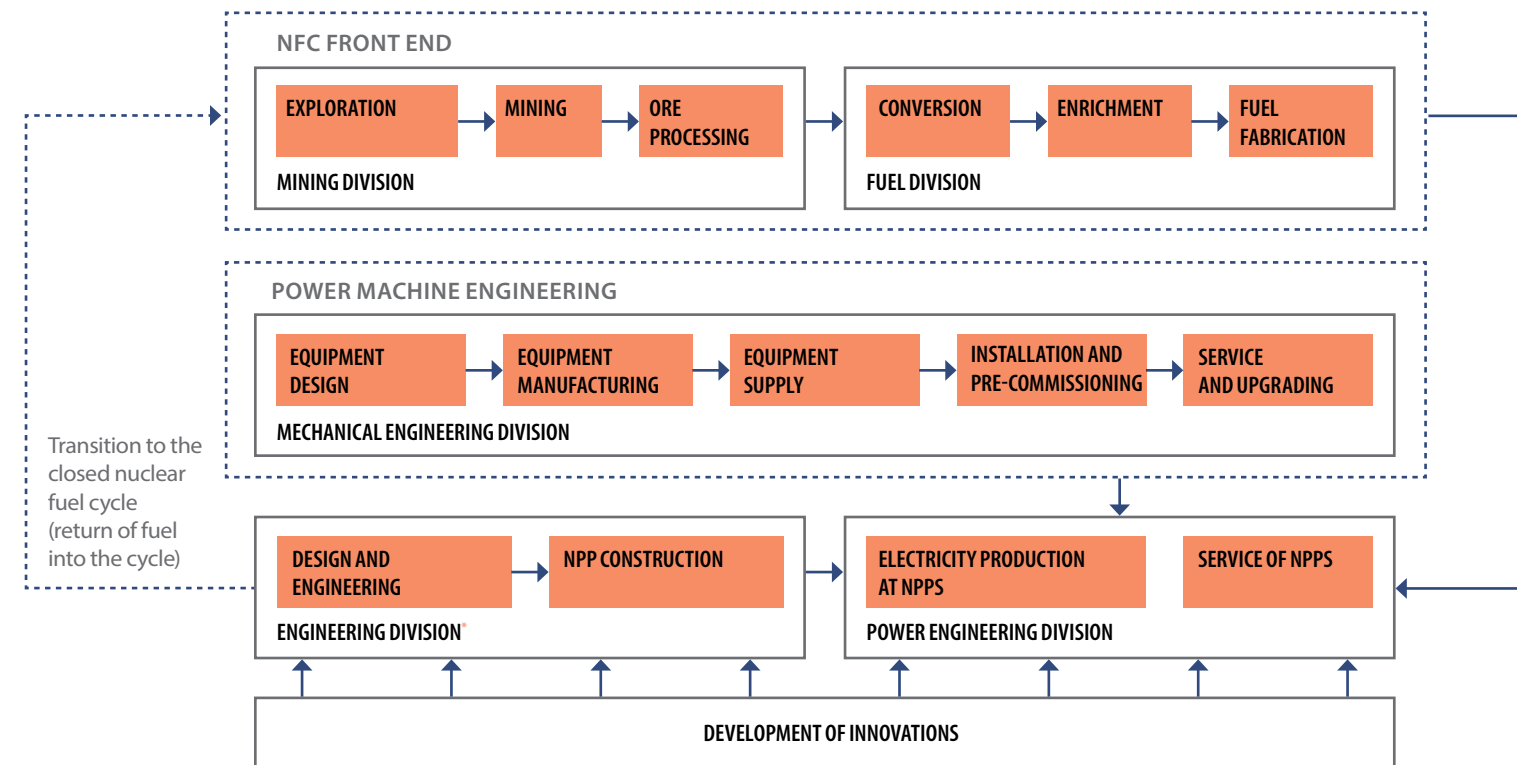
The organizations of JSC Atomenergoprom comprise a complete cycle of nuclear production ranging from uranium mining to construction of NPPs and electricity generation. The top priorities of the organizations are to improve product quality, introduce innovative technologies and ensure high-level environmental management.

JSC Atomenergoprom 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. JSC Atomenergoprom carries out numerous large-scale international projects and generates substantial overseas revenue (see the section 'International Business' for details).

The Company integrates many leading organizations and enterprises in the nuclear industry, whose development started over 70 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').

JSC Atomenergoprom today	
<b>No. 1</b>	in the world in terms of the number of NPP power units in the portfolio of foreign projects (36 power units) (including the project portfolio of ROSATOM)
<b>No. 1</b>	in the world in terms of uranium enrichment (36% of the global market)
<b>No. 2</b>	in the world in terms of uranium resources and production
<b>17%</b>	share of the global nuclear fuel market
<b>18.7%</b>	share of electricity generation in Russia

## PRODUCTION AND PROCESS CHAIN OF JSC ATOMENERGOPROM



\*The Engineering Division forms part of ROSATOM.

## HISTORY OF JSC ATOMENERGOPROM

JSC Atomenergoprom was established in July 2007 as part of the Russian Nuclear Industry Development Programme approved by the Russian President Vladimir Putin on June 8, 2007, pursuant to Federal Law No. 13-FZ on Peculiarities of the Management and Disposal of the Property and Shares of Organizations Operating in the Nuclear Power Industry and on Introducing Amendments to Selected Russian Laws of February 5, 2007, Decree No. 556 of the Russian President on Restructuring the Russian Nuclear Power Generation Complex dated April 27, 2007 and Resolution No. 319 of the Russian Government on Measures for Establishing Joint-Stock Company Atomic Energy Power Corporation dated May 26, 2007.

Regulations on the establishment of JSC Atomenergoprom stipulated a merger of 89 enterprises in all nuclear power engineering and nuclear fuel cycle segments, and three federal educational establishments. The state contributed shares of 31 companies under federal ownership to the authorized 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 (FSUEs) and were subject to corporatization to be merged with the nuclear corporation. Between 2008 and 2011,

55 FSUEs were reorganized into joint-stock companies and merged with JSC Atomenergoprom. Thus, the formation of the Company's authorized share capital was completed.

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

As of December 31, 2018, JSC Atomenergoprom's scope of consolidation in accordance with IFRS comprised 145<sup>1</sup> companies of different legal forms.

As of December 31, 2018, the shareholders of JSC Atomenergoprom were ROSATOM (94.4491%)<sup>2</sup> and the Russian Federation represented by the Russian Ministry of Finance (5.5509%).

<sup>1</sup> Including JSC Atomenergoprom.

<sup>2</sup> ROSATOM holds 100% of voting shares in JSC Atomenergoprom.



## KEY EVENTS IN 2018

■ Power unit No. 4 of Rostov NPP and power unit No. 1 of Leningrad NPP-2 started commercial operation.

■ The first criticality stage was started at the reactor units of the Akademik Lomonosov floating nuclear power plant as part of comprehensive testing.

■ Electricity output at 37 power units of 10 operating NPPs totalled 204.3 billion kWh, reaching a new all-time high in the history of Russian nuclear power generation. The share of NPPs in Russia's energy mix totalled 18.7%.

■ Concreting started at the sites of power unit No. 1 of Kursk NPP-2 in Russia, power unit No. 2 of Rooppur NPP (Bangladesh) and power unit No. 1 of Akkuyu NPP (Turkey).

■ The power start-up of power unit No. 4 at Tianwan NPP in China was completed.

■ 8 intergovernmental agreements and 20 major interdepartmental agreements were concluded.

■ A historic package of documents on four high-priority areas of cooperation in the nuclear power industry was signed with China.

■ A legal framework was established at the intergovernmental level for NPP construction in Uzbekistan.

■ Mass production of MOX fuel for the BN-800 fast neutron reactor began.

■ A Uniform Digital Strategy and a Road Map for the Digital Transformation of the Russian Nuclear Industry were approved. The first replicable digital product was unveiled: Logos Aero-Hydro, an industrial 3D modelling tool.

■ The first stage of a Data Centre in the vicinity of Kalinin NPP was put into operation. This data centre will be the largest one in Russia and one of the largest data centres in Europe.

■ A concession agreement was signed on the construction and operation of the radiology department building of the East Siberian Cancer Centre in Irkutsk.

■ A single industry-wide plan of R&D topics was drafted in order to accelerate scientific research and development in high-priority areas.

■ The team of the Russian nuclear industry finished first in the unofficial team standings of the WorldSkills Hi-Tech 2018 National Competition of cross-industry skilled professions for workers in high-technology industries.

■ No events rated at level 2 or higher on the international INES scale were detected at nuclear facilities (level 1 and 0 deviations do not pose a risk to employees operating the facilities, local residents or the environment).

## KEY RESULTS IN 2018

Indicator	2016	2017 <sup>3</sup>	2018	2018/2017
Revenue under IFRS, RUB billion	699.9	747.5	769.5	+2.9%
EBITDA <sup>4</sup> , RUB billion	250.5	292.2	296.8	+1.57%
Profit under IFRS, RUB billion	92.8	116.1	207.7	+78.9%
Assets under IFRS, RUB billion	2,809.0	2,893.8	3,162.7	+9.3%
Intangible assets, RUB billion	108.6	92.5	181.9	+96.6%
Nuclear power generation, billion kWh	196.4	202.9	204.3	+0.7%
NPP capacity factor, %	83.1	83.3	79.9	–
Uranium resources <sup>5</sup> , kt	517.9 (+220.8)	523.9 (+216.2)	520.7 (197.1)	–
Uranium production, t	7,924	8,019	7,289	-9.1%
Overseas NPP construction projects, number of power units <sup>6</sup>	34	33	36	+9.1%
Portfolio of orders for new products (outside the scope of the nuclear industry), RUB billion <sup>7</sup>	692.8	814.1	1,082.6	+33.0%
Average salary in JSC Atomenergoprom, RUB '000 per month	75.4	80.3	85.3	+6.3%
Events rated level 2 and above on the INES scale, number	0	0	0	–

<sup>3</sup> Data on revenue, profit, assets and intangible assets for 2017 has been recalculated due to the fact that in June 2018, the Company signed a share purchase agreement to purchase shares in Joint-Stock Company Prepreg-Advanced Composite Materials (JSC Prepreg-ACM). Control over JSC Prepreg-ACM was transferred to the Company in July 2018. This transaction has been recorded in consolidated financial statements as a transaction under joint control and, accordingly, the comparative data of the statement of profit and loss and other comprehensive income for 2017 has been retrospectively adjusted.

<sup>4</sup> EBITDA = Operating results + Impairment of receivables + Depreciation and amortization + Adjustments for non-cash items of other expenses and income. Data for 2017 has been recalculated.

<sup>5</sup> The lower line with a '+' sign shows the data on uranium resources of Uranium One; this data is shown separately due to the differences in the calculation methodology used for Russian and foreign assets.

<sup>6</sup> Including the project portfolio of ROSATOM.

<sup>7</sup> Including the order portfolio of ROSATOM.



## FINANCIAL AND ECONOMIC RESULTS

### Key financial results

CONSOLIDATED FINANCIAL RESULTS OF JSC ATOMENERGOPROM UNDER IFRS, RUB BILLION

	2016	2017 <sup>8</sup>	2018	2018/2017, %
<b>Revenue</b>	699.9	747.5	769.5	102.9
<b>Cost of sales</b>	(461.6)	(478.4)	(479.8)	100.3
<b>Gross profit</b>	238.3	269.1	289.7	107.7
<b>Selling and administrative expenses</b>	(81.8)	(79.5)	(85.1)	107.0
<b>Other income/(expenses), net</b>	(17.1)	(26.5)	(21.3)	80.4
<b>Financial income/(expenses), net</b>	(52.3)	(12.1)	25.4	209.9
<b>Share of net (loss) profit of equity accounted investees</b>	4.7	2.9	(0.1)	(3.4)
<b>Gain from change in accounting approach of joint ventures</b>	26.0	–	47.7	0.0
<b>Income tax expense</b>	(25.0)	(37.8)	(48.6)	128.6
<b>Profit for the year</b>	92.8	116.1	207.7	178.9
<b>Other comprehensive income/(expenses)</b>	(33.2)	(4.0)	20.8	520.0
<b>Total comprehensive income for the year</b>	59.6	112.1	228.5	203.8
<b>Net operating profit after tax (NOPAT)</b>	114.4	125.3	134.7	107.5

<sup>8</sup> Hereinafter in this section, data for 2017 has been recalculated due to the fact that in June 2018, the Company signed a share purchase agreement to purchase shares in Joint-Stock Company Prepreg-Advanced Composite Materials (JSC Prepreg-ACM). Control over JSC Prepreg-ACM was transferred to the Company in July 2018. This transaction has been recorded in consolidated financial statements as a transaction under joint control and, accordingly, the comparative data of the statement of profit and loss and other comprehensive income for 2017 has been retrospectively adjusted.

In 2018, revenue increased by 2.9%, or RUB 22 billion.

Revenue from operations before the application of IFRS 15 Revenue from Contracts with Customers increased by RUB 42.9 billion. The growth was driven mainly by the following factors:

■ Revenue growth in the Electricity Generation segment as a result of an increase in sales volumes;

■ An increase in revenue from sales of uranium products and enrichment services by the Sales and Trading operating segment as a

result of additional shipments to foreign markets and a rise in annual average exchange rates of major currencies during the reporting period;

■ Revenue growth in other operating segment as a result of an increase in revenue from NPP construction projects.

As a new standard, IFRS 15, became effective as from January 1, 2018, revenue decreased by RUB 20.9 billion, mainly due to the derecognition of revenue from the sales of electricity purchased for the Company's own needs and revenue from compensation for electricity losses in power grids.

### Structure of revenue from sales to external customers by operating segment

Operating segment	2016		2017		2018	
	RUB billion	% of the total	RUB billion	% of the total	RUB billion	% of the total
<b>Electricity Generation</b>	314.6	44.9	417.3	55.7	429.1	55.8
<b>Trading</b>	147.2	21.1	128.4	17.2	137.9	17.9
<b>Fuel Company</b>	101.4	14.4	85.8	11.5	81.2	10.6
<b>Machinery</b>	53.1	7.6	55.1	7.4	55.6	7.2
<b>Mining</b>	3.9	0.6	4.2	0.6	3.0	0.4
<b>Other segments</b>	79.7	11.4	56.7	7.6	62.7	8.1
<b>TOTAL</b>	<b>699.9</b>	<b>100.0</b>	<b>747.5</b>	<b>100.0</b>	<b>769.5</b>	<b>100.0</b>

In 2018, profit totalled RUB 207.7 billion, up by RUB 91.6 billion (78.9%) compared to 2017. Changes in profit were driven primarily by the stabilization of exchange rates and, consequently, the absence of significant foreign exchange losses in the reporting period. In addition, in 2018, the Company recorded an income totalling RUB 46.9 billion from the affiliation of two uranium mining joint ventures in Kazakhstan.

As a result of the above factors, as well as a reduction in foreign exchange losses on the conversion of indicators of foreign organizations into the Russian rouble (consolidated reporting currency), the total comprehensive income for 2018 increased by 103.8% to RUB 228.5 billion.



## Cost structure, RUB billion

Cost of sales	2016	2017	2018	2018/2017, %
Materials and Fuel Expense	116.8	101.3	126.3	124.7
Personnel Costs	103.4	105.4	105.9	100.5
Cost of electricity purchased for resale and for own use	42.7	54.2	37.1	68.5
Electric energy transfer services	13.9	26.2	25.7	98.1
Depreciation and amortization expense	86.1	93.6	87.7	93.7
Production services of third party contractors	18.3	19.1	22.9	119.9
Property tax and other taxes and payments into the budget	15.2	20.6	23.5	114.1
Other expenses	50.7	46.8	51.3	109.6
Changes in finished goods and work and progress	14.5	11.2	(0.6)	(5.4)
<b>TOTAL</b>	<b>461.6</b>	<b>478.4</b>	<b>479.8</b>	<b>100.3</b>

In 2018, production cost increased by RUB 1.4 billion (0.3%).



## Structure of the statement of financial position

## KEY CHANGES IN THE ASSET STRUCTURE, RUB BILLION

	December 31, 2016	December 31, 2017	December 31, 2018
Other current assets	9	21	23
Cash	312	228	370
Loans issued	83	102	95
Accounts receivable	288	323	299
Inventories	164	142	144
Other non-current assets	64	84	111
Financial investments	60	138	149
Intangible assets	109	92	182
Property, plant and equipment	1,685	1,730	1,749
Goodwill	35	34	41
<b>TOTAL</b>	<b>2,809</b>	<b>2,894</b>	<b>3,163</b>

Cash increased by RUB 142 billion.

Accounts receivable decreased by RUB 24 billion. The most significant changes were related to the fact that a new standard, IFRS 15 Revenue from Contracts with Customers, became effective as from January 1, 2018, stipulating that contract assets and liabilities must be presented in a consolidated form.

Other non-current assets increased by RUB 27 billion primarily due to an increase in JSC Rosenergoatom Concern's deferred expenses on the technical connection of power units to the grid.

Financial investments grew by RUB 11 billion, mainly because, as from August 2018, organizations managing private pension plans and statutory pension insurance were included in the scope of the Company's financial statements.

The write-up of fixed and intangible assets by RUB 109 billion was mainly due to the affiliation of two uranium mining joint ventures in Kazakhstan.

An increase in goodwill of Uranium One Inc. by RUB 7 billion was caused by a change in the USD exchange rate in 2018.

There were no significant changes in the lines 'Inventories', 'Loans Issued' and 'Other Current Assets' in 2018 compared to 2017.

## KEY CHANGES IN THE STRUCTURE OF EQUITY AND LIABILITIES, RUB BILLION

	December 31, 2016	December 31, 2017	December 31, 2018
Other liabilities	74	84	107
Provisions	147	159	162
Accounts payable	366	414	444
Borrowings	296	185	184
Non-controlling interest	239	283	324
Retained earnings	633	713	873
Equity	1,054	1,056	1,069
<b>TOTAL</b>	<b>2,808</b>	<b>2,893</b>	<b>3,162</b>

Other liabilities grew by RUB 23 billion, mainly due to an increase in deferred tax liabilities related to the affiliation of two uranium mining joint ventures in Kazakhstan.

An increase in accounts payable by RUB 30 billion was driven mainly by:

- An increase in outstanding advance payments for the manufacture of equipment received from JSC Atomstroyexport as part of construction of foreign NPPs by RUB 7 billion;

- An increase in accounts payable related to the technical connection of power units to the grid by RUB 20 billion;

- An increase in outstanding payments under commission contracts for the selection of suppliers by RUB 4 billion and the conclusion of contracts for the manufacture and supply of NPP equipment with JSC Atomstroyexport.

The non-controlling interest increased by RUB 44 billion, mainly as a result of issuance of additional shares to ROSATOM and the Russian Federation.

There were no significant changes in the lines 'Equity', 'Borrowings' and 'Provisions' in 2018 compared to 2017.



## Key financial and economic indicators

Financial sustainability indicator	2016	2017	2018
Debt-to-equity ratio	0.39	0.35	0.33

Liquidity ratios	2016	2017	2018
Quick ratio	1.57	1.67	2.16
Current ratio	2.01	2.13	2.65

Turnover indicators, days	2016	2017	2018
Inventory turnover	91	75	68
Accounts receivable turnover	63	68	62
Accounts payable turnover	48	47	55

Profitability ratios, %	2016	2017	2018
Return on sales (ROS)	13.3	15.6	27.0
Return on assets (ROA)	3.3	4.0	6.6
Return on equity (ROE)	4.8	5.7	9.2

Profitability ratios increased in 2018, primarily due to a year-on-year increase in profit in the reporting period.



## Cash flow

In 2018, cash totalling RUB 17 billion (RUB 25 billion in 2017) recorded on the accounts of territorial treasury offices of the Russian Federation and raised to finance individual projects was recorded in other non-current assets as restricted cash and is therefore not included in the Financing Activities section of the cash flow statement.

In 2018, payments for financing activities exceeded proceeds from financing activities by RUB 35.8 billion. This was due to the repayment of borrowings and payment of dividends.

In 2018, the Company financed its investing activities with cash flow from operating activities.

At year-end 2018, the Company recorded a positive free cash flow.

	2016	2017	2018	2018/2017, %
Cash flow from operating activities before changes in working capital	271.7	293.5	304.0	103.6
Changes in working capital	7.9	3.3	34.0	1,030.3
Income tax paid	(31.6)	(35.0)	(58.0)	165.7
Interest paid	(25.3)	(21.0)	(17.8)	84.8
Net cash flow from operating activities	222.7	240.8	262.2	108.9
Capital expenditures	(180.1)	(158.9)	(141.6)	89.1
Other	21.9	(59.9)	32.2	(53.8)
Net cash flow used in investing activities	(158.2)	(218.8)	(109.4)	50.0
Net changes in total debt	(42.4)	(100.7)	(17.4)	17.3
Proceeds from share issue	9.0	1.8	–	–
Dividends paid	(9.4)	(10.3)	(18.4)	178.6
Net cash flow used in financing activities	(42.8)	(109.2)	(35.8)	32.8
Net (decrease)/increase in cash and cash equivalents	21.7	(87.2)	117.0	(134.2)
Cash and cash equivalents at the beginning of the reporting period	328.4	312.1	227.6	72.9
Effect of movements in foreign exchange rates on cash and cash equivalents	(38.0)	2.7	25.0	925.9
Cash and cash equivalents at the end of the reporting period	312.1	227.6	369.6	162.4



# 2 BUSINESS STRATEGY

# 3 STRATEGIC GOALS

- To increase the international market share
- To reduce the cost of products and the lead time
- To develop new products for the Russian and international markets



# 2.1. BUSINESS STRATEGY UNTIL 2030

THE DEVELOPMENT OF ROSATOM AND JSC ATOMENERGOPROM IS BASED ON THE LONG-TERM TECHNOLOGICAL POLICY, WHICH INVOLVES MASTERING NEW-GENERATION NUCLEAR ENERGY TECHNOLOGIES.



## 2.1.1. BUSINESS CONTEXT

### Trends in the development of the nuclear industry

The nuclear industry is influenced by a number of factors, including<sup>9</sup>:

- Global population growth from 7.7 billion people in 2018 to 10 billion people in 2050 and an increase in the share of urban population from 54–55% to 68% by 2050;
- Steady increase in global GDP by about 3% per year;
- Growth of global electricity consumption. By 2035, global electricity consumption is expected to increase by 44% compared to 2018 and reach

37 TWh. Asian countries will lead the growth, with electricity consumption in the region increasing by a factor of 1.7 (from 13 TWh to 22 TWh). In Russia, electricity consumption is expected to grow by 1.4% per year until 2035.

- Increase in greenhouse gas accumulation. Global carbon dioxide emissions total about 33 billion tonnes per year and continue to grow. By 2035, carbon dioxide emissions are projected to exceed 35 billion tonnes per year. This drives active development of carbon-neutral electricity generation, which includes the nuclear power industry.

<sup>9</sup> Data from the World Bank, the UN, the IEA World Energy Outlook 2018 (New Policy Scenario), EIU, the IAEA, McKinsey, the Energy Research Institute of the Russian Academy of Sciences and the General Layout Plan of Power Facilities until 2035 have been used.

In recent years, environmental aspects of the electricity industry have come under closer scrutiny, which has resulted in an increase in the share of zero-carbon power in the global energy mix. In developed countries, the levelized cost of electricity (LCOE)<sup>10</sup> for renewable energy sources has almost matched that of conventional power generation facilities, ranging from USD 60 to USD 80 per megawatt-hour.

The trend towards a decrease in the weighted average cost of electricity for renewable energy sources will continue until 2025. Subsequently, the LCOE is projected to reach the following levels:

- USD 40–45 / MWh for onshore wind power plants;
- USD 60–63 / MWh for solar power plants;
- USD 70–79 / MWh for offshore wind power plants.

By contrast, the LCOE for conventional thermal power plants is expected to follow the opposite trend given the global efforts to reduce CO<sub>2</sub> emissions:

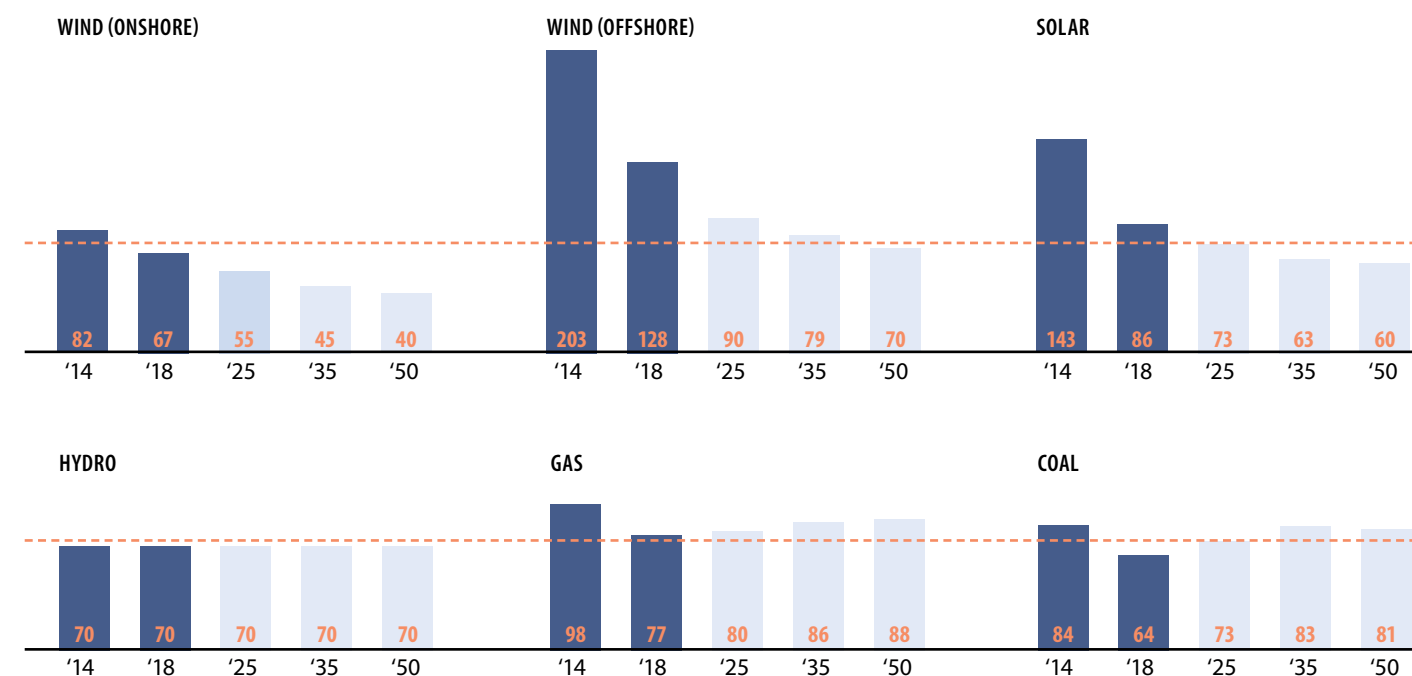
- An increase to USD 81–83 / MWh for coal-fired power plants;
- An increase to USD 86–88 / MWh for gas-fired power plants on the strategic horizon<sup>11</sup>.

**The Fourth Industrial Revolution that is currently underway across the world makes a significant impact on both global and local businesses. Its key elements, which JSC Atomenergoprom takes into account when updating its strategy, include:**

- Large-scale automation of production through active introduction of manufacturing solutions based on fully automated machine work;
- Customization of production in order to fully meet the customers' individual needs;
- Consolidation of manufacturing enterprises into integrated 'smart' networks and the development of the Internet of Things in the manufacturing industry, which involves the fullest possible digitization of information exchange;
- Accelerated development and commercialization of technologies; a shorter life cycle of technologies and products;
- Development of flexible project management systems.

### COMPETITION AGAINST OTHER TYPES OF POWER GENERATION

Average cost (LCOE), USD/MWh  
 - - - Large NPPs globally in 2018 (USD 76/MWh)



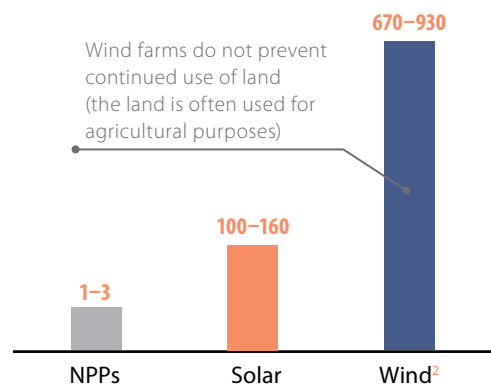
<sup>10</sup> The levelized cost of electricity (LCOE) is the net present value of the unit cost of electrical energy over the life cycle of an NPP.

<sup>11</sup> Bloomberg New Energy Finance, International Energy Agency, Nuclear Energy Agency, National Renewable Energy Laboratory, Company analysis.

RETAINING THE ROLE IN BASE LOAD GENERATION

LOW CONCENTRATION OF CAPACITY

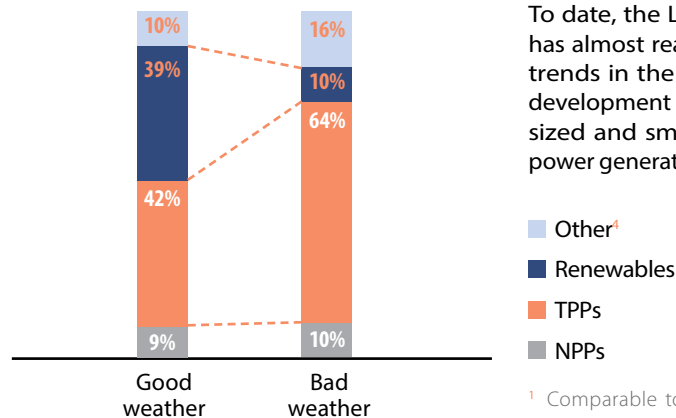
Site area of a power plant with an output of ~8 TWh<sup>1</sup>, sq. km



It is difficult to provide power supply to major cities and densely populated areas. The number of locations with favourable conditions is limited.

DEPENDENCE ON WEATHER CONDITIONS

Power generation structure depending on the weather<sup>3</sup>, %



The need for considerable reserve capacity ('double' investment) leads to a high volatility of the energy balance and prices.

The potential for the use of renewable energy sources in the power grid is limited by a number of fundamental factors.

Base load generation is necessary in order to ensure the stable operation of the power grid and provide power supply to major consumers (large cities, industrial clusters).

To date, the LCOE for nuclear power plants has almost reached its minimum, and future trends in the indicator will depend on the development of new technologies (medium-sized and small nuclear power plants, fast power generation, etc.).

<sup>1</sup> Comparable to annual output from a 1.2 GW NPP (VVER-1200, VVER-TOI).  
<sup>2</sup> Characteristics of the wind power plant: the capacity of one turbine totals 0.5 MW, with the distance between the turbines totalling 200 m.  
<sup>3</sup> As exemplified by Germany.  
<sup>4</sup> Biomass, energy storage systems, hydropower plants; Source: WNA.

These factors and trends, as well as a reduction of fossil fuel reserves, contribute to the long-term demand for nuclear energy. Leading global think tanks predict an increase in installed capacity in the nuclear power industry by 2035. The International Energy Agency, UxC consulting company and the World Nuclear Association expect to see an increase in the capacity of operating NPPs under the base case scenario to 450-500 GW, according to different estimates.

The global nuclear power industry will remain competitive in the long run compared to other energy sources. Thermal power generation will yield to nuclear energy primarily because of CO<sub>2</sub> emissions, which have a negative impact on the environment and drive up the cost of energy since many countries have imposed CO<sub>2</sub> emission fees. Unpredictable prices for raw hydrocarbons are yet another major disadvantage of thermal power generation.

Regarding renewable energy, even if energy generation becomes significantly cheaper, further traditional backup facilities or energy storage systems will need to be built to secure stable supplies of energy. This, in turn, will entail an increase in capital expenditure on the power grid.

Competitive position of the Company<sup>12</sup>

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 organizations. The Russian nuclear industry is one of the global leaders in terms of research and development in reactor design, capabilities and technologies in the nuclear fuel cycle and in the sphere of NPP operation. Russia has the most advanced enrichment technologies in the world; nuclear power plants with

<sup>12</sup> For information on the Company's main competitors, see the section 'Markets Served by Atomenergoprom'.

water-cooled water-moderated power reactors (VVERs) have proved their reliability over one thousand reactor-years of fail-free operation. The high quality of products and services offered by the Company is confirmed by successful participation in international tenders for the supply of nuclear fuel and construction of NPPs abroad. Currently, JSC Atomenergoprom is the largest global market player in terms of the number of approved NPP construction projects<sup>13</sup>.

Competitive advantages of the Company:

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

2.1.2. LONG-TERM STRATEGIC GOALS

JSC Atomenergoprom's business strategy is based on the long-term strategy of ROSATOM.

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

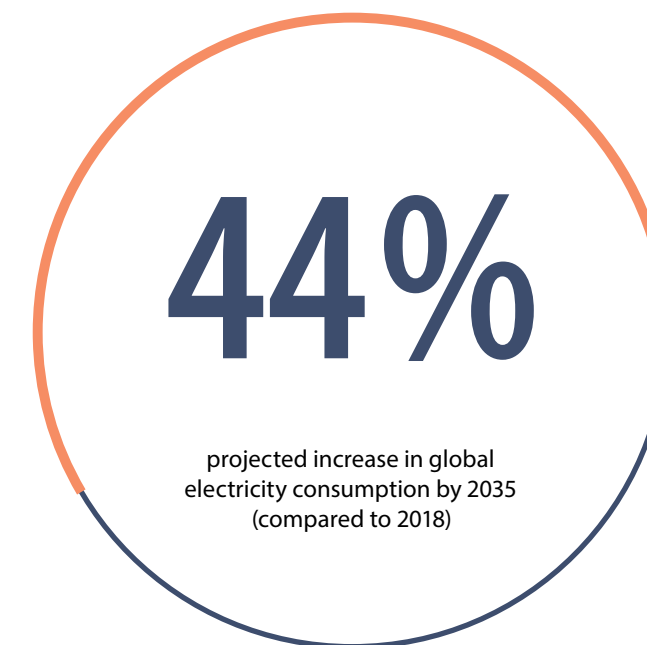
The development of ROSATOM and JSC Atomenergoprom is based on the long-term technological policy, which involves mastering new-generation nuclear technologies (including fast neutron reactors and the closed nuclear fuel cycle), as well as strengthening the export potential of Russia's nuclear technologies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

ROSATOM and JSC Atomenergoprom have set themselves three long-term strategic goals to be achieved by 2030:

- **To increase the international market share.** To assert its leadership on the global nuclear power market, the Company is currently expanding its footprint in over 50 countries around the world and the long-term portfolio of overseas orders and increasing the corresponding revenue (for details, see the sections 'International Cooperation' and 'International Business');
- **To reduce production costs and the lead time.** In order to develop the most competitive products, the Company will take further steps to reduce the duration of NPP construction and the levelized 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, JSC Atomenergoprom plans to increase the share of new businesses in revenue significantly by 2030.

<sup>13</sup> Including the project portfolio of ROSATOM.

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





In order to implement the strategy, the following objectives must be met:

- Ensuring safe use of nuclear energy;
- Non-proliferation of nuclear technologies and materials;
- Reducing the negative environmental impact to zero;
- Ensuring that the development of nuclear power is socially acceptable;
- Developing the Company'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 influence the achievement of strategic objectives include:

- Nuclear and radiation risks;
- 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 and reputational risks);
- Operational risks (including the risk of losing critical knowledge of existing and newly created products);
- Political risks;
- Technical (project) risks;
- Technological risks (including the risk of shortcomings in technology).

A detailed description and assessment of key risks for 2019 is provided in the section 'Risk Management'.



**2.1.3. CONTRIBUTION OF THE 2018 RESULTS TO THE ACHIEVEMENT OF STRATEGIC OBJECTIVES AND PLANS FOR 2019**

Strategic goal	Results and key events of 2018	Targets and key events planned for 2019
<b>Increase of the international market share</b>	<p>Concreting started at power unit No. 1 of Akkuyu NPP in Turkey and power unit No. 2 of Rooppur NPP in Bangladesh.</p> <p>An intergovernmental agreement was signed on the construction of a Russian-design NPP equipped with two power units in Uzbekistan; the NPP construction project was launched.</p> <p>A major package of agreements and contracts on a variety of nuclear projects was signed with China.</p> <p>A contract was signed for the construction of a Nuclear Research and Technology Centre in Zambia.</p> <p>8 intergovernmental agreements and 20 major interdepartmental agreements were concluded.</p> <p><i>For details, see the sections 'International Business' and 'International Cooperation'.</i></p>	<p>Connection of power unit No. 1 to the grid and the start of the first criticality stage at power unit No. 2 of the Belarusian NPP.</p> <p>Shipment of the steam generator for power unit No. 4 of Kudankulam NPP (India) from the manufacturing plant.</p> <p>Signing and coming into force of a General Contract for power units No. 7 and 8 of Tianwan NPP (China).</p> <p>Signing and coming into force of a General Contract for power units No. 3 and 4 of Xudabao NPP (China).</p>
<b>Reduction of production costs and the lead time</b>	<p>Performance against the targets of the investment programme for the construction of nuclear power plants in Russia (the investment programme of JSC Rosenergoatom Concern) totalled 101.5%.</p> <p>In 2018, the Company continued to implement measures to reduce the full cost of uranium production: Russian enterprises reported a 2% decrease in production cost against the target.</p>	<p>Performance against the targets of the investment programme for the construction of nuclear power plants in Russia is expected to total at least 100%.</p>
<b>New products for the Russian and international markets</b>	<p>The 10-year portfolio of orders for new products (outside the scope of the nuclear industry) reached RUB 1,082.6 billion.</p> <p>Revenue from new products (outside the scope of the nuclear industry) totalled RUB 196.7 billion.</p> <p>In accordance with the 'May decree' of the President of Russia, federal projects were approved in the following areas: 'Infrastructure for the Management of Hazard Class 1 and 2 Waste' and 'Digital Technologies and Projects'.</p> <p>Construction of a PAN precursor (composite materials) plant was started in Elabuga (Republic of Tatarstan).</p> <p>Modernization projects were launched in the utilities sector (water supply and sewerage).</p> <p><i>For details, see the section 'Business Diversification'.</i></p>	<p>The 10-year portfolio of orders for new products (outside the scope of the nuclear industry) should exceed RUB 1 trillion.</p> <p>Revenue from new products (outside the scope of the nuclear industry) is expected to exceed RUB 220 billion.</p> <p>Launch of a plant producing wind turbines and components in Volgodonsk (Rostov Region).</p> <p>Launch of industrial production of high-precision healthcare products using additive manufacturing technologies.</p> <p>Establishment of an R&amp;D centre specializing in energy storage systems at LLC Cathode Materials.</p>

# 2.2. MARKETS SERVED BY ATOMENERGOPROM

IN 2018, THE NUCLEAR POWER INDUSTRY ACCOUNTED FOR ABOUT 11% OF THE GLOBAL ELECTRICITY SUPPLY.

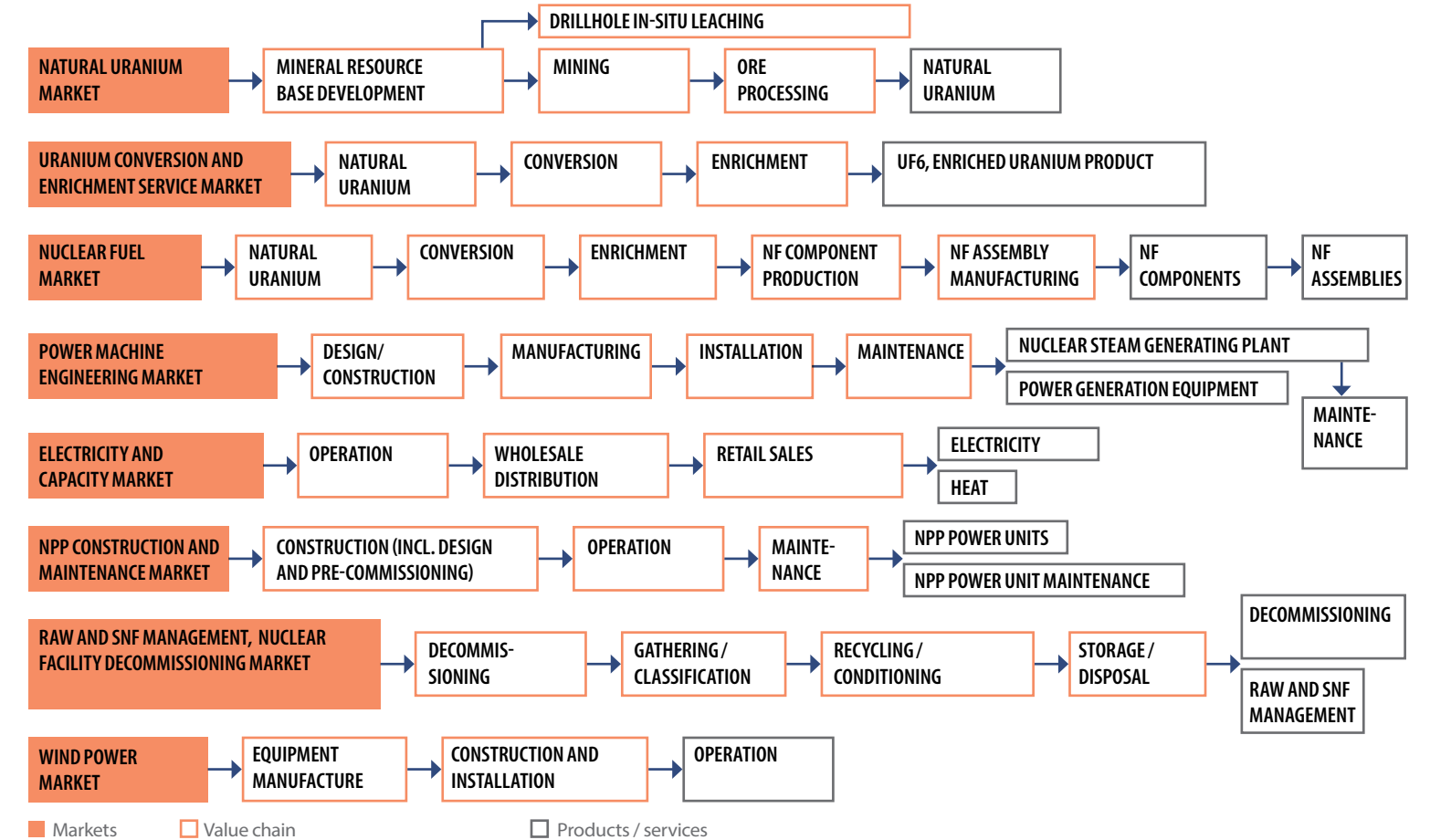


**In 2018, JSC Atomenergoprom ranked:**

- First in the world in terms of the number of NPP power units in the portfolio of foreign projects\*;
- First on the global uranium enrichment market (36%);
- Second in the world in terms of uranium production (14% of the market);
- Third on the global nuclear fuel market (17%).

\*including the project portfolio of ROSATOM.

MARKETS SERVED BY ATOMENERGOPROM AND VALUE CHAINS



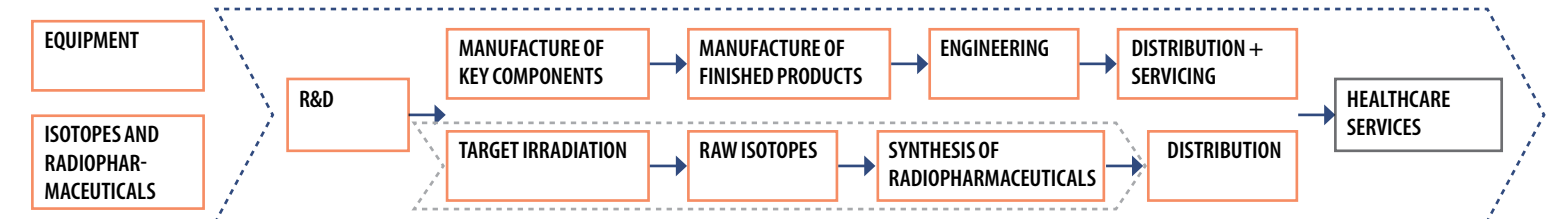
VALUE CHAIN ON THE MARKET FOR COMPOSITE MATERIALS:



VALUE CHAIN ON THE MARKET FOR THE MANAGEMENT OF HAZARD CLASS 1 AND 2 WASTE:



VALUE CHAIN ON THE NUCLEAR MEDICINE MARKET:





## 2.2.1. NATURAL URANIUM MARKET

### Forecast for changes in uranium demand by 2035

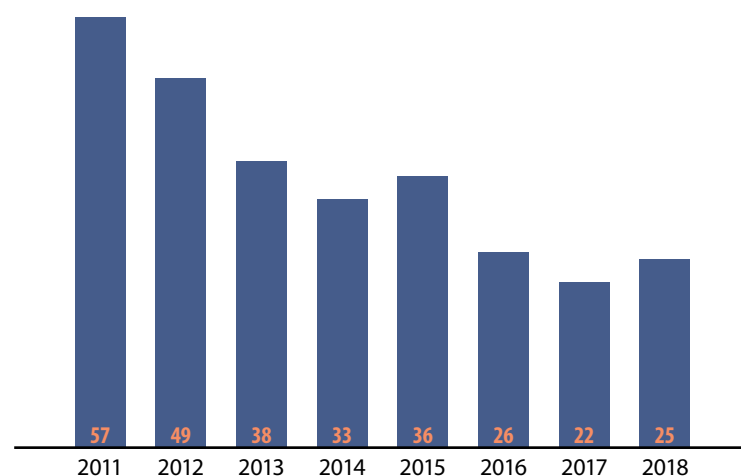
After 2011, there was a significant drop in prices on the nuclear fuel cycle front-end markets, including a long-term decline in quotations for natural uranium. Nevertheless, in 2018, there was a trend towards price recovery, which was primarily related to a reduction of uranium oversupply. In the reporting year, average spot market quotations reached USD 24.6/lb of U<sub>3</sub>O<sub>8</sub>, which is 12% higher than in 2017.

In 2018, global reactor demand for uranium totalled 65,000 tonnes. At the same time, global demand including commercial and strategic

stockpiling not intended for current consumption is estimated at 73,000 tonnes.

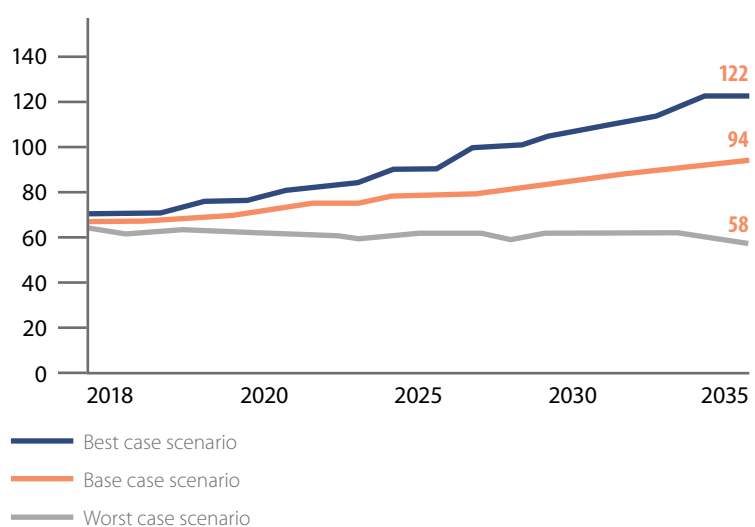
The uranium market fundamentals remain favourable. In the medium and long term, demand for natural uranium is expected to increase due to the commissioning of new power units at NPPs in China, India and other countries. According to the baseline forecast of the World Nuclear Association (WNA), by 2035, global reactor demand for uranium will increase to 94,000 tonnes.

AVERAGE ANNUAL SPOT MARKET QUOTATIONS FOR NATURAL URANIUM, USD/LB OF U<sub>3</sub>O<sub>8</sub>

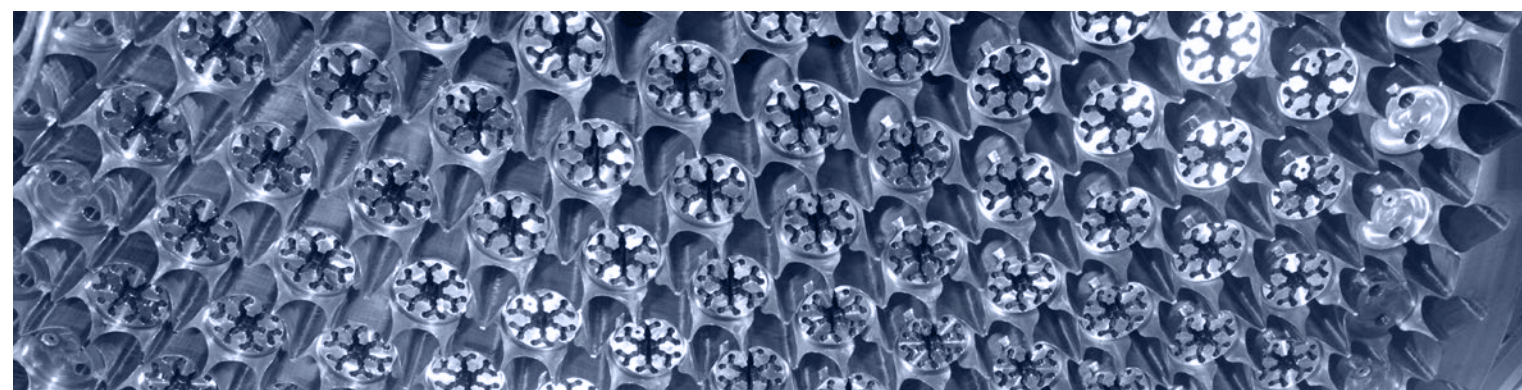


Sources: raw data from UxC<sup>14</sup>; average values have been calculated by JSC Atomredmetzoloto

FORECAST FOR CHANGES IN URANIUM DEMAND BY 2035, KT



Source: World Nuclear Association, 2017.



<sup>14</sup> UxC, LLC (UxC) is an independent international company specializing in market analysis, research and forecasting covering the entire nuclear fuel cycle. It was founded in 1994. Website: <https://www.uxc.com/>.

### Natural uranium market overview

In 2018, global production of natural uranium decreased by 9% compared to 2017 and totalled about 53,000 tonnes. Supply from secondary sources (inventories of energy companies and some states, reparation of depleted uranium hexafluoride, reprocessed uranium, etc.) are estimated at 20,000 tonnes of natural uranium equivalent.

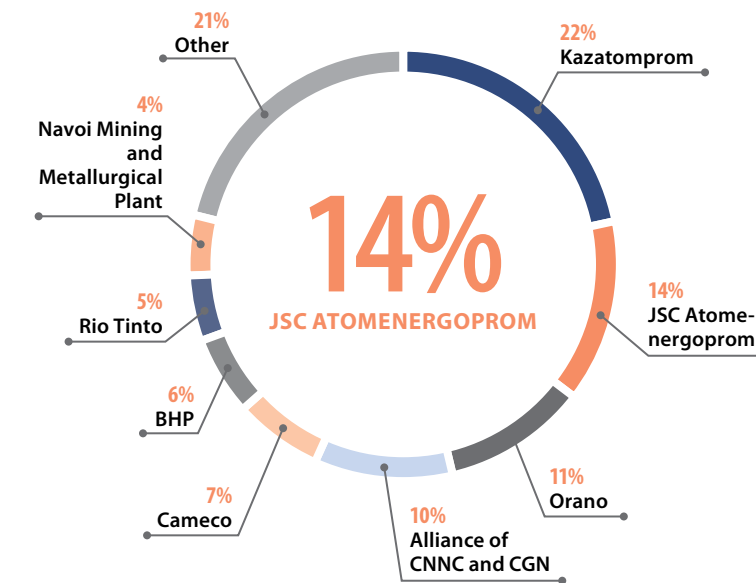
In the reporting year, major uranium producers continued to reduce output and optimize production amid continued market weakness. A number of mining assets were put on care and maintenance (including the McArthur River mine in Canada, which is the world's largest enterprise with a capacity of about 7,000 tonnes of uranium per year, as well as the Langer Heinrich mine in Namibia). Production decreased in Kazakhstan, the US, Niger and other countries.

Progress on most projects developed by junior companies remained slow due to difficulties with raising funds and arranging product sales.

According to the UxC forecast<sup>15</sup>, in 2019, global uranium production will total 54,500 tonnes, while supply from secondary sources will total about 19,000 tonnes. Global production of natural uranium is expected to increase by 2035 due to rising demand. Supply from secondary sources will total 6,000 to 7,000 tonnes of natural uranium equivalent in 2035.

A stable group of leaders has emerged on the natural uranium market. At year-end 2018, along with JSC Atomenergoprom (14% of the global output), the group also comprised NAC Kazatomprom (Kazakhstan, 22%), Orano<sup>16</sup> (France, 11%), an alliance of CNNC and CGN (China, 10%), Cameco (Canada, 7%), BHP (Australia – United Kingdom, 6%), Rio Tinto (Australia – United Kingdom, 5%) and Navoi Mining and Metallurgical Plant (Uzbekistan, 4%). The eight largest market players account for 79% of the total uranium output.

LARGEST PLAYERS ON THE NATURAL URANIUM MARKET IN 2018



See also the report of JSC Atomredmetzoloto for 2018.



## 2.2.2. URANIUM CONVERSION AND ENRICHMENT MARKET

Products sold on the market include uranium hexafluoride (UF<sub>6</sub>), uranium conversion services, enriched uranium product (EUP) and the uranium enrichment service measured in separative work units (SWU).

### Forecast for changes in demand for uranium conversion services by 2035

According to the baseline scenario of the World Nuclear Association, in 2018, global reactor demand for uranium conversion totalled about 63,000 tonnes.

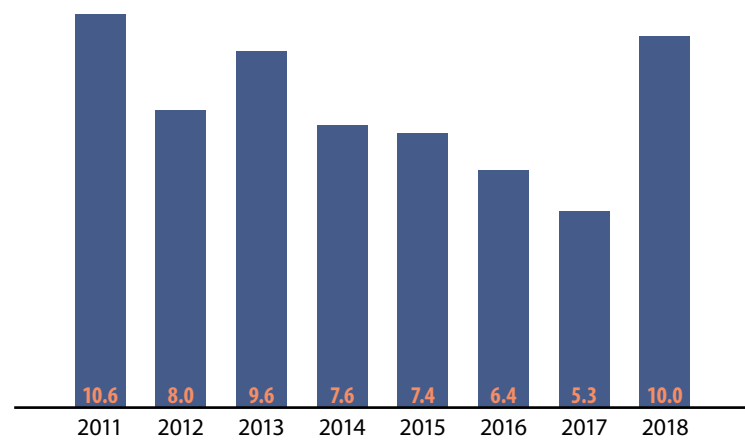
<sup>15</sup> UxC, 1Q 2019 UMO.

<sup>16</sup> In 2017, in the course of restructuring, the French company AREVA was divided into two companies: Orano (nuclear fuel cycle) and Framatome (nuclear mechanical engineering, NPP construction and maintenance). EDF became the main owner of Framatome.

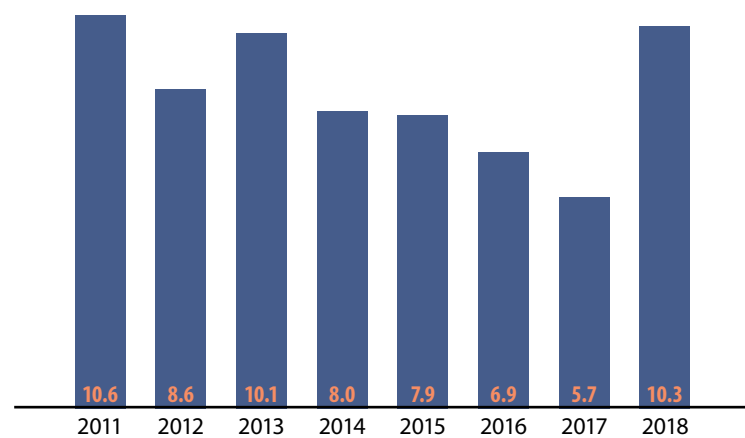
In 2018, average annual spot quotations on the North American and European markets increased by 90% and 81% respectively, while average annual long-term quotations on these markets increased by 2% and 3% respectively. This was caused by a reduction, suspension and curtailment of production by conversion service providers in response to low demand, as well as by considerable buying activity on the market.

AVERAGE ANNUAL SPOT MARKET QUOTATIONS FOR CONVERSION SERVICES, USD/KG OF URANIUM

ON THE NORTH AMERICAN MARKET

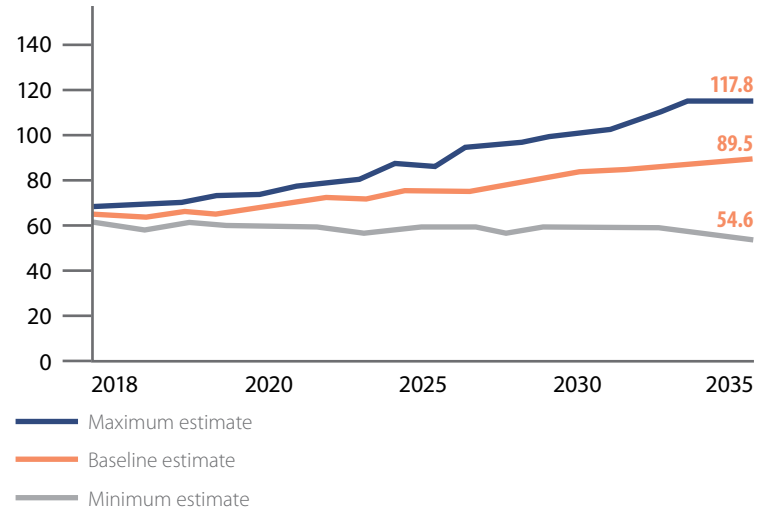


ON THE EUROPEAN MARKET



The development of the nuclear industry until 2035 will have a positive impact on the market for uranium conversion services. According to the baseline scenario of the World Nuclear Association, global demand for conversion services will grow to 72,000 tonnes by 2025, 80,000 tonnes by 2030 and 89,500 tonnes by 2035.

FORECAST FOR CHANGES IN DEMAND FOR URANIUM CONVERSION BY 2035, KT

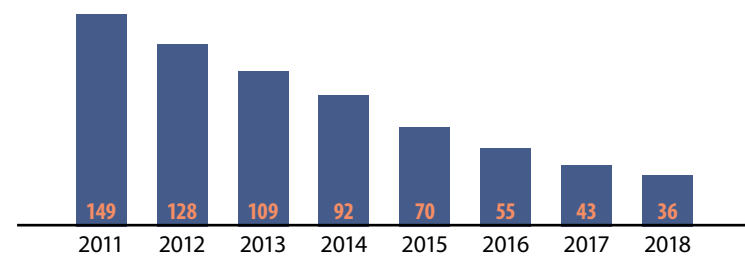


Source: World Nuclear Association, 2017.

Forecast for changes in demand for uranium enrichment services by 2035

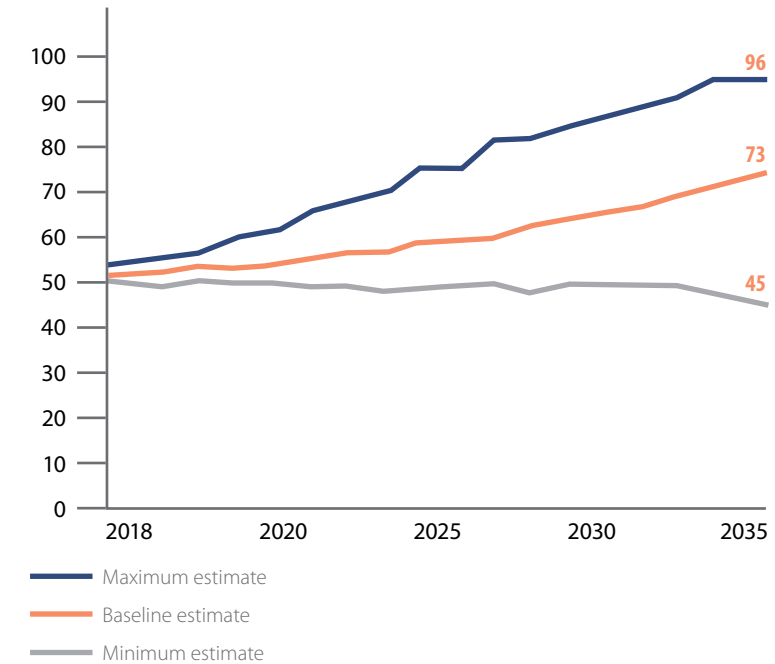
According to the Company's estimates, global reactor demand for enrichment totalled about 56 million SWU in 2018. Given the current significant oversupply on the uranium enrichment market, spot market quotations declined by 16% during the year, while long-term quotations fell by 15%. Moreover, since 2011, quotations for enrichment have dropped by more than 75%.

AVERAGE ANNUAL QUOTATIONS FOR ENRICHMENT, USD/SWU



The development of the nuclear industry until 2035 will have a positive impact on the market for natural uranium enrichment services. According to the baseline scenario of the WNA, global demand for enrichment will grow to 58 million SWU by 2025, 65 million SWU by 2030 and 73 million SWU by 2035. Given the expected growth of demand in the future, the market is likely to become more balanced.

FORECAST FOR CHANGES IN DEMAND FOR URANIUM ENRICHMENT BY 2035, MILLION SWU



Source: World Nuclear Association, 2017.

Uranium conversion and enrichment market overview

Along with JSC Atomenergoprom, 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 (36% of the global market), URENCO (UK, Germany, Netherlands; 29%), Orano (France; 14%) and Chinese companies (9%). Together, they control about 90% of the market. At present, all players use modern gas centrifuge technology for uranium enrichment (see also the reports of JSC TVEL and JSC TENEX for 2018).

2.2.3. NUCLEAR FUEL FABRICATION MARKET

According to the Company, in 2018, the global nuclear fuel market capacity totalled about 11,000 tonnes of heavy metal (tHM). This includes:

- Fuel for light-water reactors requiring uranium enrichment accounting for 7,000 tHM (including over 1,000 tHM of fuel for water-cooled water-moderated power reactors (VVERs));
- Fuel for heavy-water reactors accounting for 4,000 tHM.

As the reactor fleet will be expanding, the demand for fabrication services may increase to 12,000 tonnes by 2030.

Global suppliers on the fabrication market include Westinghouse, Framatome (formerly AREVA), Global Nuclear Fuel and JSC Atomenergoprom.

Westinghouse Electric Company fabricates nuclear fuel for nearly all types of light-water reactors (LWRs). Its major markets are the US and Western European countries. The company is the largest player holding 25% of the market.

The French Framatome produces fuel for PWR and BWR reactors and holds 23% of the global fabrication market, with Western Europe being its main end market.

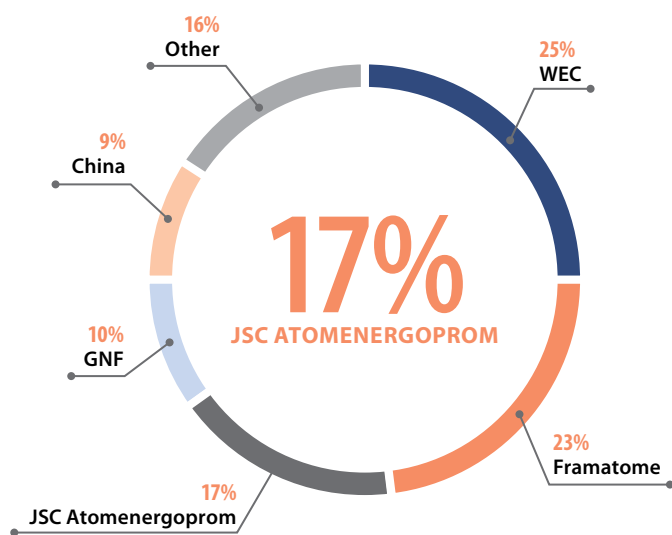




Global Nuclear Fuel (GNF) is a joint venture of GE and Hitachi. It consists of two divisions: GNF-J operating in Japan and GNF-A operating on other markets. The company only produces fuel for BWR reactors and holds 10% of the market.

In 2018, 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 (57%), Finland (36%), India (30%) and China (7%) for reactor fuel. JSC Atomenergoprom, in cooperation with Framatome, also supplies fuel and components from reprocessed uranium to Western European NPPs. In the reporting year, JSC Atomenergoprom's share on the nuclear fuel fabrication market totalled 17%.

SHARES OF PLAYERS ON THE NUCLEAR FUEL FABRICATION MARKET



### Entering new nuclear fuel markets

In 2018, the Company continued to take steps towards entering the markets 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 2018, the manufacture of the first batch of MOX nuclear fuel assemblies was completed. A contract for the supply of uranium fuel for the Chinese CFR-600 unit was concluded. The Company continues to implement the Proryv (Breakthrough) Project. It involves building a fuel fabrication and refabrication module and the BREST-OD-300 fast neutron reactor, which will use mixed nitride uranium-plutonium fuel (see also the section 'Research and Innovations').

### 2.2.4. POWER MACHINE ENGINEERING MARKET

The modern power machine engineering market is characterized by long lead times, high capital intensity and design for manufacturability. The global power machine engineering market is affected by the trends in the development of the global electricity industry (improved energy efficiency, environmental programmes, etc.) and the commissioning of new generating capacities.

According to preliminary estimates, in 2018, the total volume of the global market for commissioned power generation equipment, including the volume of the modernized capacity market, increased by 10.4%. The shares of commissioned power generation equipment are distributed as follows: equipment for increasing the renewable energy capacity accounts for the largest share (57.4%), while the shares of equipment for thermal power generation, hydropower and the nuclear power industry stand at 33.8%, 6.5% and 2.3% respectively. Analysts estimate that if this growth rate is maintained, the capacity of power generation equipment commissioned annually on the global market may almost double by 2035.

At the same time, shares of power generation equipment that is already in operation are quite different: equipment for thermal power generation accounts for 63.2%, while the shares of equipment for hydropower, nuclear power and renewable energy stand at 19.6%, 6.2% and 11% respectively.

According to a survey conducted by the Industrial Marketing Research Group, 'Power Generation Equipment Market in 2019', no fundamental changes are expected in the structure of energy consumption by type of fuel. Hydrocarbons will continue to dominate the fuel mix. In the coming years, the structure of the power machine engineering market is expected to remain largely unchanged, with thermal power generation equipment having a predominant share. If the share of equipment commissioned in the nuclear power industry increases by 2–3% per year, it may reach 8–9% by 2040 (given that the share of other types of commissioned equipment will grow at a faster rate).

The Russian power machine engineering market depends on the global market trends. In 2018, the Russian power machine engineering market increased by 20.3% to 23.1 GW. Market growth was driven by an increase in the production of central heating boilers by 37% to 19.8 GW. At the same time, other segments of the market declined. For instance, the production of hydraulic turbines and water wheels decreased by 68.9% to 628 MW, while the production of gas turbines (except for turbojets and turboprops) decreased by 12.8% to 634 MW. Meanwhile, the production of water steam turbines and other steam turbines increased by 1.3%.

In 2018, JSC Atomenergomash (the Mechanical Engineering Division of the Company), PJSC Power Machines, PJSC OMZ and a number of other companies remained leaders on the Russian power machine engineering market. At year-end 2018, JSC Atomenergomash accounted for 33.9%

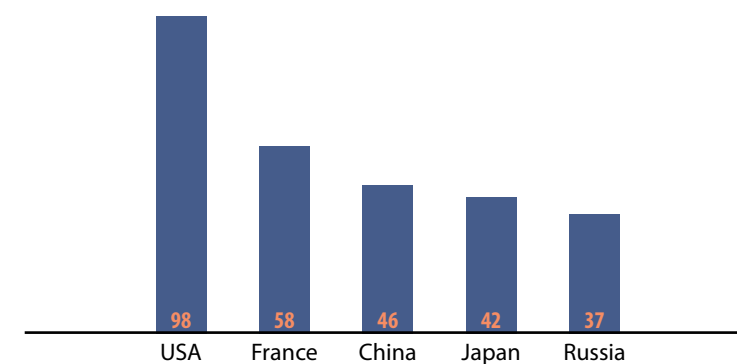
of main power generation equipment produced in Russia. Equipment manufactured by the Division's enterprises has been installed in over 20 countries at 14% of NPPs globally and 40% of thermal power plants in Russia, the CIS and the Baltic countries (see also the report of JSC Atomenergomash for 2018).

### 2.2.5. NPP CONSTRUCTION AND OPERATION MARKET

In 2018, the nuclear power industry accounted for about 11% of the global electricity supply. According to the IAEA<sup>17</sup>, in 13 states, more than a quarter of the electricity demand is met by nuclear power generation. Countries with the largest share of electricity produced at NPPs include France (71.6%), Ukraine (55.1%), Slovakia (54%), Hungary (50%) and Belgium (49.9%).

According to the IAEA<sup>18</sup>, as of December 31, 2018, 451 power reactors were in operation with a total capacity of 396.9 GW (including the suspended Japanese reactors). Another 55 reactors were under construction. In 2018, the number of power units in operation in Russia including newly commissioned power units, reached 37, with their capacity totalling 30.11 GW. In 2018, JSC Atomenergoprom ranked second among global generating companies in terms of installed NPP capacity, surpassed only by the French EDF.

LEADING COUNTRIES BY THE NUMBER OF OPERATING NPP POWER UNITS

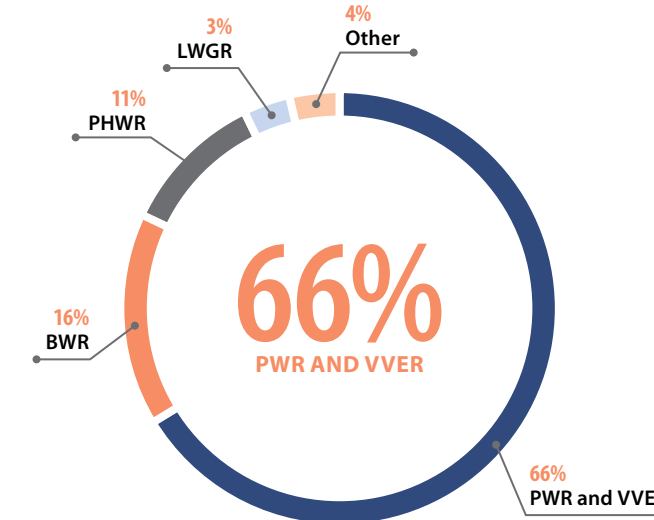


Light-water reactors (VVER, PWR, BWR, LWGR) are the main type of reactors currently in operation in the world. They make up 85.5% of the global market. The share of PHWR (CANDU) heavy-water reactors totals 11%.

<sup>17</sup> Power Reactor Information System (PRIS) developed by the IAEA (<https://pris.iaea.org>).

<sup>18</sup> IAEA, 2019: Nuclear Power Reactors in the World (RDS-2).

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



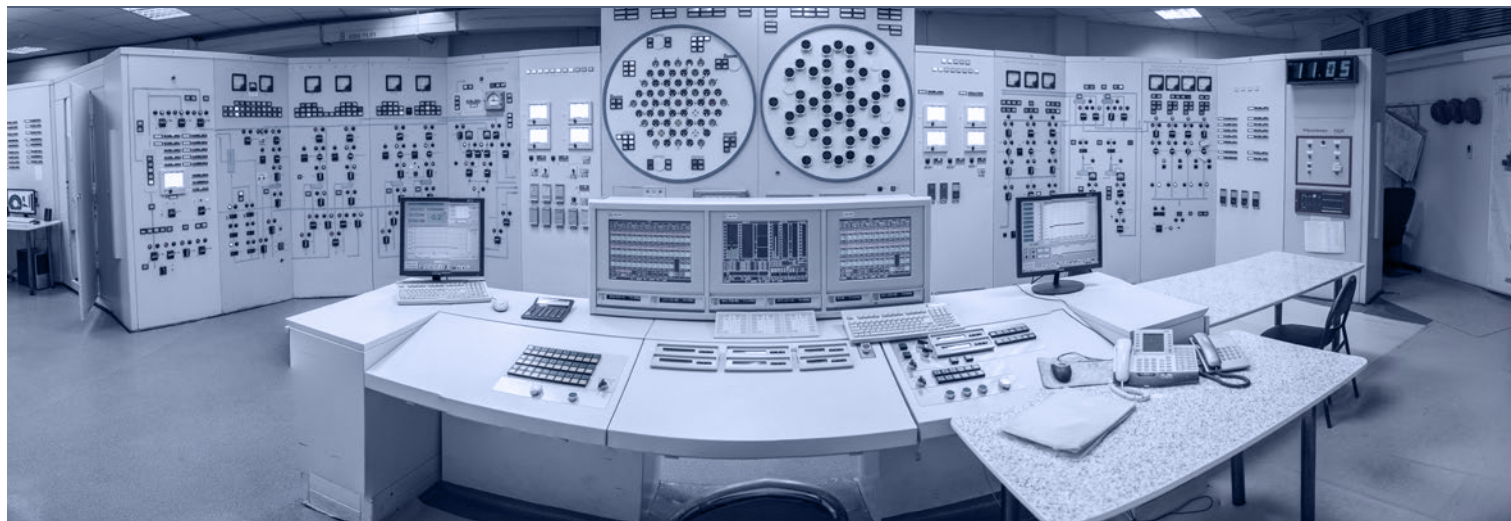
At present, demand for NPP construction comes primarily from Asian countries, which is due to rapidly growing electricity consumption in this region. JSC Atomenergoprom is actively expanding its global footprint: it is currently the largest global player in terms of the number of NPP construction projects in its portfolio of overseas orders.

### 2.2.6. NPP SERVICING MARKET

The Company provides life extension services and personnel training for 47 Russian-design power units abroad that are currently in operation or at the design/construction stage.

JSC Atomenergoprom is a market leader in China, Bulgaria and Armenia, acting as a general contractor for life extension, scheduled preventive maintenance and modernization of equipment of NPPs equipped with VVER reactors. The portfolio of overseas orders exceeds USD 1 billion.

The Company competes against national operators and large international companies (Framatome, Westinghouse) (see also the section 'International Business').



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

### Market for RAW and SNF management, processing and disposal

In 2018, the volume of SNF accumulated globally totalled 285,000 tHM. Most countries have chosen to postpone SNF management efforts, which necessitates long-term storage of SNF due to a lack of available permanent disposal facilities and processing capacities. Every year, around 10,000 tHM of SNF is produced globally, of which less than 2,000 tHM is sent for processing. An increase in the amount of accumulated SNF encourages the development of the temporary waste storage market.

Key market players are Holtec, Orano, SKB and GNS. JSC Atomenergoprom promotes its own RAW and SNF storage solutions as part of an integrated offer for a balanced nuclear fuel cycle.

The Company's basic solution in the field of SNF management involves the processing of spent fuel. The development of the SNF processing market is closely linked to the improvement of the relevant technologies and the use of regenerated SNF processing products in the nuclear fuel cycle. A reduction in the cost of processes, an improved efficiency of separation of SNF components and compaction of RAW will significantly increase processing volumes.

Orano and JSC Atomenergoprom are the leaders of the SNF processing market.

The market for permanent disposal of SNF and HLW is still at an early stage of development, hindered by strict requirements for a potential site for deep repositories and strong public disapproval of such projects. There are

no operating HLW disposal facilities at present. The possible use of deep repositories is actively examined by the countries that have chosen the policy of direct SNF disposal: the US, Sweden, Finland and Canada.

### NPP decommissioning market

By 2019, more than 170 power units had been shut down in the world. According to the estimates of JSC Atomenergoprom, by 2035, the number of shut-down power units will double (the NPP construction activity peaked in the 1970s and 1980s, and by 2035 the service life of many units will have reached 60 years). Most countries prefer 'postponed decommissioning': maintaining the NPP in a safe condition for a long time in order to reduce radiation levels and improve the decommissioning technology. Only a few countries (such as the US and Germany) begin the decommissioning process immediately after the unit has been shut down. Some EU countries (for example, Belgium) also make statements about 'accelerated decommissioning'.

Key market players include JSC Atomenergoprom, Energy Solutions, Westinghouse, Orano, Bechtel, Studsvik, AECOM, GNS, Cavendish Nuclear, North Star, Siempelkamp, Onet Tech and Holtec.

The Company is preparing to decommission power units of Novovoronezh, Leningrad and Beloyarsk NPPs and is participating in the decommissioning of NPPs in Germany (Philippsburg NPP), Bulgaria (Kozloduy NPP) and Lithuania (Ignalina NPP) (see also the section 'International Business').

## 2.2.8. ELECTRICITY MARKET

JSC Atomenergoprom operates power generation capacities only in Russia. The Company is a leader on the Russian power generation market, ahead of PJSC Inter RAO, PJSC RusHydro and LLC Gazprom Energoholding.

The potential for the commissioning of new NPPs is limited until 2035 due to the growth rate of electricity consumption remaining moderate, combined with government support focused primarily on the thermal power plant modernization programme, as well as capacity surplus in European Russia.

For the past ten years, JSC Atomenergoprom has also been present on the electricity distribution market. As the supplier of last resort in four regions of Russia, a subsidiary of the Company provides services to almost 55,000 legal entities and over 2 million individuals (see also the report of JSC Rosenergoatom Concern for 2018).

## 2.2.9. COMPOSITE MATERIALS MARKET

Until 2035, the global carbon fibre market is expected to grow by 10% per year, while the growth rate of the Russian market is projected to exceed 15% per year (in physical terms). The world's largest carbon fibre manufacturers include Japanese companies (Toray, Teijin, Mitsubishi Rayon), American companies (Hexcel, DowAksa, Cytec), the German SGL and the Chinese Formosa Plastics.

Key characteristics of the market include the following:

- Fabrics and pre-pregs account for 75% of end use by manufacturers of finished products;
- The maximum profitability of composite products is achieved in the final stages of the production chain (finished products).

Further increase in the global use of composite materials is expected due to replacement of conventional materials and expansion of the areas of application.

In the reporting year, the share of JSC Atomenergoprom in the Russian production of carbon fibre totalled 27% (see also the section 'Business Diversification').

## 2.2.10. WIND POWER MARKET

The global wind power market is actively developing. Installed capacity of wind power plants (WPPs) is expected to increase significantly, from 0.5 TW in 2018 to about 2.2 TW in 2035. The market is highly competitive, and the top 5 players account for 60% of the global installed capacity.

In Russia, the number of WPPs is expected to grow rapidly until 2024, supported by competitive selection of investment projects for the construction of renewable energy facilities. In 2018, the capacity of facilities under construction by JSC Atomenergoprom totalled about 1,000 MW, which is more than 30% of the Russian wind power market (see also the section 'Business Diversification').





## 2.2.11. NUCLEAR MEDICINE MARKET

In 2018, the global nuclear medicine market totalled USD 145 billion, while the Russian market exceeded USD 3 billion. The market is expected to actively develop until 2035. The global market will grow by 1.6% per year (in 2018 dollars), while the growth rate of the Russian market is projected at 0.6% (in 2018 dollars). The Russian nuclear medicine market lags behind the global market in terms of technological development and specific consumption of healthcare services, which determines its significant growth potential.

As part of the Healthcare National Project, JSC Atomenergoprom participates in a programme in the field of nuclear medicine, including the production of radiopharmaceuticals and the establishment of cancer centres.

The Company's main capabilities are focused on the in-house production of raw isotopes. The Company plans to increase its capabilities in the nuclear medicine equipment segment by partnering with the world's leading manufacturers, securing government support and using the equipment in its own nuclear medicine centres (see also the section 'Business Diversification').

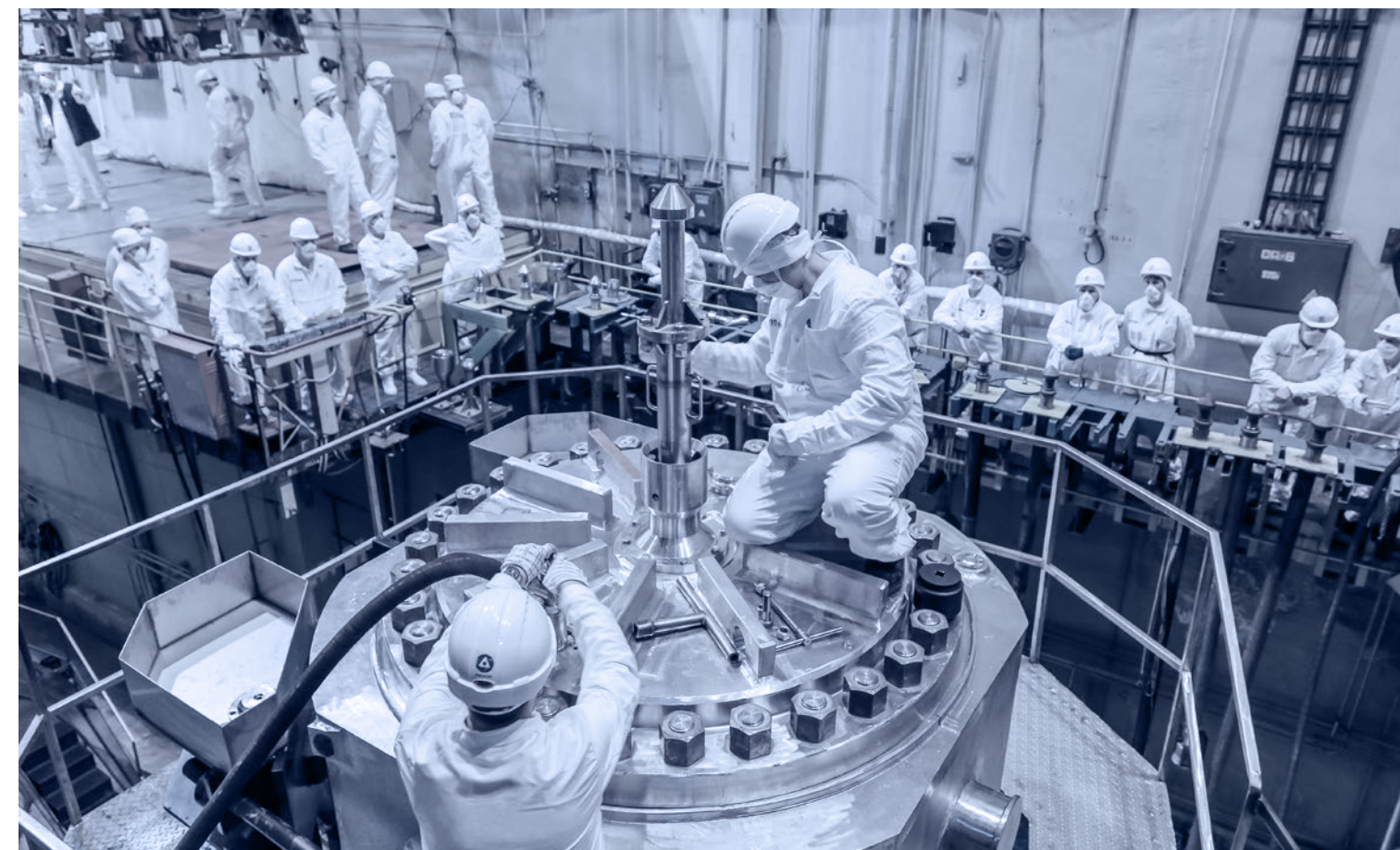


## 2.2.12. WASTE MANAGEMENT MARKET

For a long time, the issues of industrial and consumer waste management had been neglected in Russia, and the market has faced a shortage of capacity for the processing and storage of hazard class 1 and 2 waste<sup>19</sup>. At present, only a small part of hazardous waste is treated and recycled by operators that have licences for the relevant operations and the required capacities.

To achieve a fundamental transformation in the sphere of hazardous waste management, a federal project titled 'Infrastructure for the Management of Hazard Class 1 and 2 Waste' has been developed and approved as part of the Ecology National Project. As the contractor for this federal project, ROSATOM is creating a federal scheme and implementing an integrated state information system for hazardous waste management. The required processing and disposal infrastructure is being created in the Russian nuclear industry; it consists of seven

inter-regional specialized complexes incorporating the principles of the best available technology and international experience. A total of RUB 36 billion has been allocated for the federal project for the period from 2019 through 2024 (see also the section 'Business Diversification').



<sup>19</sup> Class 1 includes extremely dangerous substances (polonium, benzopyrene, lead salts, etc.).  
Class 2 includes highly dangerous substances (lithium, phenol, chloroform, arsenic, molybdenum, etc.).



**3** INTERNATIONAL  
BUSINESS  
PERFORMANCE

**No. 1**  
**IN THE WORLD**

in terms of the number of NPP power units in  
the portfolio of foreign projects (36 power  
units) (including the project portfolio  
of ROSATOM)



## 3.1. INTERNATIONAL COOPERATION<sup>20</sup>

JSC ATOMENERGOPROM PARTICIPATES IN ROSATOM'S INTERNATIONAL ACTIVITIES AIMED AT CREATING A FAVOURABLE ENVIRONMENT FOR PROMOTING RUSSIAN NUCLEAR TECHNOLOGIES ON THE GLOBAL MARKET.



### Key results in 2018

- A historic package of documents on four high-priority areas of cooperation in the nuclear power industry was signed with China.
- A legal framework was established at the intergovernmental level for NPP construction in Uzbekistan.
- A Memorandum on the Development of Cooperation was signed with the German Committee on Eastern European Economic Relations. It defines the areas of possible cooperation and prospects for the development of the existing potential between the two countries.

- The signing of a Strategic Document on Partnership gave new impetus to cooperation between Russia and France in the peaceful use of nuclear energy.
- A framework intergovernmental agreement was signed with Rwanda, providing a foundation for bilateral cooperation with Russia in the nuclear industry.
- An intergovernmental protocol was prepared and signed with Bangladesh; it contains specific clauses on cooperation in the field of physical protection. This is the first international legal document of this kind in practice.

<sup>20</sup> Including the agreements signed by ROSATOM.

### 3.1.1. STRENGTHENING THE INTERNATIONAL LEGAL FRAMEWORK FOR COOPERATION

In 2018, expansion of the international legal framework for cooperation continued in order to promote Russian nuclear technologies in the world. 8 intergovernmental agreements (IGAs) and 20 major interdepartmental arrangements were signed (11 and 16 in 2017, 8 and 20 in 2016 respectively).

#### Cooperation with key partners in strengthening the international legal framework

<b>China</b>	<p>A strategic package of documents was signed, including:</p> <ul style="list-style-type: none"> <li>■ An intergovernmental protocol and a framework contract for the construction of power units No. 7 and 8 of Tianwan NPP;</li> <li>■ An intergovernmental protocol and a framework contract for the serial construction of power units for Xudabao NPP;</li> <li>■ An intergovernmental agreement and a framework contract for the construction of a Chinese demonstration fast neutron reactor;</li> <li>■ A contract for the supply of radionuclide thermal units to China.</li> </ul> <p>This package of agreements has become the largest one in the history of nuclear cooperation between Russia and China. Its uniqueness is due to the fact that it involves cooperation on several high-technology projects, which are unparalleled in the global nuclear industry. Thus, a contract and legal framework has been formed for cooperation in the four high-priority areas outlined in the Joint Statement of the Heads of Government of Russia and China dated November 7, 2016.</p>
<b>Uzbekistan</b>	<p>An IGA was signed on cooperation in the construction of a nuclear power plant in the Republic of Uzbekistan. The agreement provides for cooperation on the design, construction, commissioning and operation of a nuclear power plant in Uzbekistan; the power plant will consist of two power units equipped with a Russian-design water-cooled water-moderated power reactor, with the installed capacity of each unit totalling up to 1.2 GW.</p>
<b>Rwanda</b>	<p>A framework IGA was signed providing a legal framework for nuclear cooperation with Rwanda. Conditions were created for promoting Russian nuclear technologies in this country and implementing specific nuclear projects.</p>
<b>Belarus</b>	<p>A Protocol amending the IGA on the construction of a nuclear power plant in Belarus dated March 15, 2011 was signed.</p>
<b>Bangladesh</b>	<p>A protocol to the IGA on the construction of Rooppur NPP was signed. The document provides for involving Russian organizations in developing the physical protection system for Rooppur NPP, for which the Bangladeshi side is responsible.</p>
<b>India</b>	<p>A tripartite memorandum of understanding on cooperation in the implementation of the Rooppur NPP project was signed. The document provides for involving Indian companies in the project. In the future, this expertise can also be applied to other foreign projects.</p> <p>An Action Plan for Prioritization and Implementation of Cooperation Areas in the Nuclear Field Identified Jointly by Russia and India was signed. The document provides for selecting a new site for NPP construction, launching serial construction of Russian-design power units in India and increasing the degree of localization, as well as cooperation in third countries.</p>
<b>Vietnam</b>	<p>The following interdepartmental agreements were signed:</p>
<b>Congo</b>	<ul style="list-style-type: none"> <li>■ Memoranda of cooperation on the peaceful use of nuclear energy with Congo and Rwanda;</li> </ul>
<b>Cuba</b>	<ul style="list-style-type: none"> <li>■ Memoranda on shaping a positive public opinion on nuclear power with Vietnam, Sudan and Uzbekistan;</li> </ul>
<b>Mongolia</b>	<ul style="list-style-type: none"> <li>■ Memoranda on personnel training in the peaceful use of nuclear energy with Vietnam, Sudan, Uzbekistan and Chile;</li> </ul>
<b>Rwanda</b>	<ul style="list-style-type: none"> <li>■ A memorandum on strategic partnership in the development and application of irradiation technologies with Cuba;</li> </ul>
<b>Sudan</b>	<ul style="list-style-type: none"> <li>■ A memorandum of cooperation in the establishment of a Nuclear Research and Technology Centre in Mongolia.</li> </ul>
<b>Uzbekistan</b>	<p>The signing of these documents will enable the development of nuclear power infrastructure in these countries.</p>
<b>Chile</b>	
<b>Argentina</b>	<p>A strategic document on partnership between Russia and Argentina in the peaceful use of nuclear energy and a road map for cooperation on specific Russian-Argentine projects were signed. The documents are focused on expanding R&amp;D and commercial cooperation.</p>

<b>France</b>	A strategic document on partnership between Russia and France in the peaceful use of nuclear energy was signed. The document outlines plans for the development of bilateral cooperation. It reflects the parties' mutual intention to develop cooperation in the field of energy efficiency and renewable energy sources, as well as the possibility of joint implementation of industrial projects in third countries.
<b>Germany</b>	A Memorandum on the Development of Cooperation was signed with the German Committee on Eastern European Economic Relations. The document outlines various areas of possible cooperation and the prospects for the development of the existing cooperation potential in the following areas: nuclear safety, R&D cooperation, preservation and management of nuclear knowledge, decommissioning of German nuclear power plants (including spent nuclear fuel management), cooperation in third countries, the use of nuclear technologies in industry, healthcare, agriculture, etc.
<b>Serbia</b>	A Statement on the Principles of Russian-Serbian Cooperation in the Field of Innovation and Technological Development in the Peaceful Use of Nuclear Energy was signed. The document provides for support for the creation and development of nuclear infrastructure and nuclear medicine in Serbia, as well as the use of radiation technologies in agriculture and industry.

### 3.1.2. OBJECTIVES FOR 2019 AND FOR THE MEDIUM TERM

In 2019, ROSATOM, with assistance from JSC Atomenergoprom, will continue to expand the international legal framework of cooperation for the benefit of organizations and enterprises in the industry, including such areas as Nuclear Research and Technology Centres and spent nuclear fuel management. The Corporation plans to intensify cooperation in personnel training, making nuclear power more acceptable for society and fostering public demand for it.

In the course of its international activities, ROSATOM is guided by the UN Sustainable Development Goals. The Company seeks to contribute to their achievement by providing the benefits of environmentally friendly nuclear energy to countries at any level of economic development. At the same time, the Company intends to give special focus to non-energy applications of the 'peaceful atom'.

To achieve its goals, the Company will continue bilateral cooperation and activities on the platforms of specialized international organizations, as extensive international cooperation is a prerequisite for the long-term, sustainable and safe development of nuclear power.



## 3.2. INTERNATIONAL BUSINESS

THE MAIN FOCUS OF JSC ATOMENERGOPROM'S INTERNATIONAL BUSINESS IS THE CONSTRUCTION OF RUSSIAN-DESIGN NUCLEAR POWER PLANTS ABROAD.



### 3.2.1. PROMOTING JSC ATOMENERGOPROM'S TECHNOLOGIES ON FOREIGN MARKETS

In 2018, Russian nuclear power technologies were promoted on the global market amid increased competition on the NPP construction and nuclear fuel cycle markets and an increase in the activity of other players in the global nuclear industry due to a growing number of countries expressing interest in projects related to the construction and operation of nuclear facilities.

The main focus of JSC Atomenergoprom's international business is the construction of Russian-design nuclear power plants abroad. The Company promotes an integrated offer covering a wide range of areas, from uranium supply and NPP construction to participation in project

financing and personnel training. This approach is unique on the global market, which enables the Company to remain the only organization in the world capable of establishing a comprehensive technological partnership in the nuclear power industry.

Today, 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 those based on Russian technology).



### 3.2.2. CONSTRUCTION OF NPPS ABROAD

As of December 31, 2018, ROSATOM had official commitments to build 36 nuclear power units in 12 foreign countries. Russian-design nuclear reactors that are currently under construction fully meet international safety requirements.



In the reporting year, ROSATOM continued to take measures to secure new orders for NPP construction abroad:

- A package of strategic documents was signed with China, including intergovernmental protocols and framework contracts for the construction of power units No. 7 and 8 of Tianwan NPP and power units of No. 3 and 4 of Xudabao NPP (see also the section 'International Cooperation');
- Following the signing of an intergovernmental agreement on NPP construction in Uzbekistan, an official ceremony was held in October 2018 to mark the launch of the project. The event heralded the start of an engineering survey aimed at selecting the site for the construction of the future NPP. The project will involve building two power units equipped with VVER-1200 reactors;
- An Action Plan was signed with India; it provides for signing a contract for the construction of six power units at a new site.

Active work continued with countries that are planning to implement projects involving the construction of nuclear power plants or other nuclear facilities: Argentina, Bulgaria, Brazil, Zambia, Kazakhstan, Saudi Arabia and the Czech Republic.

#### Key results in 2018:

- The overseas NPP construction project portfolio included 36 power units in 12 countries around the world\*.
- A contract was signed for the construction of a Nuclear Research and Technology Centre (NRTC) in Zambia.
- Projects were underway in over 50 countries worldwide.

\*including the project portfolio of ROSATOM

### 3.2.3. NPP SERVICING ABROAD

The Company finalized a rationale for extending the life of power unit No. 6 of Kozloduy NPP (Bulgaria) to 60 years.

As part of the project to extend the life of the Armenian NPP, the modernization of equipment at power unit No. 2 was completed, and scheduled preventive maintenance of the power unit was carried out.

The first contract for the servicing of power unit No. 1 of Kudankulam NPP in India was signed and carried out.

As part of the construction of the Belarusian NPP, the provision of technical support for commissioning began.



### 3.2.4. NATURAL URANIUM MINING ABROAD

In 2018, uranium mining enterprises of Uranium One implemented the annual production programme in full. They produced 4,400 tonnes of uranium.

As of December 31, 2018, the mineral resource base of Uranium One enterprises (including the 100% stake in Mantra Resources Pty Limited) under international reporting standards totalled 197,100 tonnes.

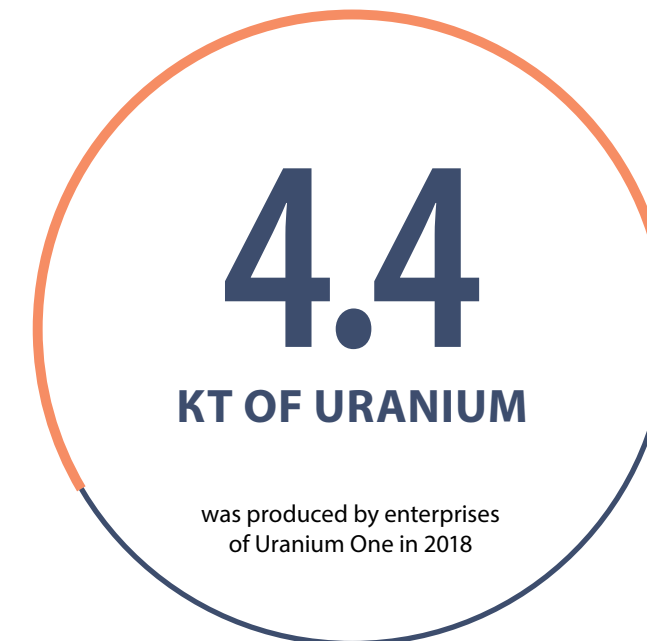
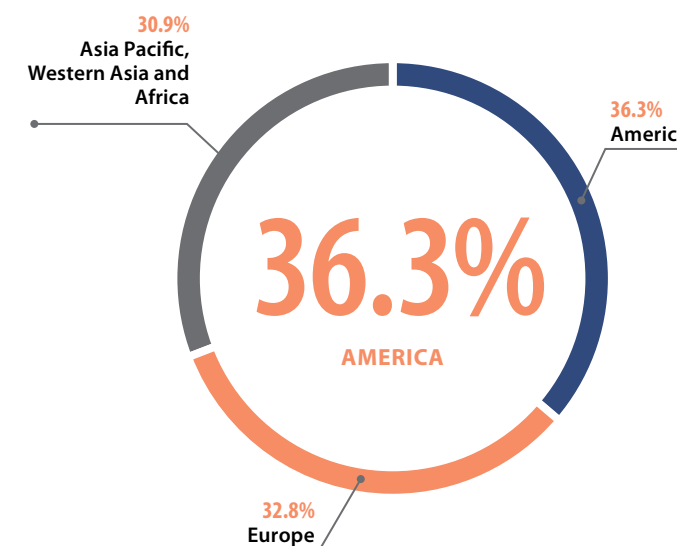
URANIUM MINING BY URANIUM ONE ENTERPRISES, T

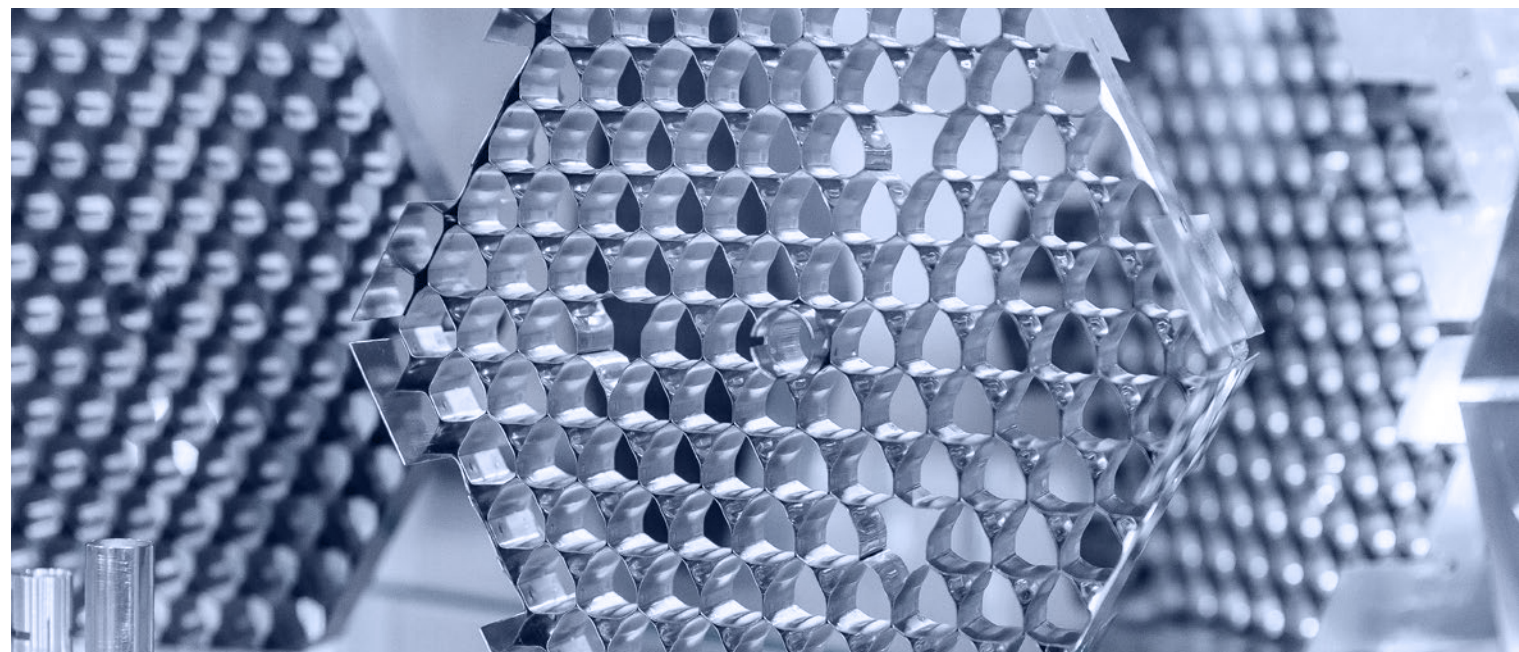
	2016	2017	2018
<b>Kazakhstan</b>	4,896	5,063	4,375
<b>USA</b>	23	39	10
<b>Total</b>	<b>4,919</b>	<b>5,102</b>	<b>4,385</b>

MINERAL RESOURCE BASE OF URANIUM ONE ENTERPRISES, KT

Category of reserves	2016	2017	2018
<b>Mineral resource base including:</b>			
<b>Measured + Indicated</b>	132.0	127.4	182.6
<b>Inferred</b>	88.8	88.8	14.4

REGIONAL SALES STRUCTURE OF URANIUM ONE IN 2018





### 3.2.5. EXPORT OF URANIUM PRODUCTS

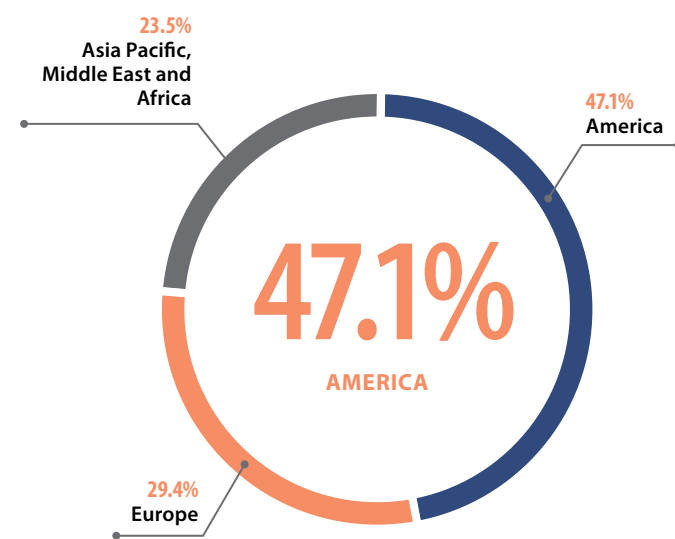
JSC TENEX is the Company's main organization promoting uranium conversion and enrichment services and enriched uranium for power and research reactors on the global market. In 2018, JSC TENEX remained one of the leading suppliers of nuclear fuel cycle front-end products as it satisfied a significant share of the demand of Western-design reactors for uranium enrichment services.

All obligations under the current contracts in the reporting year were fulfilled by JSC TENEX on time and in full. The annual sales volume totalled about USD 1.7 billion.

In the reporting year, JSC TENEX signed major long-term contracts with Electricite de France SA (EDF) for the provision of a range of services related to processing French regenerated material and supplying the resulting uranium products to nuclear power plants in France.

The project to process Orano's uranium compositions of various shapes and degrees of enrichment was successfully completed. The final product of processing, uranium metal with a degree of enrichment of up to 19.75%, was supplied to France for the production of fuel assemblies for research reactors. The successful implementation of this technically complex project marked the launch of a new business area of JSC TENEX and provided a practical foundation for long-term mutually beneficial cooperation between Russian nuclear organizations and Orano.

REGIONAL SALES STRUCTURE OF JSC TENEX IN 2018



### 3.2.6. SUPPLY OF NUCLEAR FUEL

The foreign revenue of JSC TVEL, which exports nuclear fuel, totalled USD 0.96 billion. The 10-year portfolio of overseas orders reached USD 13.3 billion.

In 2018:

- A contract was signed for the supply of fuel pellets for Tarapur NPP (India) equipped with BWR reactors;
- A number of contracts for the supply of nuclear fuel components for a research reactor in Egypt were signed and carried out;
- Nuclear fuel was supplied for the restarted research reactor of the Institute of Nuclear Physics under the Academy of Sciences in Uzbekistan.

### 3.2.7. NEW PRODUCTS FOR FOREIGN MARKETS

#### Life cycle back-end services

In 2018, projects were underway to develop a neutron detector and analyse changes in the properties of corium during its ageing for use in the Fukushima disaster clean-up.

Preparations were made to ensure the safe handling of spent nuclear fuel from Akkuyu NPP.

A feasibility study of options for the handling of spent nuclear fuel from the Belarusian NPP was prepared at the request of the Joint Institute for Power and Nuclear Research — Sosny of the National Academy of Sciences of Belarus.

#### Construction of Nuclear Research and Technology Centres (NRTCs) abroad, nuclear infrastructure and personnel training

ROSATOM offers its foreign partners a product solution based on a research reactor and a set of additional elements for developing nuclear technologies for scientific research and practical applications. Nuclear Research and Technology Centres (NRTCs) are focused on both creating nuclear power capabilities in the customer country and developing nuclear medicine and radiation technologies for the national economy. In 2018, the Company began to carry out the first contract for the construction of a facility of this kind in Bolivia. Engineering research and preparatory work were completed at the construction site; construction and installation work was carried out, and equipment was shipped for the NRTC. In addition, a contract was signed for the development of nuclear infrastructure in Bolivia.

<sup>21</sup> It is used for the treatment of endocrine diseases (Graves' disease), thyroid cancer, non-Hodgkin lymphoma, as well as in systemic therapy of other types of late-stage cancer.

A contract was signed for the construction of a Nuclear Research and Technology Centre in Zambia. The Centre will enable widespread use of radiation technologies in the country's healthcare, industrial and agricultural sectors. The NRTC will also contribute to raising the standards in education and science by providing training for highly qualified professionals in various fields. Preliminary engineering surveys at the Centre's site began in 2018. In addition, the Company provided services under the contract for the evaluation and development of nuclear infrastructure in the country.

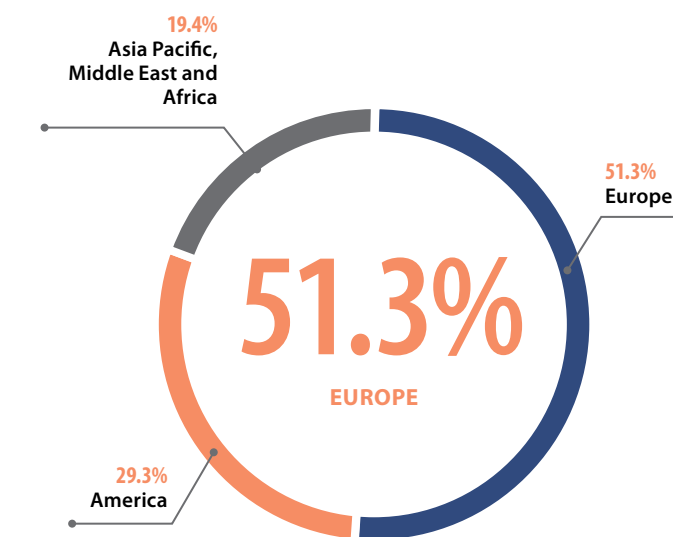
A Memorandum of Understanding was signed with the Nuclear Energy Commission of Mongolia on the construction of a Nuclear Research and Technology Centre in the country.

Consultations are being held on the implementation of similar projects in Serbia and Rwanda.

#### Supply of isotope products

In 2018, revenue from the supply of isotope products exceeded USD 100 million.

GEOGRAPHY OF ISOTOPE PRODUCT SALES IN 2018



The Company is an active player on the international isotope market: in recent years, it has held about 11% of the market for cobalt-60 for industrial radiation facilities and 5% of the market for molybdenum-99 for radiological diagnosis.

In 2018, a contract was signed for regular deliveries of one of the most in-demand medical isotopes, iodine-131<sup>21</sup>, through a joint Russian-Chinese enterprise.



# 4 PERFORMANCE OF DIVISIONS

# 204.3

## BILLION KWH

electricity output at Russian  
NPPs in 2018



## 4.1. MINING DIVISION<sup>22</sup>

THE MINING DIVISION (ITS HOLDING COMPANY IS JSC ATOMREDMETZOLOTO) CONSOLIDATES URANIUM MINING ENTERPRISES IN RUSSIA.



The Mining Division (its holding company is JSC Atomredmetzoloto) consolidates uranium mining enterprises in Russia<sup>23</sup>. The Division is implementing a number of uranium and non-uranium projects at different stages of development, from geological exploration to intensive commercial development. In-house uranium production in Russia enables the Company to guarantee reliable supplies to customers, to secure long-term resources for nuclear power generation and maintain a competitive cost of production.

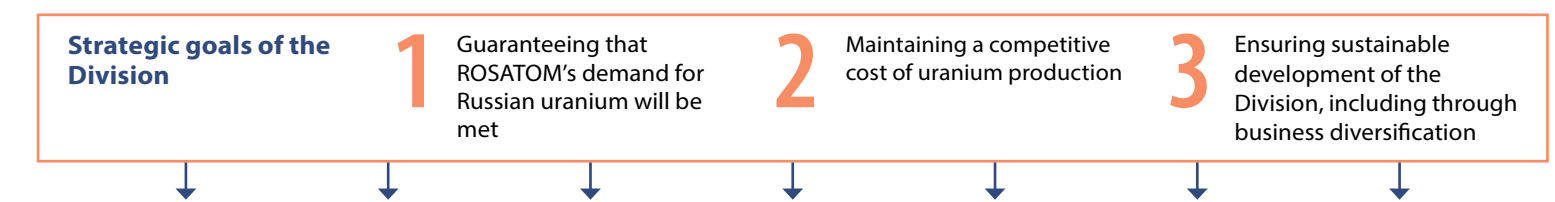
### Key results in 2018:

- Uranium resources totalled 520,700 tonnes.
- 2,904 tonnes of uranium were produced (the production programme was 101% completed).
- A programme of work on the project 'Development of the Argunskoye and Zherlovoye Deposits (Construction of Mine No. 6)' was completed.

<sup>22</sup> For details about the Division's results, see the report of JSC Atomredmetzoloto for 2018.

<sup>23</sup> Uranium is mined abroad by Uranium One, an organization of JSC Atomenergoprom (see the section 'International Business').

### LINK BETWEEN THE DIVISION'S GOALS AND THE STRATEGIC GOALS OF JSC ATOMENERGOPROM



### CONTRIBUTION TO THE ACHIEVEMENT OF JSC ATOMENERGOPROM'S STRATEGIC GOALS

<b>Reduction of the cost of products and the lead time</b>	<ul style="list-style-type: none"> <li>■ Reduction of the unit cost of uranium production</li> <li>■ Launch of the Smart Mine, a smart uranium mining management system</li> </ul>
<b>Development of new products for the Russian and international markets</b>	<ul style="list-style-type: none"> <li>■ Start of commercial supply of scandium oxide produced by JSC Dalur</li> <li>■ Implementation of high-technology non-uranium projects aimed at increasing the production of marketable products from ores, solutions and secondary sources</li> </ul>
<b>Increase in the share on international markets</b>	<ul style="list-style-type: none"> <li>■ Increase in sales of coal produced by PJSC PIMCU to China</li> <li>■ Increase in foreign revenue</li> </ul>

Uranium production remains the main focus of the Division's operations on the strategic horizon. The development of existing enterprises will be supplemented by new projects in the mining and related industries, which will help to expand the business and increase its social and financial sustainability.

### 4.1.1. RESULTS IN 2018

#### MINERAL RESOURCE BASE AND URANIUM PRODUCTION

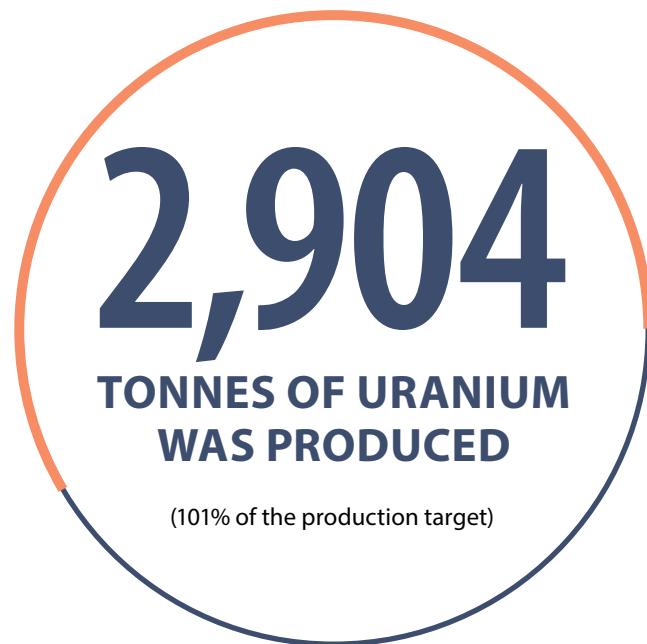
	2016	2017	2018
<b>Mineral resource base, kt</b>	517.9	523.9	520.7
<b>Uranium production, t, including:</b>	3,005	2,917	2,904
<b>PJSC PIMCU</b>	1,873	1,631	1,456
<b>JSC Dalur</b>	592	592	590
<b>JSC Khiagda</b>	540	694	858



### Key operating results

The Division produced 2,904 tonnes of uranium, which totals 101% of the target volume.

At the largest production site of the Division, PJSC PIMCU, a programme of work on the project 'Development of the Argunskoye and Zherlovoye Deposits (Construction of Mine No. 6)' was completed: auxiliary facilities were constructed.



The Division actively develops uranium mining using the most effective technique: drillhole in-situ leaching. In 2018, the share of uranium extracted through in-situ leaching at JSC Khiagda and JSC Dalur increased from 44% to 50% of the Division's total output.

### New products

Production of coal with a high calorific value (sized coal) at PJSC PIMCU reached a stable level. A technology for producing ferrosilicon, which is in demand in the steel industry, from pyrite cinders was piloted as part of the diversification programme.

JSC Dalur (Kurgan Region) continues to produce scandium oxide and fluoride. These are by-products of uranium mining using the drillhole in-situ leaching technique.

2018 saw the 50<sup>th</sup> anniversary of establishment of PJSC PIMCU. On March 13, 1968, in accordance with Order No. 068 of the legendary Minister of Medium Machine-Building of the USSR Efim Slavsky, the construction of the Priargunsky Industrial Mining and Chemical Union was started. In the reporting year, the team of PJSC PIMCU was awarded the Efim Slavsky decoration by ROSATOM.

### Digitization projects

As part of the implementation of the Uniform Digital Strategy in the Russian nuclear industry, JSC Khiagda commissioned the Smart Mine, a system for modelling and tracking the mining process in real time using video surveillance and smart sensors. JSC Dalur became the world's first uranium mining enterprise to use computer-based environmental modelling, which enables it to assess the projected environmental impact of the development of a deposit with maximum accuracy.



### Development of new businesses (diversification)

#### GEOGRAPHY OF PROJECTS OF NEW BUSINESSES



- 1** Improving the processing depth of the mineral resource base and industrial waste:
- Scandium
  - Pyrite cinders
  - Sized coal

- 2** Implementation of greenfield mining projects:
- Pavlovskoye deposit
  - Gold (Severnoye deposit)
  - Lithium (Zavitinskoye deposit)
  - Titanium (Tuganskoye deposit)

### Social projects to improve the quality of people's lives

#### Fostering self-employment in Krasnokamensk

The Division holds an annual competition of charity and social projects in Krasnokamensk and provides financial support (grants) to socially oriented small and medium-sized enterprises. The competition helps to promote urban improvement and the development of youth leisure and sports.

In 2018, financial support totalling RUB 2 million was provided for 25 important social projects, including the purchase of ice hockey gear, renovation and flooding of an ice rink for young patients of the regional children's tuberculosis sanatorium, and installation of vandal-proof outdoor fitness equipment.

## 4.1.2. PLANS FOR 2019 AND FOR THE SHORT AND MEDIUM TERM

In 2019, the construction of a new mine No. 6 will continue at the Argunskoye and Zherlovoye uranium deposits of PJSC PIMCU.

JSC Khiagda will continue to develop the Istochnoye, Vershinnoye and other deposits forming part of the Khiagdinskoye ore field. JSC Dalur has been set the goal of maintaining the current level of uranium mining and developing the Dobrovolnoye deposit.

An assessment of prospects and development of technical solutions will be continued for the Elkon prospective uranium mining project (JSC Elkon MMP).

The development of new areas of business will include further expansion of the product portfolio, including the development of the Pavlovskoye polymetal deposit in the Novaya Zemlya Archipelago and the piloting of the technology for producing ferrosilicon from pyrite cinders.



## 4.2. FUEL DIVISION<sup>24</sup>

THE FUEL DIVISION OF JSC ATOMENERGOPROM (ITS HOLDING COMPANY IS JSC TVEL) IS ONE OF THE LEADING PLAYERS ON THE GLOBAL NUCLEAR FUEL CYCLE FRONT-END MARKET.



The Fuel Division of JSC Atomenergoprom (its holding company is JSC TVEL) is one of the leading players on the global nuclear fuel cycle front-end market. The Division comprises enterprises responsible for nuclear fuel fabrication, uranium conversion and enrichment and production of gas centrifuges, as well as research and design organizations.

In 2018, the Division supplied nuclear fuel for 76 power reactors in Russia, Europe and Asia (15 countries in total), Russian- and foreign-design research reactors in nine countries around the world, propulsion systems in the Russian nuclear-powered fleet and the world's first floating nuclear power plant. Today, one in every six power reactors in the world runs on fuel produced in the Division; together they generate about 400 billion kWh of electricity annually.

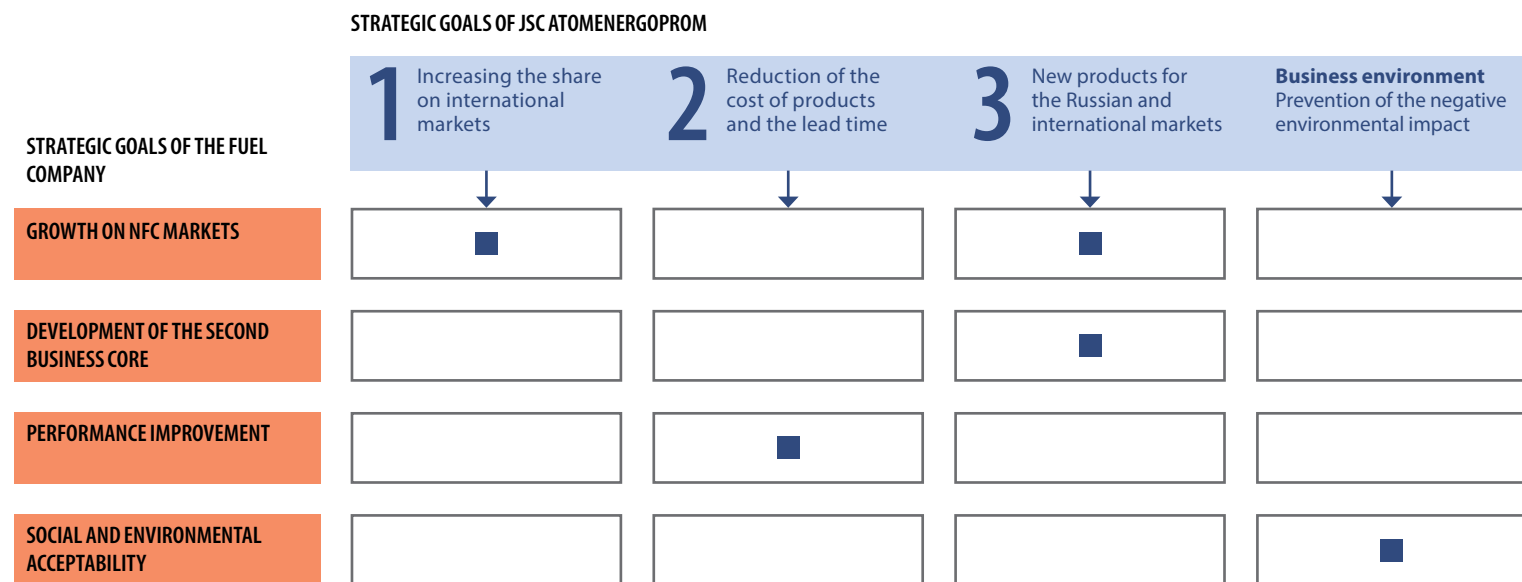
### Key results in 2018:

- Mass production of MOX fuel for the BN-800 fast neutron reactor began.
- The first Russian experimental fuel assemblies with accident tolerant nuclear fuel were manufactured.
- Industry integrators were formed within the Division for the following areas: Additive Manufacturing Technologies and Energy Storage Systems.

<sup>24</sup> For details about the Division's results, see the report of JSC TVEL for 2018.



LINK BETWEEN THE DIVISION'S GOALS AND THE STRATEGIC GOALS OF JSC ATOMENERGOPROM



### 4.2.1. RESULTS IN 2018

#### Key operating results

- In 2018, the Division fulfilled all of its obligations related to the supply of nuclear fuel to Russian and foreign customers.
- JSC UEIP continued to introduce new sections of state-of-the-art generation 9+ gas centrifuges for uranium enrichment. LLC RME Centrotech began to produce new high-performance gas centrifuges for the separation of stable isotopes.
- Mass production of MOX fuel for the BN-800 fast neutron reactor began.
- PJSC NCCP manufactured the first Russian experimental fuel assemblies with accident tolerant nuclear fuel, which is resistant to severe beyond-design-basis accidents involving a loss of coolant. Russian accident tolerant fuel is being developed by researchers at JSC A. A. Bochvar National Research Institute for Inorganic Materials.

#### New products

Contracts for the supply of large batches of calcium injection wire were concluded with leading Russian steel and rolled steel manufacturers.

Contracts for the supply of lithium to France, Korea and the US market were signed with global manufacturers of lithium products.

In 2018, a single industry integrator, LLC RusAT (Rusatom — Additive Technologies), was formed and started to function in a new business

In 2018, a business accelerator for start-ups and new ideas was created in the Fuel Division (<http://ba.tvel.ru/>).

The business accelerator is focused on projects in high-priority non-nuclear business areas of the Division: chemistry, mechanical engineering, special metals, additive manufacturing and new energy. As part of the pilot acceleration cycle, 42 applications were submitted by the Division's enterprises and external participants. Following the selection, three projects entered the investment stage.

area of the Fuel Division: Additive Manufacturing Technologies. Key results of the integrator in the reporting year include the following:

- Arrangements were made to start batch production of RusMelt 3D printers;
- A project was launched to create an additive manufacturing centre at LLC RusAT;
- Projects were initiated to design key elements of additive manufacturing equipment based on technologies such as selective laser melting and direct laser cladding;
- A national standardization programme in the field of Additive Manufacturing Technologies for 2019 was updated and expanded.

### Digitization projects

- In 2018, digital projects were implemented in the following areas:
- Real-time monitoring and control of the manufacture of fuel assemblies for power reactors and their components at PJSC NCCP;
  - Procurement activities;
  - Repairs planning and accounting at the enterprises of the Division;
  - Cybersecurity.

In 2018, a 'digital twin of equipment' was introduced at an enterprise of the Fuel Division, which enabled a drastic reduction in design time and the cost of full-scale tests.

### Social projects to improve the quality of people's lives

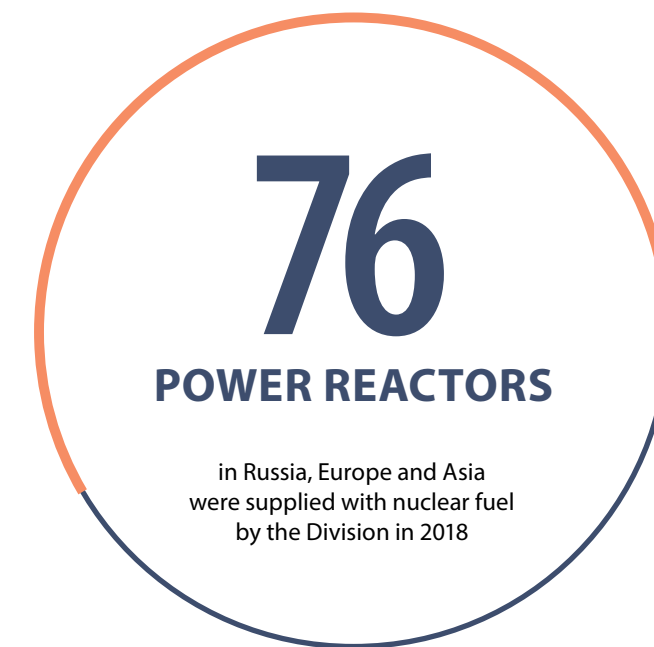
The Fuel Division supports social projects and initiatives in the towns and cities of its operation. These projects are typically focused on education and healthcare.

The main educational project is the School Science Park network project. It is an educational environment that makes it possible to integrate education, research and production capabilities in order to promote innovative educational activities. It is a network of laboratories established in 2016 and 2017 at four schools in the CATF of Seversk, Novouralsk Lyceum No. 58 and the Glazov Physics and Mathematics Lyceum, as well as nine schools in the CATF of Zelenogorsk. In 2018, three new laboratories were opened in Glazov, Novouralsk and Zelenogorsk.

The main healthcare project is the Lean Polyclinic. For instance, measures taken at an outpatient clinic for children in Novouralsk helped to reduce the time spent by patients at the reception desk almost by half, while the total time spent at the outpatient clinic was reduced by a factor of one and a half. At an outpatient clinic for adults in Glazov, the time spent on a health screening was reduced 40-fold; the time spent in the X-ray room was halved, while the time spent in the treatment room was reduced threefold. At an outpatient clinic for children in Zelenogorsk, the waiting time for receiving a medical service when visiting a paediatrician or specialized doctors was reduced from 90 to 40 minutes; the waiting time at the reception desk was reduced fourfold, while the time for receiving information services at the reception desk was reduced from ten to three-to-five minutes.

### 4.2.2. PLANS FOR 2019

- To complete the first phase of reactor tests and post-irradiation examination of accident tolerant fuel;
- To develop and carry out export contracts for the supply of nuclear fuel for existing NPPs and NPPs under construction;
- To open the first Additive Manufacturing Centre in Moscow equipped with five 3D printers of various models.



## 4.3. MECHANICAL ENGINEERING DIVISION<sup>25</sup>

THE MECHANICAL ENGINEERING DIVISION OF JSC ATOMENERGOPROM (ITS HOLDING COMPANY IS JSC ATOMENERGOMASH) IS THE LEADING MECHANICAL ENGINEERING ENTERPRISE IN RUSSIA.



The Mechanical Engineering Division of JSC Atomenergoprom (its holding company is JSC Atomenergomash) is the leading mechanical engineering enterprise in Russia (33.9% of the market) offering effective integrated solutions for the nuclear and thermal power industry, the gas and petrochemical industry, shipbuilding and the special steel market.

The Division comprises more than 20 enterprises, including research, engineering and manufacturing organizations located in Russia, the Czech Republic, Hungary and other countries.

Equipment produced at the enterprises of the Division has been installed at 14% of NPPs in the world and at 40% of thermal power plants in Russia, the CIS and the Baltic countries.

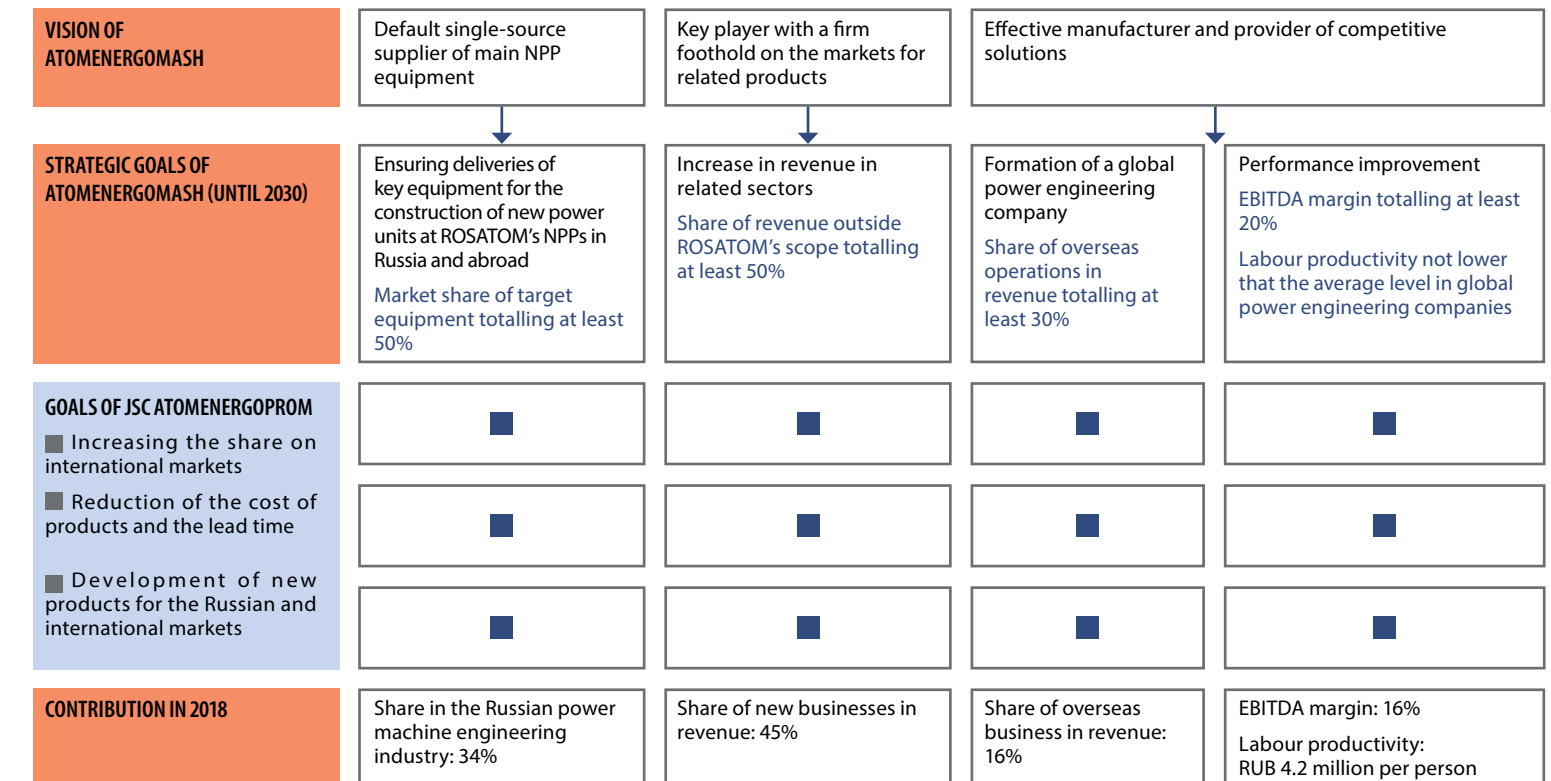
### Key results in 2018:

- Mechanical engineering products were delivered on time to seven NPPs in Russia and abroad.
- The manufacture of RITM-200 innovative reactor units for three new-generation icebreakers was completed.
- A number of major import substitution projects were implemented in the gas and petrochemical industry.

<sup>25</sup> For details about the Division's results, see the report of JSC Atomenergomash for 2018.

### LINK BETWEEN THE DIVISION'S GOALS AND THE STRATEGIC GOALS OF JSC ATOMENERGOPROM

#### STRATEGIC GOALS OF JSC ATOMENERGOMASH



■ Alignment of the Division's objectives with JSC Atomenergoprom's strategic goals

### 4.3.1. RESULTS IN 2018

#### Key operating results

Mechanical engineering products were delivered on time to seven NPPs in Russia and abroad. In the reporting year, the Division began to manufacture reactor and turbine hall equipment for Rooppur NPP (Bangladesh), Akkuyu NPP (Turkey) and Kursk NPP-2.

In 2018, the RITM-200 reactor unit was manufactured and shipped for the second follow-on multipurpose nuclear icebreaker.

JSC Atomenergoprom (a branch of JSC AEM-Technology) manufactured equipment for the Multipurpose Fast Neutron Research Reactor (MBIR) and conducted the first stage of a check assembly of the reactor.

Executive contracts for the implementation of the project to build the CFR-600 Chinese demonstration fast neutron reactor were signed; they provide for equipment supply and provision of services, granting of a software licence and a review of documentation.

#### New products

##### Gas and petrochemical industry

A number of major import substitution projects were implemented. In particular, batch production of check valves for main oil and gas pipelines was set up; the delivery of a wastewater treatment unit for the ZapSib-2 project was completed; canned electric pumps for pumping hydrocarbons, explosive, flammable and toxic liquids were developed and are manufactured.

The manufacture of key static equipment for a gas liquefaction line was set up: six coil heat exchangers are to be supplied for the Yamal LNG project in 2019. In addition, the manufacture of pumps was launched for the Yamal LNG project: for the first time, Russian-made LNG pumps are to be used at an operating facility.



**Special steel**

About 30,000 tonnes of various special steel products were manufactured and delivered to customers. Our partners include ArcelorMittal, General Electric, Ilva and other large international companies.

**Thermal power**

The manufacture of boiler island equipment for waste-to-energy plants in the Moscow Region and the Republic of Tatarstan was started.

TO **7** NPPs

In 2018, the Division shipped mechanical engineering products in Russia and abroad

**Digitization projects**

JSC AEM-Technology optimized manufacturing equipment monitoring systems. As a result, the equipment setup time was reduced from 50% to 30% of the machine run time.

A universal barcoding system was introduced at the manufacturing site of PJSC ZiO-Podolsk. It allows users to automate the data input process and minimize the potential impact of human error on the accuracy of input data.

**Social projects to improve the quality of people's lives**

The enterprises of the Division make improvements to their premises and participate in urban improvement projects in the municipalities where they are located.

JSC Afrikantov OKBM created green spaces on the premises of Kindergarten No. 389 in Nizhny Novgorod. In addition, employees of the enterprise organized a charity donation of items for the Nizhny Novgorod Regional TB Clinic and for the Radost Social Support Centre.

**4.3.2. PLANS FOR 2019**

In 2019, the Division will continue to fulfil its contractual obligations and develop new projects, including the manufacture of cryogenic equipment for LNG plants.

As part of preparation for the development of its production capacities, the Division will fine-tune its management and production processes, invest in the development of production capabilities, recruit new staff and develop the competences and professional skills of its employees.



## 4.4. ENGINEERING DIVISION<sup>26</sup>

THE MAIN AREAS OF BUSINESS OF THE ENGINEERING DIVISION INCLUDE DESIGN AND CONSTRUCTION OF LARGE NUCLEAR POWER PLANTS, AND DIGITAL TECHNOLOGIES FOR MANAGING ENGINEERING FACILITIES.



The main areas of business of the Engineering Division include the following:

- Design of large NPPs;
- Construction of large NPPs under EPC and EPC (M) contracts;
- Digital technologies for managing complex engineering facilities based on the Multi-D platform.

The Division actively engages local and international suppliers in the implementation of its projects. The Division comprises major design institutes in Moscow, Saint Petersburg and Nizhny Novgorod. Its holding company is JSC ASE EC.

**Key results in 2018:**

- Concreting started at the construction site of power unit No. 1 of Kursk NPP-2.
- Cold and hot trial runs were carried out at the reactor unit of power unit No. 2 of Novovoronezh NPP-2.
- A transformation programme was launched in the Division.

<sup>26</sup> For additional information about the Division's results, see also the section 'International Business' and the report of the Engineering Division for 2018.



STRATEGIC GOALS OF ROSATOM

- INCREASING THE SHARE ON INTERNATIONAL MARKETS
- NEW PRODUCTS FOR THE RUSSIAN AND INTERNATIONAL MARKETS
- REDUCTION OF THE COST OF PRODUCTS AND THE LEAD TIME

STRATEGIC GOALS OF THE DIVISION

- LEADERSHIP IN THE CORE BUSINESS: NPP CONSTRUCTION
- OPERATIONAL SUSTAINABILITY (DIVERSIFICATION)
- FINANCIAL SUSTAINABILITY

In 2018, a transformation programme was launched in the Division to make it more competitive on the global market and improve its performance.

MAIN AREAS OF THE TRANSFORMATION PROGRAMME OF THE ENGINEERING DIVISION



1. Organizational model
2. Design
3. Construction
4. Personnel and incentives
5. Digitization
6. Project management

### 4.4.1. RESULTS IN 2018

#### Key operating results

- At the site of Novovoronezh NPP-2 (power unit No. 2):
- Cold and hot trial runs of the reactor unit were carried out;
  - Inspection of main equipment of the reactor unit was started.
- At the site of Kursk NPP-2:
- Concreting of the foundation slab of the reactor building was started at power unit No. 1;
  - Installation of the core catcher was started at power unit No. 1;
  - Reinforcement of the foundation slab of the reactor building was started at power unit No. 2.

For details on NPP construction abroad, see the section 'International Business'; for details on the commissioning of new capacities, see the section 'Power Engineering Division'.

#### Digitization projects

In 2018, an integrated digital transformation programme was launched in the Engineering Division. Its goals are as follows:

- To develop a digital transformation strategy of the Division, the concept of a digital platform and its infrastructure (a market service platform);
- To train 'digital transformation leaders': to provide the participants and support teams with basic knowledge and skills that enable further independent development and implementation of projects as part of the Division's transformation.

In addition, the Division is implementing an industry-wide programme titled 'Digitization of NPP Construction Processes'. The programme consists of the following five main work streams:

- Design quality assurance based on digital modelling of NPPs;
- Digitization of end-to-end cross-functional and inter-divisional production chains (end-to-end data transfer between systems at different stages of the life cycle of a facility);
- Management of construction and IT structure of the construction site;
- Development of the Multi-D digital platform (NPP construction process management);
- Implementation of an integrated system for the management of NPP construction cost and duration.

### Social projects to improve the quality of people's lives

The Engineering Division holds an annual contest of charity projects in the regions of its operation. The aim of the contest is to support the initiatives of various organizations aimed at addressing topical social and cultural issues and fostering sustainable development in the Division's regions of operation. In 2018, financial support for projects totalled RUB 509.9 million.

In addition, in 2018, the Youth Council of the Division initiated and conducted a number of volunteer campaigns, including the Corporate Volunteering project (volunteer campaigns at the boarding school for blind and visually impaired children in Nizhny Novgorod and at boarding school No. 1 for orphans and abandoned disabled children).

### 4.4.2. PLANS FOR 2019

At the construction site of Leningrad NPP-2, tests and trial runs of equipment of power unit No. 2 are to be carried out.

At the construction site of Kursk NPP-2, concreting of the foundation slab of the reactor building at power unit No. 1 will be completed, and installation of the core catcher at power unit No. 2 will be started.





## 4.5. POWER ENGINEERING DIVISION<sup>27</sup>

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



### Key results in 2018:

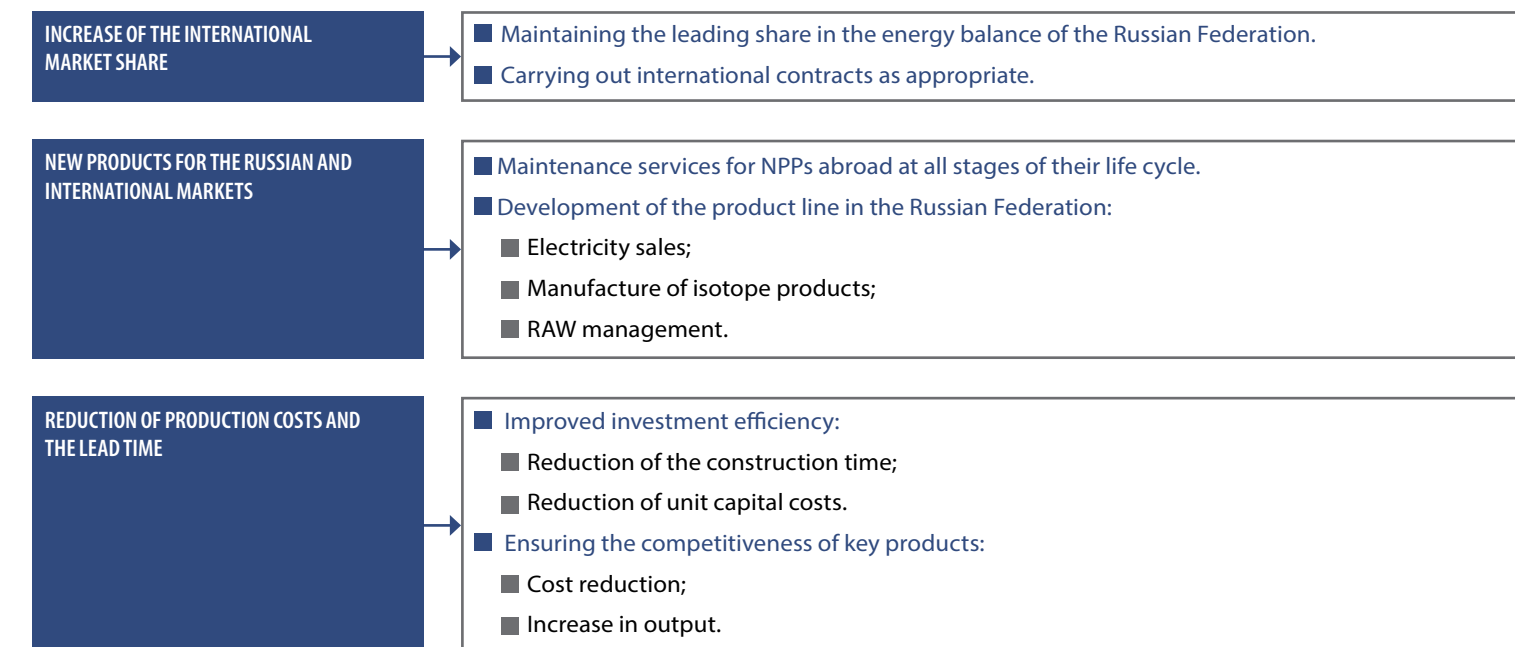
- Power generation by Russian nuclear power plants reached a new all-time high and totalled 204.3 billion kWh (which is comparable to electricity consumption in Moscow and the Moscow Region for two years).
- Power unit No. 4 of Rostov NPP and power unit No. 1 of Leningrad NPP-2 were put into operation.
- The first criticality stage was started at the reactor units of the Akademik Lomonosov floating nuclear power plant.
- The capacity of ten Russian NPPs (37 operating power units, including those newly commissioned during the year) totalled 30.1 GW.
- The NPP capacity factor totalled 79.9%.

<sup>27</sup> For details about the Division's results, see the report of JSC Rosenergoatom Concern for 2018.

The Power Engineering Division generates electricity and heat at nuclear power plants and acts as the operator of all Russian NPPs. JSC Rosenergoatom Concern, the Division's holding company, is Russia's largest power generation company and ranks second in the world in terms of installed capacity among NPP operators. Along with NPPs, the Division includes the Pilot and Demonstration Engineering Centre for

Decommissioning, the Technology Branch Office, the Directorate for Construction and Operation of Floating Thermal Nuclear Power Plants and the Capital Projects Implementation Branch Office.

### LINK BETWEEN THE DIVISION'S GOALS AND THE STRATEGIC GOALS OF JSC ATOMENERGOPROM



### Safety as a strategic priority

In the reporting year, under the resolution of the Board of Directors of JSC Rosenergoatom Concern, these goals were supplemented with strategic safety goals:

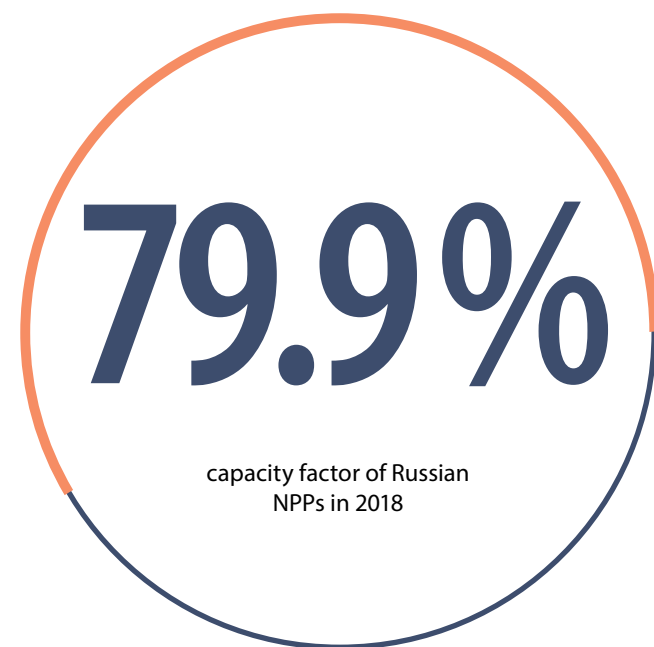
- To reduce the risk of accidents involving damage to the reactor core across the fleet of nuclear reactors;
- To prevent workplace fatalities at NPPs;
- To prevent violations at NPPs resulting in employee radiation exposure exceeding 50 mSv per year;
- To prevent violations at NPPs resulting in radioactive releases and discharges exceeding permitted limits.

### 4.5.1. RESULTS IN 2018

#### Operating results

In 2018, electricity output at 37 power units of 10 operating NPPs totalled 204.3 billion kWh, reaching a new all-time high in the history of Russian nuclear power generation (in 2017, electricity output totalled 202.9 billion kWh). The balance target set by the Federal Antimonopoly Service of Russia was exceeded by 1.5%.

The NPPs' capacity factor amounted to 79.9% (83.3% in 2017). Nuclear power generation accounted for 18.7% of the total electricity output in Russia (18.9% in 2017). The changes in the capacity factor are due to a year-on-year increase in the number of power units undergoing long-term modernization, repair schedules for the existing units and the implementation of measures to improve the integrity of graphite stacks in RBMK reactors.



New power generation capacities were commissioned in Russia. Power unit No. 4 of Rostov NPP and power unit No. 1 of Leningrad NPP-2 were put into operation. Power unit No. 1 of Leningrad NPP-2 has become the second unit equipped with a generation 3+ reactor in Russia.

The FNPP project attracts a strong interest from foreign partners. In 2018, an agreement on the development of a project to build an optimized floating nuclear power plant was signed with Sudan.

The first criticality stage was started at the reactor units of the Akademik Lomonosov floating nuclear power plant (FNPP) as part of comprehensive testing. The FNPP is an innovative Russian solution designed to provide power supply in the Far North, on islands and in other remote areas.

### New products

In 2018, JSC AtomEnergSbyt (an organization forming part of the Division) continued to operate as the power supplier of last resort in the Kursk, Tver, Smolensk and Murmansk Regions through the branches and separate divisions established in these regions. In the reporting year, the net electricity supply totalled 15.9 billion kWh.

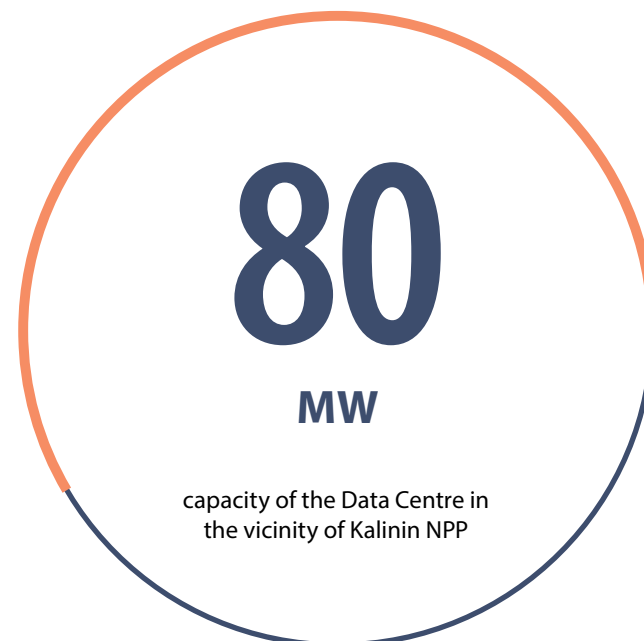
In order to increase exports, the production of cobalt-60 continued at Leningrad NPP; the production of this isotope was also launched at Smolensk and Kursk NPPs.

The Division has established a Business Laboratory, which is tasked with searching for and developing new products. The Business Laboratory draws on the Division's enormous intellectual capabilities and manufacturing expertise. In 2018, two training modules were conducted; following their completion, a bank of promising new product ideas was formed.

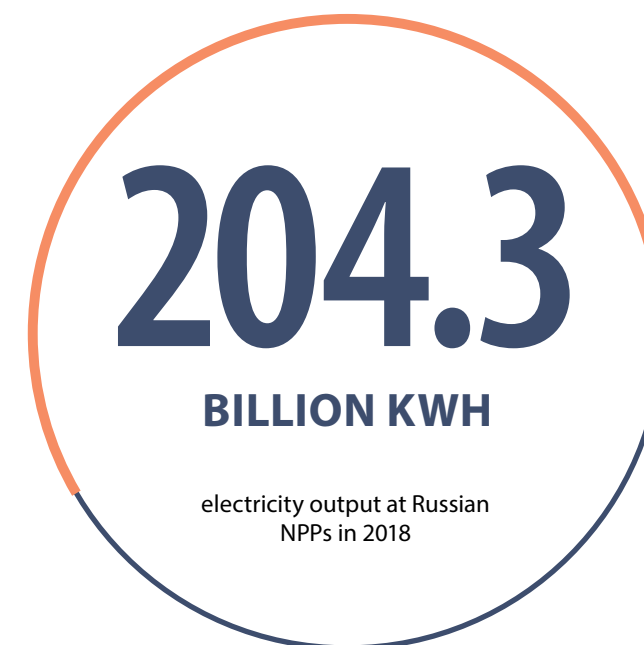
### Digitization projects

The first stage of the Data Centre in the vicinity of Kalinin NPP was put into operation. The Centre will be the largest one in Russia (80 MW) and one of the largest data centres in Europe. The design life of the Centre totals 30 years. A network of data centres of this kind, which will be formed as part of the Mendeleev project, will help to provide Russian people with equal access to digital public services. One of the social goals of the project is to encourage investment and create new jobs in the regions where the data centres are located.

The Smart Home project allows consumers to reduce housing and utility bills. It also demonstrates the practical application of digital technologies. In 2018, elements of a smart resource management system were installed in selected apartment buildings in the Kursk, Smolensk, Tver and Murmansk Regions. In the future, the Smart Home will become a single access point enabling residents to address all matters related to housing and utilities using digital technologies.



In 2018, a pilot project was launched at Kola NPP to ensure industrial safety based on computer vision. The project involves real-time monitoring of the use of personal protective equipment by employees in the course of operations. The video stream is analysed using an artificial intelligence system. If a violation is detected, a signal is sent to the persons responsible for the operation. The goal of the project is to avoid accidents in monitored facilities caused by improper use of personal protective equipment.



### Social projects to improve the quality of people's lives

In 2018, the Division held the sixth open contest of important social projects among non-profit organizations in the areas where NPPs are located. 52 projects worth a total of RUB 45 million were declared winners. All the projects have been successfully implemented.

During the year, more than 40 events aimed at developing and supporting the volunteer movement were held in the areas where NPPs are located, including the We Are Together volunteer forum (Polyarnye Zori), the People of Good Will festival (Kurchatov), the Soldier's Grave project (Volgodonsk), the Memory Watch project (Novovoronezh) and Days of Good Deeds.

### 4.5.2. PLANS FOR 2019

The commissioning of power unit No. 2 of Novovoronezh NPP-2 is expected to be completed.

The Division plans to complete the construction of the FNPP comprised of a floating power unit, hydraulic structures and onshore infrastructure in the town of Pevek (Chukotka Autonomous District). After it is put into operation, the FNPP will be able to supply electricity and heat to 50,000 residents and industrial enterprises in the region.

The construction of the second stage of the Data Centre will be completed.





**5** INNOVATIONS  
AND NEW  
PRODUCTS

**>1**  
**RUB TRILLION**

10-year portfolio of orders for  
new products outside the scope of the  
nuclear industry

АЭМ-ТЕХНОЛОГИИ



## 5.1. RESEARCH AND INNOVATIONS

JSC ATOMENERGOPROM CREATES BREAKTHROUGH TECHNOLOGIES AND INNOVATION INFRASTRUCTURE TO FACILITATE LONG-TERM DEVELOPMENT AND MEET THE ENERGY NEEDS OF MANKIND.



### 5.1.1. IMPLEMENTATION OF THE INNOVATIVE DEVELOPMENT AND TECHNOLOGICAL MODERNIZATION PROGRAMME

In 2018, innovative activities in the Russian nuclear industry were aimed at developing industry research and creating 'technological corridors' to ensure the competitiveness of products on the global market.

Implementation of the Innovative Development and Technological Modernization Programme until 2030 was focused on the following areas:

- Upgrading existing technologies;
- Creating new technologies for energy markets;
- Upgrading existing technologies and creating new technologies for non-energy markets;
- Developing an innovation management system and innovation infrastructure, cooperating with third-party organizations.

#### Key results in 2018:

- High-priority areas of scientific and technological development of the industry were approved, and a plan of R&D topics was developed.
- Over 70 technological projects were underway.
- The Company continued to implement the Proryv (Breakthrough) project aimed at closing the nuclear fuel cycle.

### Development of an innovation management system and innovation infrastructure

In 2018, high-priority areas of scientific and technological development of the industry were approved taking into account the latest trends in scientific research and ROSATOM's unique research and engineering capabilities. A portfolio of research projects was created. This makes it possible to finance early stages of R&D, which are the basis for the design and development of products.

An industry-wide plan of R&D topics was developed. It includes not only applied research, but also exploratory research that can open up new development paths for the industry. As part of the plan, ROSATOM intends to achieve a significant improvement in the characteristics of VVER reactors and to ensure their reasonable compatibility with fast neutron reactors that are currently under development.

In 2018, the first ever competition of conceptual designs was organized to provide a rationale for radically new developments. More than 650 applications were submitted for the competition, and 190 applications were selected in various areas. Following the implementation of conceptual designs, robust statements of work for R&D were prepared.

In order to develop an innovation community based on the open innovation model, a web portal, ROSATOM's Innovations, has been launched (<http://www.innov-rosatom.ru/>). The web resource has been created for communicating, informing and providing a shared information space for innovative leaders, employees in the industry and other stakeholders, as well as encouraging cooperation with small and medium-sized businesses and universities.

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

The Proryv (Breakthrough) Project is the key innovative project in the nuclear industry. It is aimed at developing fast neutron reactors and closing the nuclear fuel cycle. The project will result in the development of technologies that will help to solve the problem of radioactive waste accumulation and make nuclear power plants more cost-effective.

In 2018, the construction of the Fabrication and Refabrication Module, one of the key parts of the pilot and demonstration energy facility which is designed to produce mixed nitride uranium-plutonium (MNUP) fuel for fast neutron reactors, continued at JSC SCC. Main process equipment was delivered. In addition, a positive opinion was obtained on the design documentation for a power unit equipped with the BREST-OD-300 reactor.

In the reporting year, the Company completed the manufacture of full-scale mock-ups of all types of equipment for the core of the BREST-OD-300 reactor unit and conducted factory tests, which confirmed the efficiency of the equipment. Reactor tests of MNUP fuel were carried out in the BN-600 and BOR-60 reactors. Post-irradiation examination of nuclear fuel elements with various degrees of fuel burnup was performed. It confirmed the efficiency of technologies used for fuel fabrication and the manufacture of fuel elements and fuel assemblies with MNUP fuel. For the purpose of incineration of long-lived elements, technologies for MNUP fuel refabrication and the use of minor actinides (MAs) in the fuel cycle were piloted; the first fuel elements with MNUP fuel and MAs were manufactured and supplied for irradiation.





## 5.2. BUSINESS DIVERSIFICATION

KEY NEW BUSINESS AREAS OF JSC ATOMENERGOPROM INCLUDE NUCLEAR MEDICINE, WIND POWER, COMPOSITE MATERIALS, ADDITIVE MANUFACTURING, ENERGY STORAGE SYSTEMS, AUTOMATED PROCESS CONTROL SYSTEMS AND DIGITAL PRODUCTS.



New businesses (those that cater primarily to markets outside the scope of the industry) are developed first and foremost in those segments where JSC Atomenergoprom has capabilities and technological know-how. This approach helps to mitigate market and technological risks.

Key new business areas include nuclear medicine, wind power, composite materials, additive manufacturing, energy storage systems, lasers, supercomputers, automated process control systems and electrical engineering, equipment for the oil and gas industry, water desalination and purification and wastewater treatment technologies, digital products<sup>28</sup>, etc. These 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. Industry-wide strategic programmes and product strategies developed and launched in the nuclear industry cover more than 60 areas in total.

### Key results in 2018:

■ Revenue from new products outside the scope of the nuclear industry totalled RUB 196.7 billion (RUB 170.9 billion in 2017), making up 19.1% of the total revenue.

■ The 10-year portfolio of orders for new products outside the scope of the nuclear industry reached RUB 1,082.6 billion (RUB 814.1 billion in 2017).

<sup>28</sup> For details, see the section 'Digital Transformation'.

### 5.2.1. RESULTS IN 2018

In the reporting year, revenue outside the scope of the nuclear industry totalled RUB 196.7 billion, almost meeting the target (RUB 197.9 billion) and exceeding the 2017 level by 15.1%. The 10-year order portfolio outside the scope of the nuclear industry reached RUB 1,082.6 billion, which is 23% above the target (RUB 880.0 billion) and 33% more than in 2017.



REVENUE FROM NEW PRODUCTS AND 10-YEAR PORTFOLIO OF ORDERS FOR NEW PRODUCTS (OUTSIDE THE SCOPE OF THE CORPORATION), RUB BILLION

	2016	2017	2018
Revenue from new products	147.4	170.9	196.7
10-year portfolio of orders for new products	692.8	814.1	1,082.6

### Nuclear medicine

JSC Atomenergoprom offers nuclear medicine technologies and services that enable timely diagnosis and effective treatment of certain types of cancer. The Company is developing new high-technology equipment and radiopharmaceuticals based on isotopes produced in-house. It supplies solutions for nuclear medicine centres comprising diagnostic and radiotherapy modules worldwide. JSC Rusatom Healthcare is the industry integrator for this business.

JSC Rusatom Healthcare is also developing the radiation processing business. A number of projects to create multipurpose processing centres have been launched in Brazil, Malaysia, the Philippines and other countries. For instance, in 2018, a framework agreement was signed on the construction of a network of processing centres using radiation technologies in the Philippines.

In 2018, a concession agreement was signed on the construction and operation of the radiology department building of the East Siberian Cancer Centre in Irkutsk. In 2019 and in the medium term, the Company plans to further develop and promote nuclear medicine centres and proton beam therapy centres in Russian regions.

In addition, in 2018, the following documents were signed as part of development of cooperation in various areas:

■ A cooperation agreement between JSC Rusatom Healthcare and LLC MedInvestGroup, which is the part of Pharmstandard Group. The agreement is aimed at combining the experience, knowledge, facilities and technical capabilities of both companies in the design, construction, equipment and operation of nuclear medicine facilities taking into account the best international practices, including the construction of facilities for the production of radiopharmaceuticals;

■ A memorandum of cooperation between JSC Rusatom Healthcare and the Federal State Budgetary Institution National Medical Research Radiological Centre of the Ministry of Health of Russia. Under the memorandum, the parties will join efforts to develop, implement and improve modern technologies for the manufacture of equipment, innovative radionuclide products and radiopharmaceuticals based on them for nuclear medicine and medical radiology;

■ A memorandum of cooperation on the Digital Healthcare in the Yaroslavl Region project between ROSATOM, PJSC Rostelecom and the Government of the Yaroslavl Region.

## Wind power

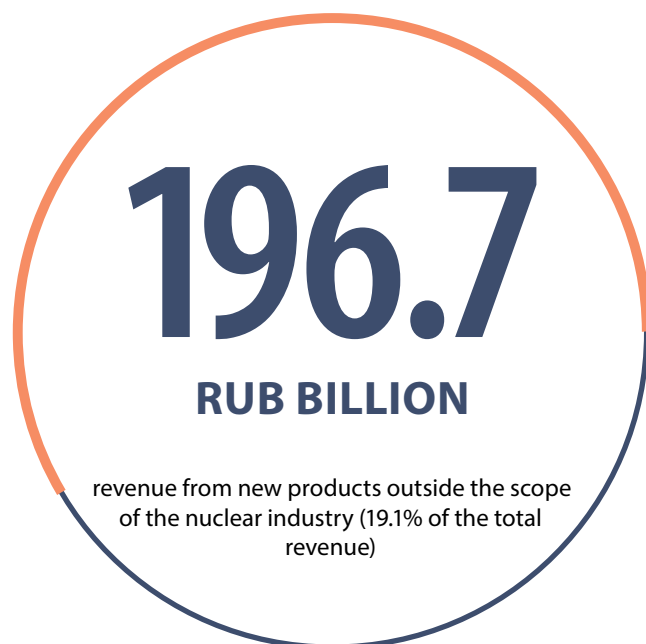
JSC Atomenergoprom is actively developing the Russian wind power market. JSC NovaWind, the holding company managing wind power projects, consolidates all of the Company's wind power assets and capabilities in the leading wind power segments and technological platforms.

In 2018, letters of intent on the implementation of investment projects for the construction of advanced wind power plants were signed with the Administration of the Krasnodar Territory, the Government of the Stavropol Territory and the Government of the Rostov Region.

In 2018, construction of a 150 MW pilot wind power plant in Adygea and a wind turbine and component factory in Volgograd was underway.

To promote wind power capabilities, JSC NovaWind and the Dutch company Lagerwey established a joint venture, Red Wind, which will be responsible for marketing and sales in Russia, turnkey supply of wind turbines and after-sales service.

After obtaining references for the construction of wind farms in Russia, the Company plans to expand into the international market.



As of December 31, 2018, rated capacity of JSC NovaWind's wind farms totalled 1 GW. This is sufficient to provide permanent power supply for 167,000 apartments. Over 20 years of operation, a wind farm of this size will help to save 92 million barrels of oil.

## Composite materials

JSC Atomenergoprom has launched the production of a wide range of carbon fibres and materials based on them. The materials match the best global analogues in terms of quality and price. JSC RPC Khimpromengineering (a brand of UMATEX Group) is the holding company managing enterprises that produce high-strength high-modulus carbon fibre and fabrics.

Composite materials are light in weight, while their strength, elasticity, chemical and corrosion resistance are several times higher than those of conventional materials. Composite materials are used in the aerospace, nuclear and automotive industries, construction, shipbuilding, bridge construction and manufacture of consumer goods.

ROSATOM produces polymer composite materials based on carbon fibre with carbon content ranging from 92% to 99.99%.

This business area is strategically important to the Company. Its key task is to create a complete production chain in Russia to ensure import substitution at all processing stages and for all types of materials. The Company has consolidated three of the four processing stages: the manufacture of carbon fibre, fabrics (including multiaxial fabrics) and pre-pregs. A project to start in-house production of PAN precursor (the fourth processing stage) is at the active stage: a PAN precursor plant is under construction in Elabuga. It is scheduled to be launched in 2020.

JSC Atomenergoprom has developed FibArm carbon tapes for the repair and reinforcement of concrete, reinforced concrete, stone, metal and wooden structures. Compared to traditional structural reinforcement methods, the use of carbon tapes can significantly reduce the cost and duration of work. It does not require special expensive equipment. In addition, when buildings and structures are reinforced with carbon tapes, their life increases to 50 years. In 2019, these materials will be used in the renovation of the Moscow Kremlin museum complex.

In 2018, the production of fabrics and pre-pregs was launched, and two industrial enterprises were acquired. Starting from 2019, the Company is ready to meet up to 90% of domestic demand for carbon composites.

In 2018, 60 sets of composite casings for wind turbines were delivered; they will be installed in the Corporation's wind farm that is currently under construction in the Republic of Adygea.

## Industrial waste processing

In 2018, the Company launched a new major project in the sphere of industrial waste processing. The decision was made given the Corporation's proven track record in radioactive waste management, as well as the availability of modern technologies, manufacturing infrastructure and management capabilities.

By 2024, at least seven large-scale facilities for the processing of the most hazardous industrial waste are to be created and provided with equipment in the Russian Federation. Four such facilities will be located on the premises of enterprises that were previously engaged in the disposal of chemical weapons. The implementation of the project will enable a significant improvement in environmental safety in Russia.

## 5.2.2. PLANS FOR 2019

In 2019, the Company plans to continue to take active steps to increase the revenue and expand the portfolio of orders across its new businesses.





# 6 DIGITAL TRANSFORMATION

>300

PEOPLE

took part in the development of the  
Uniform Digital Strategy



## 6.1. UNIFORM DIGITAL STRATEGY

ROSATOM IS ONE OF THE FIRST STATE-OWNED COMPANIES TO DEVELOP AND APPROVE A UNIFORM DIGITAL STRATEGY. JSC ATOMENERGOPROM'S DIGITAL STRATEGY IS BASED ON THE STRATEGY OF ROSATOM.



In 2018, ROSATOM was one of the first state-owned corporations and partially state-owned companies to develop and approve a Uniform Digital Strategy. JSC Atomenergoprom's digital strategy is based on the strategy of ROSATOM.

The strategy is based on an analysis of the current challenges facing the Russian nuclear industry and its readiness for digitization. It takes into account key technological trends, best practices in the sphere of digital transformation and analysis of the causes of success and failure in the transformation of industrial companies in Russia and abroad.

More than 300 people took part in the development of the strategy at all levels, from the central office of ROSATOM to its divisions and enterprises.

The planning horizon of the strategy extends until 2024, while the target state is described for the period until 2030.

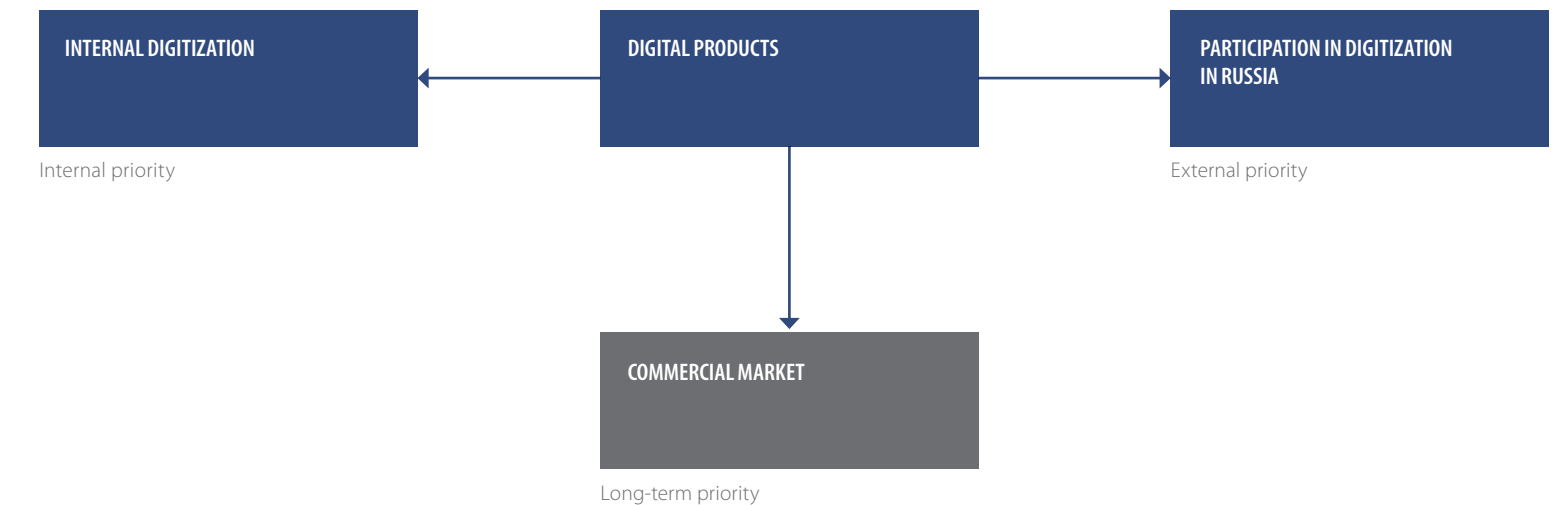
The Uniform Digital Strategy includes a Programme of Organizational Transformations as Part of Digital Transformation, as well as a Digital Competence and Digital Corporate Culture Development Programme.

### Participation in the development of Russia's digital economy

In 2018, a study of the technological landscape of end-to-end digital technologies was conducted in Russia. The National Index of Development of the Digital Economy of the Russian Federation was compiled and published.

ROSATOM is one of the co-founders of Autonomous Non-Profit Organization Digital Economy and actively participates in digital economy projects launched by a number of federal executive bodies.

THE CONCEPT OF THE UNIFORM DIGITAL STRATEGY IS BASED ON THREE CORE AND TWO SUPPORTING AREAS:



### Prerequisites for the implementation of the Strategy





## 6.2. DIGITAL PRODUCTS OF JSC ATOMENERGOPROM

The Uniform Digital Strategy gives priority to developing digital products and putting them on the market. Following an extensive review of existing digital developments in the industry, a portfolio of digital products was formed in 2018.

In 2018, the first replicable digital product in the Russian nuclear industry, Logos Aero-Hydro, came onto the market. It is a tool for 3D modelling of fluid and gas dynamics for the purposes of engineering analysis in high-technology industries. This is a high-performance product enabling highly accurate calculations; it is compatible with corporate software and easily adaptable to new engineering applications.

In 2018, the Industry 4.0 educational programme was launched for the executive succession pool of nuclear organizations.

The Digital Enterprise product is a comprehensive solution for the management of various aspects of operations of a large industrial enterprise and various stages of the life cycle of its products, including design, engineering, production, procurement, finance, document management, transport, etc. It meets the strictest information security requirements.

JSC Atomenergoprom also offers an integrated Multi-D solution (for details, see the section 'Engineering Division').

The Company is also successfully developing projects to create modern data centres. In particular, a project is underway to build a data centre near Kalinin NPP (for details, see the section 'Power Engineering Division'). The Company offers solutions in the form of mobile and containerized data centres. These are high-performance data centres that do not require a special building. They can be installed quickly and are easy to transport.

### Infrastructure projects

JSC Atomenergoprom implements infrastructure projects aimed at fostering social and economic development of towns and cities through the use of innovative digital solutions.

As part of the Smart City project, the Company is implementing systems for the automation and digitization of production and distribution processes. For instance, the Digital Water Supply and Sewerage System enables effective management of water supply and sewerage systems as part of municipal utilities infrastructure.

### SMART CITY: BASIC PLATFORM



A single integration platform comprising different functional modules and user groups

#### Purpose

Digitization of municipal services and processes in order to promote the development of towns and cities, create a safe, comfortable and smart environment, improve the efficiency of management and the quality of people's lives.

#### Users

Individuals, commercial, non-profit and state-funded organizations, municipalities.



**26** towns, cities and regions — potential customers of the product

**4** pilot applications

#### Pilot project: Sarov

- Over 30 functioning modules
- Continuous improvement of the platform's functionality
- Public and service layers
- Potential for scaling-up and commercialization

<https://smartsarov.ru>

The Smart Sarov project has been included in the UN-Habitat database of best practices

## 6.3. PLANS FOR 2019

### Internal digitization and digital products

- To launch several pilot projects in the field of digital twins, artificial intelligence and machine learning with the prospect of replication in the industry;
- To adopt the Logos Aero-Hydro product in the industry as part of the replacement of foreign software;
- To release Multi-D Docs&Resources, a Multi-D IMS 3.0 product;
- To launch the Logos-Thermo product on the market;
- To commission the second stage of the Data Centre at Kalinin NPP.

Benefits from the introduction of the Smart City platform in Sarov include, for instance:

- A reduction of the time required to repair potholes from 19 to 10 days;
- An increase in the accuracy of forecasts of the time of arrival of public transport from 62% to 87%;
- A sixfold increase in the performance of dispatchers and timekeepers;
- An 11-fold increase in the speed of response to lift breakdowns.

In the reporting year, agreements were reached on the introduction of the Smart City in Snezhinsk, Ozersk, Zheleznogorsk, Zelenogorsk, Lesnoy, Novouralsk, Sosnovy Bor, Glazov and Zarechny.



### Participation in the development of Russia's digital economy

- To develop road maps for end-to-end technologies;
- To participate in the development of an ecosystem of end-to-end digital technologies (EDTs) based primarily on domestic inventions, including:
  - Participation in the selection of leading research centres and technology leaders among digital economy companies;
  - Comprehensive cooperation with the IT market, federal executive bodies and development institutes to create, develop and implement solutions based on EDTs.



# 7 GOVERNANCE SYSTEM

90%

performance against the targets of the investment programme

АЭМ-ТЕХНОЛОГИИ



# 7.1. CORPORATE GOVERNANCE

JSC ATOMENERGOPROM'S MAIN GOAL WITH REGARD TO ORGANIZATIONS IN THE NUCLEAR INDUSTRY IS TO IMPROVE THEIR PERFORMANCE.



## 7.1.1. OBJECTIVES, PRINCIPLES AND MECHANISMS OF CORPORATE GOVERNANCE

JSC Atomenergoprom exercises its shareholder powers with regard to organizations in the nuclear industry in accordance with the applicable Russian corporate legislation. Since it holds 100% of JSC Atomenergoprom's voting shares, ROSATOM influences all of the

shareholder's decisions. Thus, JSC Atomenergoprom's main goal with regard to organizations in the nuclear industry is to improve their performance in order to help to achieve the strategic objectives of ROSATOM.

### Principles and mechanisms of corporate governance:

- Standardization of governance in the organizations in the Russian nuclear power sector, organizations of various legal forms specializing in nuclear and radiation safety, nuclear science and technology and personnel training, with due regard to the special characteristics of each enterprise and organization;
- Removal of non-operating and inactive companies from the nuclear industry and elimination of redundant corporate ownership levels;

■ Transfer of a number of optional issues to the level of cooperation between corporate governance bodies of organizations in the industry 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 having core business divisions (Mining, Fuel, Mechanical Engineering, Power Engineering, Engineering, etc.) and a number of business incubators and industrial complexes.

## 7.1.2. GOVERNING BODIES

### Board of Directors of JSC Atomenergoprom

**Members of JSC Atomenergoprom's Board of Directors during the period from January 1, 2018 through June 29, 2018 (elected on June 30, 2017):**

1. Kirill Komarov
2. Ekaterina Lyakhova, Chair of the Board of Directors
3. Andrey Popov
4. Ilya Rebrov
5. Vladislav Korogodin

**Members of JSC Atomenergoprom's Board of Directors during the period from June 30, 2018 through December 31, 2018 (elected on June 29, 2018):**

1. Kirill Komarov
2. Ekaterina Lyakhova, Chair of the Board of Directors
3. Anna Miroshnichenko
4. Ilya Rebrov
5. Vladislav Korogodin

### Information on members of the Board of Directors

#### Kirill Komarov

Year of birth: 1973.

Place of birth: Leningrad.

Education: university degree.

#### Positions held over the last five years:

2010 – present — Executive Director of the Directorate for the Nuclear Power Complex, ROSATOM; Deputy Director General, Director for Corporate Development and International Business; First Deputy Director General, Director for Corporate Development and International Business, ROSATOM. He simultaneously holds the position of Director of JSC Atomenergoprom.

He does not own the Company's shares.

#### Ekaterina Lyakhova

Year of birth: 1975.

Place of birth: Sverdlovsk.

Education: university degree.

#### Positions held over the last five years:

2010–2011 — Vice President of JSC TVEL.

2011 – present — Deputy Director of JSC Atomenergoprom, Director for Investment Management and Operational Efficiency, Director for Economics and Investments, ROSATOM.

She does not own the Company's shares.

### Andrey Popov

Year of birth: 1971.

Place of birth: Leningrad.

Education: university degree.

#### Positions held over the last five years:

2009 – present — Director of the Department for Legal Issues and Corporate Governance, Director for Legal Issues, Corporate Governance and Property Management; Director of the Department for Legal Issues and Corporate Governance, ROSATOM.

He does not own the Company's shares.

### Vladislav Korogodin

Year of birth: 1969.

Place of birth: Moscow.

Education: university degree.

#### Positions held over the last five years:

2010 – present — Deputy Director of the Directorate for the Nuclear Power Complex, Director for NFC and NPP Life Cycle Management, ROSATOM.

He does not own the Company's shares.

### Director of JSC Atomenergoprom

Kirill Komarov was appointed as Director of JSC Atomenergoprom as from April 14, 2015 (Minutes of the Meeting of JSC Atomenergoprom's Board of Directors No. 272 dated March 26, 2015).

## 7.1.3. REPORT OF THE BOARD OF DIRECTORS

In 2018, the Board of Directors held 54 meetings by absentee voting. During the Board meetings, decisions were made on key aspects of JSC Atomenergoprom's business, including the following:

- A meeting of the Board of Directors was held prior to the Annual General Meeting of Shareholders of JSC Atomenergoprom;
- Additional issuance of book-entry registered ordinary shares and book-entry registered preferred shares of JSC Atomenergoprom was completed;
- A number of decisions were taken to improve the structure of JSC Atomenergoprom's group of companies.

<sup>29</sup> The additional share issues were registered on February 11, 2019.

### Ilya Rebrov

Year of birth: 1976.

Place of birth: Leningrad.

Education: university degree.

#### Positions held over the last five years:

2010 – present — Director of the Economics and Financial Controlling Department, Economics and Finance Director, Finance Director, ROSATOM.

He does not own the Company's shares.

### Anna Miroshnichenko

Year of birth: 1978.

Place of birth: Murmansk.

Education: university degree.

#### Positions held over the last five years:

2010 – present — leading specialist, adviser in the Division of Corporate Engagement with Joint-Stock Companies, Federal State Unitary Enterprises and Federal Government Agencies, Department for Legal Issues and Corporate Governance; 2014 – present — Corporate Secretary of JSC Atomenergoprom.

She does not own the Company's shares.

## 7.1.4. RESOLUTIONS OF THE SOLE SHAREHOLDER

Five resolutions of the sole shareholder were passed in 2018:

- Profit distribution for 2017, including the decision to declare and pay dividends for 2017;
- Election of the Board of Directors;
- Declaration and payment of dividends for the six months of 2018 and for the nine months of 2018;
- An increase in the authorized share capital of JSC Atomenergoprom through the placement of additional book-entry registered ordinary and preferred shares<sup>29</sup>;
- Amendments to the Charter of JSC Atomenergoprom.

## 7.1.5. 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, in January and February 2018, dividends for the nine months of 2017 were paid on book-entry registered ordinary shares held by ROSATOM and book-entry registered preferred shares held by the Russian Ministry of Finance representing the Russian Federation; the dividends totalled RUB 5,500 million and RUB 323 million respectively.

Under the resolution of ROSATOM as the holder of 100% of voting shares in JSC Atomenergoprom, in June 2018, dividends for 2017 were declared and paid within the prescribed time frame; the dividends totalled RUB 7,094 million, including RUB 6,700 million on ordinary shares and RUB 394 million on preferred shares.

Under the resolution of ROSATOM as the holder of 100% of voting shares in JSC Atomenergoprom, in the third quarter of 2018, interim dividends for the first half of 2018 were declared and paid within the prescribed time frame; the dividends totalled RUB 1,588 million, including RUB 1,500 million on ordinary shares and RUB 88 million on preferred shares.

Under the resolution of ROSATOM as the holder of 100% of voting shares in JSC Atomenergoprom, in the fourth quarter of 2018, interim dividends for the nine months of 2018 were declared and paid within the prescribed time frame; the dividends totalled RUB 6,882 million, including RUB 6,500 million on ordinary shares and RUB 382 million on preferred shares.

## 7.1.6. MAJOR TRANSACTIONS AND NON-ARM'S LENGTH TRANSACTIONS

### Major transactions

In 2018, JSC Atomenergoprom did not conclude any transactions recognized as major transactions under the Russian legislation and subject to approval by the Company's authorized governing body.

### Non-arm's length 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.

## 7.1.7. KEY CHANGES IN THE CORPORATE STRUCTURE IN 2018

In order to consolidate the results of R&D conducted as part of the Proryv project as intangible assets and commercialize them, JSC Atomenergoprom established a wholly-owned subsidiary JSC Proryv.

In order to set up a business specializing in industrial and consumer waste management, JSC Atomenergoprom established a wholly-owned subsidiary LLC Rusatom Greenway.

In order to ensure compliance with legislative requirements for mandatory corporatization of private pension funds that are non-profit organizations and to continue the implementation of a corporate social programme aimed at providing a private pension plan for employees in the nuclear industry, the Atomgarant Private Pension Fund was transformed into a joint-stock company.

JSC Atomenergoprom established a wholly owned subsidiary LLC Rusatom Infrastructure Solutions and its subsidiaries LLC RIR-Sarov and LLC RIR-Lesnoy in order to create a corporate structure for the following new business areas: Centralization and Development of Resource Distribution Systems (Concession), Clean Water and the Smart City.

In order to enable joint implementation of a project to build 610 MW wind power plants in Russia, a special-purpose entity acquired a stake in the authorized share capital of JSC VetroOGK as a result of issuance of additional shares of JSC VetroOGK (with organizations of ROSATOM remaining the holders of the controlling interest).

In order to launch the production of fabrics and pre-pregs, JSC Khimpromengineering completed the acquisition of a 100% shareholding previously held by JSC RUSNANO and JSC Composite Holding Company in JSC Prepreg-ACM, which produces fabrics and pre-pregs from carbon fibre.

LLC RIR-Lesnoy, the administration of the Lesnoy municipality and the Sverdlovsk Region concluded a concession agreement with regard to centralized water supply and sewerage systems owned by the Lesnoy municipality.

JSC Atomenergoprom completed the issuance of additional shares, which also involved securing funding from the National Wealth Fund to finance the construction of Hanhikivi NPP (Finland).



### 7.1.8. JSC ATOMENERGOPROM'S COMPLIANCE WITH THE PRINCIPLES AND RECOMMENDATIONS OF THE CORPORATE GOVERNANCE CODE RECOMMENDED BY THE CENTRAL 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 special characteristics of the business and the legal status of JSC Atomenergoprom and its organizations (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).

### 7.1.9. KEY PROVISIONS OF JSC ATOMENERGOPROM'S POLICY ON REMUNERATION AND/OR REIMBURSEMENT OF EXPENSES; INFORMATION ON REMUNERATION AND/OR REIMBURSEMENT OF EXPENSES

No decisions were taken in 2018 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 Standardized Industry-Wide Remuneration System instituted by ROSATOM. Remuneration, including salary, is paid to Board members who are full-time employees in accordance with employment contracts and applicable local regulations of the Company/ROSATOM on remuneration<sup>30</sup>.

<sup>30</sup> Details on income, expenses, assets and liabilities of JSC Atomenergoprom's Board members who are the Company's full-time employees are available on the website at: <http://www.rosatom.ru/about/protivodeystvie-korrupsii/svedeniya-o-doxodax-rabotnicov>.

## 7.2. RISK MANAGEMENT

THE INDUSTRY-WIDE RISK MANAGEMENT SYSTEM IS BASED ON A CONTINUOUS CYCLICAL PROCESS OF IDENTIFYING, ASSESSING AND MANAGING THE RISKS THAT CAN AFFECT THE COMPANY'S PERFORMANCE AND THE IMPLEMENTATION OF ITS STRATEGY.



### 7.2.1. RISK MANAGEMENT SYSTEM

The industry-wide risk management system (RMS) is based on a continuous cyclical process of identifying, assessing and managing the risks that can affect the Company's short- and long-term performance and the implementation of its strategy.

In 2018:

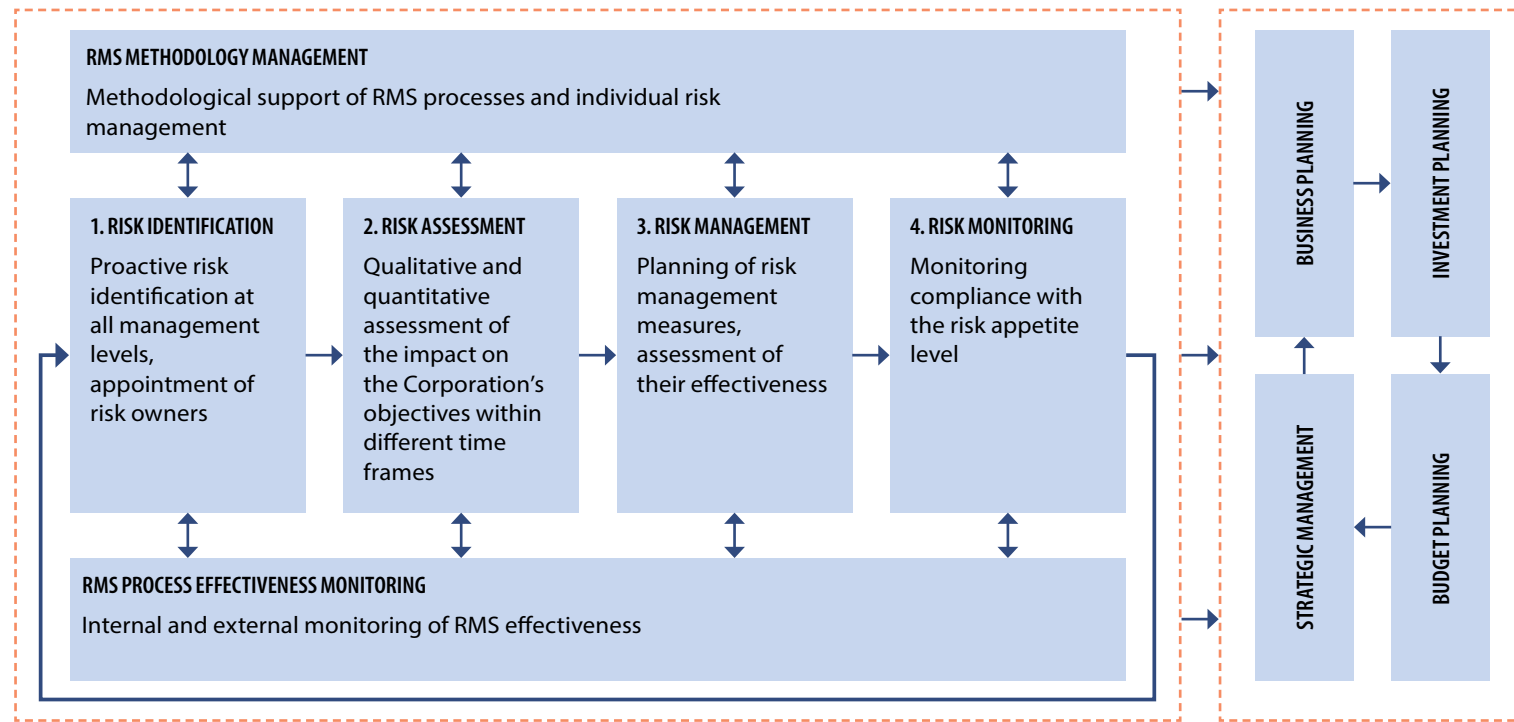
- A long-term Risk Management Development Programme was approved for the period from 2019 through 2024; it includes alignment with business processes and the development of a risk management culture;
- Regulations were adopted establishing the procedures for investment project risk management, risk assessment of projects forming part of the state programme 'Development of the Nuclear Power and Industry Complex' and quantitative risk assessment of NPP construction projects;

- A quantitative risk assessment was carried out for NPP construction projects (in accordance with the requirements of the Total Cost Management Framework developed by the Association for the Advancement of Cost Engineering (AACE))<sup>31</sup>;

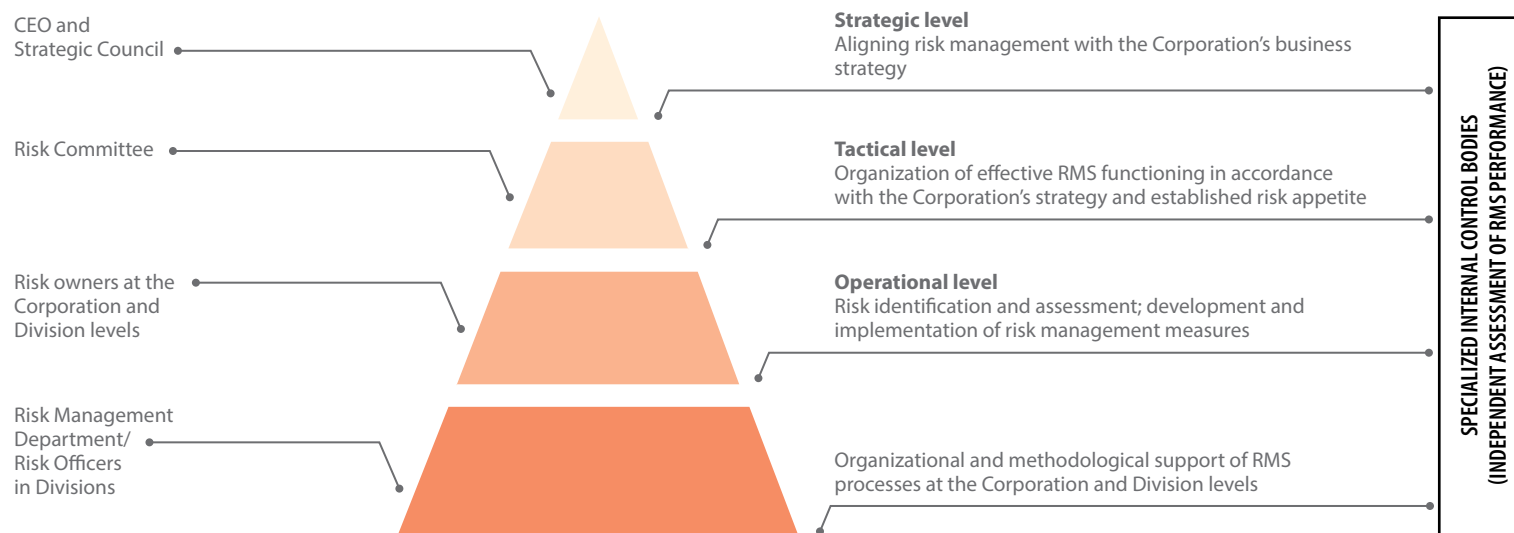
- The list of key risks was updated, and a matrix of responsibility for the management of key risks was developed;
- Databases were prepared on all NPP construction projects completed in Russia and abroad and on systemic risk factors;
- Statistical analysis of the impact of risks on the cost and duration of ongoing and completed global and Russian NPP construction projects was performed.

<sup>31</sup> An assessment using the Monte Carlo method was carried out for Hanhikivi NPP (Finland) and Akkuyu NPP (Turkey). A parametric assessment was carried out for Kudankulam NPP (India, power units No. 3–6), El Dabaa NPP (Egypt), Akkuyu NPP (Turkey), Rooppur NPP (Bangladesh), Paks NPP (Hungary) and Kursk NPP-2.

RMS PROCESSES



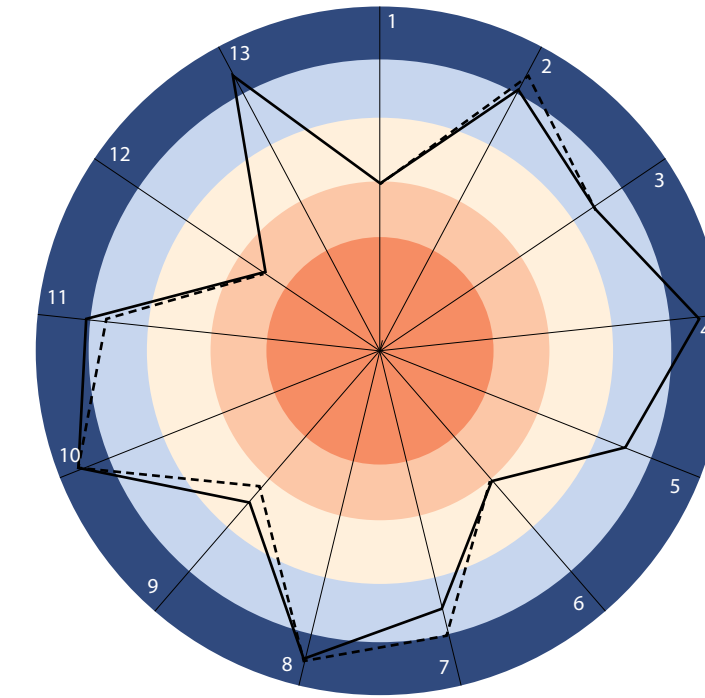
ORGANIZATIONAL MODEL OF THE RISK MANAGEMENT SYSTEM



7.2.2. KEY BUSINESS RISKS<sup>32</sup>

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

RISK RADAR



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. Industrial and environmental safety risk
9. Political risk
10. Risk of loss of and damage to assets
11. Reputational risk
12. Technical (project) risk
13. Climate risk

— 2018 risk assessment    - - - 2019 risk assessment

Comprehensive risk management measures largely offset the negative impact of external factors on the implementation of JSC Atomenergoprom's strategy (the connection between critical risks and the Company's strategic goals is shown in section 7.2.3).

<sup>32</sup> 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.











## 7.2.3. RISK MANAGEMENT OUTCOMES IN 2018







### Change in estimated risk levels for 2019:



↑ increase    ↓ decrease    ■ no significant changes



### Strategic goals of the Company:

- 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



Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<b>1. Currency risk</b>  (Heads of Divisions)	Adverse changes in exchange rates	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>Maintaining a balance of claims and liabilities denominated in foreign currencies (natural hedging);</li> <li>Use of financial hedging instruments.</li> </ul> <b>Results:</b> An optimal ratio of assets and liabilities denominated in the same currency was maintained.	  
<b>2. Interest rate risk</b>  (ROSATOM's Treasury Department)	Adverse changes in interest rates, different timing of interest income and interest expenses	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>Maintaining a balance of interest income and interest expenses in terms of timing and amounts;</li> <li>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. It has not raised any loans with interest rates linked to the refinancing rate/key rate of the Bank of Russia;</li> <li>Floating-rate loans on which interest rates may be increased are refinanced using the intra-group liquidity pool.</li> </ul> <b>Results:</b> The Company maintains a stable long-term credit portfolio. The average interest rate on the total debt portfolio was reduced to below 5.9%, partly due to the refinancing of both the rouble-denominated and foreign-currency-denominated portions of the credit portfolio, as well as the refinancing of the rouble-denominated portion of the credit portfolio in 2018.	  
<b>Changes:</b> The reduction in the risk level was the result of effective use of the risk management approaches described above and a decrease in volatility of the Russian credit market. <i>For details, see the section 'Financial Management'.</i>			

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<b>3. Credit risk</b>  (ROSATOM's Treasury Department for banks; heads of the Company's organizations for other counterparties)	Failure by counterparties to fulfil their obligations in full and on time	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>Setting and monitoring of limits for counterparty banks;</li> <li>Use of suretyship, guarantees, restrictions on advance payments in favour of external counterparties;</li> <li>Improvement of the legal framework for the wholesale electricity and capacity market (including an increase in fines and improvement of the system of financial guarantees);</li> <li>Monitoring of accounts receivable and the financial position of counterparties;</li> <li>Internal counterparty solvency rating system.</li> </ul> <b>Results:</b> There were no significant losses through the fault of counterparties.	 
<b>4. Liquidity risk</b>  (ROSATOM's Treasury Department / Heads of Divisions)	Lack of funds for the fulfilment of obligations by the Company and its organizations	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>Centralized cash management (cash pooling);</li> <li>Rolling liquidity forecasts and cash flow budget;</li> <li>Maintaining required amounts of open lines of credit with banks;</li> <li>Reducing the period of keeping free cash on bank deposits when this is advisable from an economic perspective;</li> <li>Discussion of matters related to state support with Russian federal executive authorities;</li> <li>Wider use of project financing instruments as part of implementation of projects and programmes by the Company and its organizations;</li> <li>Maintaining credit ratings assigned to JSC Atomenergoprom by the 'Big Three' international rating agencies (S&amp;P, Moody's and Fitch) and by JSC Expert RA at the level of Russia's sovereign credit rating.</li> </ul> <b>Results:</b> The Company maintained sufficient liquidity to repay liabilities on time, preventing unacceptable losses and reputational risk. <i>For details, see the section 'Financial Management'.</i>	 

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<b>5. Nuclear fuel cycle (NFC) product and service market risk</b>  (Heads of the relevant Divisions)	Adverse change in the pricing environment and demand on markets for natural uranium and uranium conversion and enrichment services	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>■ Maintaining an optimal balance between market-focused and escalation pricing mechanisms (benchmark price inflation) in contracts;</li> <li>■ Aligning pricing mechanisms used for procurement and those used in contracts with a high level of commodity risk;</li> <li>■ Discussing the volume of future orders with customers in advance;</li> <li>■ Embedding quantitative flexibility and options in contracts with suppliers to align purchase and sales volumes;</li> <li>■ Providing supply guarantee mechanisms;</li> <li>■ Improving the technical and economic characteristics of nuclear fuel; developing new types of fuel;</li> <li>■ Promoting products in new market segments.</li> </ul> <b>Results:</b> The risk level remains unchanged, as the fact that natural uranium prices and separative work unit prices are currently low limits their further reduction and at the same time creates growth opportunities if the market environment is favourable.  <i>For details, see the section 'International Business' and the annual reports of JSC TENEX and JSC TVEL for 2018.</i>	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; background-color: #4a7ebb; color: white; display: flex; align-items: center; justify-content: center;">1</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; background-color: #4a7ebb; color: white; display: flex; align-items: center; justify-content: center;">2</div>
<b>6. Electricity and capacity market risks</b>  (Director General of JSC Rosenergoatom Concern)	Adverse changes in electricity and capacity prices	<b>Management approaches:</b> 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 Concern are negotiating with PJSC FGC UES and JSC SO UEC in order to align the schedule of power grid equipment maintenance.  <b>Results:</b> In 2018 (like in previous periods), key drivers included electricity consumption in the first pricing zone, indexation of gas prices (with gas being the main type of fuel used by thermal power plants in the first pricing zone) and competition between power generation companies. There were no significant changes in the impact of these factors on electricity and capacity prices in 2018 compared to 2017.  <i>For details, see the annual report of JSC Rosenergoatom Concern for 2018.</i>	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; background-color: #4a7ebb; color: white; display: flex; align-items: center; justify-content: center;">1</div>

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<b>7. Risk of a decrease in power generation</b>  (Director General of JSC Rosenergoatom Concern)	Decrease in power generation due to equipment shutdowns and unavailability	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>■ Scheduled preventive maintenance and repairs at NPPs;</li> <li>■ Implementation of the NPP life extension programme and equipment upgrades to increase installed capacity and power generation at operating power units of NPPs (including the possibility of power units operating at above nameplate capacity).</li> </ul> <b>Results:</b> 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.  <b>Changes:</b> The risk level has decreased. Implementation of a set of risk management measures and the use of tools forming part of ROSATOM's Production System made it possible to offset the impact of negative factors in 2018.  <i>For details, see the annual report of JSC Rosenergoatom Concern for 2018.</i>	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; background-color: #4a7ebb; color: white; display: flex; align-items: center; justify-content: center;">1</div>
<b>8. Industrial and environmental safety risk</b>  (Heads of Divisions)	Major accidents/incidents at nuclear enterprises	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>■ Provision of an up-to-date legal framework;</li> <li>■ Engineering measures to ensure the safety of nuclear facilities;</li> <li>■ Maintaining a high level of professionalism and safety culture among employees.</li> </ul> <b>Results:</b> Safe operation of nuclear facilities and hazardous industrial facilities.  <i>For details, see the section 'Nuclear and Radiation Safety; Occupational Safety and Health'.</i>	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; background-color: #4a7ebb; color: white; display: flex; align-items: center; justify-content: center;">1</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; background-color: #4a7ebb; color: white; display: flex; align-items: center; justify-content: center;">3</div>



Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<b>9. Political risk</b>  (International Cooperation Department of ROSATOM)	Changes in the regulatory and political climate in foreign countries imposing restrictions on the operations of the Company and its organizations	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>■ Support for global operations of nuclear organizations;</li> <li>■ Using the platform of specialized international organizations;</li> <li>■ Awareness-raising activities conducted worldwide.</li> </ul> <b>Results:</b> As of December 31, 2018, the 10-year portfolio of overseas orders totalled USD 133.2 billion, while overseas revenue increased to USD 6.5 billion. The revenue growth was driven primarily by the overseas NPP construction project portfolio. 8 intergovernmental agreements and 20 major interdepartmental agreements were concluded, which is a positive trend. <b>Changes:</b> The risk tends to increase, as persisting sanctions pressure on Russian individuals and legal entities generally increases uncertainty over the possibility of implementation of specific economic projects. <i>For details, see the sections 'International Cooperation' and 'International Business'.</i>	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">1</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">2</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">3</div>
<b>10. Risk of loss of and damage to assets</b>  (Asset Protection Department of ROSATOM)	Corruption and other offences leading to a damage to/loss of assets	<b>Management approaches:</b> An integrated industry-wide system for the prevention of corruption and other offences is in place in the Russian nuclear industry. <b>Results:</b> Steps have been taken to develop the legal and organizational framework for the prevention of corruption in the Company and its organizations and to ensure compliance with laws and managerial decisions on the prevention of corruption. Anti-corruption measures stipulated by new federal laws passed in 2018 were duly implemented; this involved improving and updating corporate anti-corruption regulations. Systematic measures have been taken to prevent and resolve conflicts of interest.	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">1</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">2</div>

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<b>11. Reputational risk</b>  (Communications Department of ROSATOM and Heads of Divisions)	Changes in stakeholder perception of the trustworthiness and appeal of the Company and its organizations	<b>Management approaches:</b> <ul style="list-style-type: none"> <li>■ Measures are taken to shape a positive public opinion on the development of JSC Atomenergoprom's technologies (both nuclear and non-nuclear) through improved information transparency and open stakeholder engagement (including the functioning of an industry-wide public reporting system);</li> <li>■ 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);</li> <li>■ The Company continuously monitors public opinion on NPP construction and information on the decisions of government and regulatory bodies on curtailment of the nuclear industry in the countries where the Company is implementing projects. It continuously monitors and analyses news reports in the national and international media and information obtained during business meetings, industry conferences and workshops. Measures have been taken to ensure that industry executives are immediately informed about key developments in the media space in Russia and abroad;</li> <li>■ If it is reasonable to make changes to the schedule of NPP construction projects in Russia and abroad, the relevant decisions are agreed with all parties involved in the projects and are reflected transparently in communications with partners and other stakeholders (including the general public and local communities).</li> </ul> <b>Results:</b> According to an opinion poll by Levada-Centre, in early 2019, 74.5% of the Russian population supported the use of nuclear power (73.9% in 2018). Over the past few years, this figure remains persistently high. According to data in the Medialogia automated media monitoring and analysis system, in 2018, 95.7% of publications about the Russian nuclear industry were positive or neutral. Projects implemented abroad are supported by government bodies. The main Russian nuclear industry exhibition, ATOMEXPO 2018, titled 'Global Partnership — Joint Success' was attended by over 4,000 specialists and experts from 68 countries worldwide. The Company received a number of prizes and awards in the sphere of personnel management. In March 2019, ROSATOM topped the Ranking of the Best Russian Employers compiled by HeadHunter. A high level of transparency and social responsibility is confirmed by the fact that ROSATOM was included in the top groups in sustainable development, corporate responsibility and reporting indices compiled by the Russian Union of Industrialists and Entrepreneurs (RSPP) for 2018 and ranked second in the Best Annual Report (Non-Financial Sector) category of the Annual Report Contest for 2018 held by Expert RA. <b>Changes:</b> An increase in the risk level was due to its strong correlation with political risk. <i>For details, see the sections 'Stakeholder Engagement' and 'Personnel Management'.</i>	<div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">1</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 2px; display: inline-block;">3</div>

Risks and changes in risk levels (risk owners)	Risk description	Risk management practices	Connection with strategic goals
<p><b>12. Project risk</b></p> <p>■</p> <p>(Heads of Divisions)</p>	<p>Changes in the macroeconomic indicators of countries participating in the projects; contractors' failure to fulfil their commitments with regard to the schedule and quality of work to be performed</p>	<p><b>Management approaches:</b></p> <ul style="list-style-type: none"> <li>■ Improvement of project management practices;</li> <li>■ Development of action plans for the interaction with foreign customers;</li> <li>■ Conclusion of long-term contracts with fixed electricity prices;</li> <li>■ Development of standardized design solutions;</li> <li>■ Implementation of a programme to reduce the cost and duration of NPP construction;</li> <li>■ Implementation of a set of measures forming part of the industry-wide approach to managing risks associated with NPP construction projects;</li> <li>■ Reallocation of available credit resources between projects, when possible.</li> </ul> <p><b>Results:</b> 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).</p> <p><i>For details, see the reports of the Engineering Division and JSC Rosenergoatom Concern for 2018.</i></p>	<p>1</p> <p>3</p>
<p><b>13. Climate risk</b></p> <p>■</p> <p>(Heads of Divisions)</p>	<p>Adverse climate change / impacts of natural disasters on the operations of the Company and its organizations</p>	<p><b>Management approaches:</b></p> <p>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.</p> <p>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.</p> <p><b>Results:</b> 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.</p> <p>The Company makes sure that all its operations are environmentally safe; nuclear power generation facilities produce virtually no CO or CO<sub>2</sub> emissions, helping to maintain the natural ecological balance and reduce the likelihood of adverse climate changes or natural disasters.</p>	<p>1</p>

### 7.2.4. RISK INSURANCE

Risk insurance is one of the main risk management approaches used by JSC Atomenergoprom. To improve the reliability of insurance coverage, in 2018, the Company continued to cooperate with the insurance community on the reinsurance of Russian operators against property risks in the international pooling system. A significant share of liability of Russian NPPs for potential nuclear damage was transferred for reinsurance to the international pooling system. This proves that the international nuclear insurance community acknowledges the safety and reliability of Russian NPPs to be adequate. In-house insurance audits were conducted with assistance from experts of the Russian Nuclear Insurance Pool.

Key enterprises in the industry will continue to be audited for insurance purposes in 2019.

### 7.2.5. OBJECTIVES FOR 2019 AND FOR THE MEDIUM TERM

Plans for the development of the industry-wide RMS in 2019 have been aligned with the key areas of the Risk Management Development Programme approved for the period from 2019 through 2024 and take 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).





## 7.3. FINANCIAL MANAGEMENT

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



### Implementation of ROSATOM's financial strategy

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

#### Key results in 2018:

- A total of about RUB 1.7 billion was saved through intra-group financing.
- Russian and international rating agencies rated JSC Atomenergoprom at the level of Russia's sovereign credit ratings.

Key financial transactions of the Company have been centralized. Cash flow management is centralized through:

- An established 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 the Treasury Department. The established treasury structure enables 100% control of funds in the industry;
- Concentration of principal treasury functions of nuclear organizations in the Treasury Department, which communicates with nuclear organizations 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 scope of consolidation of ROSATOM on a daily basis.

In 2018, the Company initiated further centralization 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.

Targets for 2018 in the sphere of cooperation with banks, development of the cash pool and debt management set out in the financial strategy have been achieved. In order to improve the performance of the treasury functions, in 2018, the Company continued to work towards:

- Accumulating spare cash in the accounts of pool leaders<sup>33</sup>;
- Improving the accuracy of payment scheduling (a rolling liquidity forecast);
- Ensuring competitiveness of the cost of servicing of the consolidated debt portfolio;
- Centralizing treasury transactions (complying with the financial policy);
- Using project financing instruments as part of project implementation by the Company and its organizations.

A total of about RUB 33.4 billion was saved through intra-group financing within the industry between 2010 and 2018 (including RUB 1.7 billion in 2018).

<sup>33</sup> A pool leader is an organization on whose accounts spare cash is accumulated and subsequently redistributed between organizations in the industry through loan agreements. A pool leader is appointed under the resolution of ROSATOM's executive bodies.

### Debt portfolio management

In 2018, the average interest rate on the total debt portfolio denominated in Russian roubles was maintained below 8.5%. Throughout the reporting year, the Company maintained sufficient liquidity or sources of liquidity (credit facilities, etc.) to repay liabilities on time, preventing unacceptable losses and reputational risk.

The Company continued to use suretyship as security for obligations of organizations in the industry to their counterparties. This measure helps to reduce both the cost of bank guarantees and the cost of financing (including interest expenses).

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



## Receiving and maintaining credit ratings

As of December 31, 2018, Russian and international rating agencies rated JSC Atomenergoprom at the level of Russia's sovereign credit ratings:

- BBB-/A-3 with a stable outlook by S&P;
- BBB- with a positive outlook by Fitch Ratings;
- Ba1 with a positive outlook by Moody's Investors Service;
- ruAAA with a stable outlook by JSC Expert RA.



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

In 2018, the Company continued to roll out project financing approaches across its new businesses. It developed approaches to financing concession projects in the utilities sector and in the sphere of nuclear medicine; in addition, the Company engaged a financial partner to participate in a pilot concession project in the utilities sector in the town of Lesnoy (Sverdlovsk Region). Projects to be implemented in Glazov, Sosnovy Bor and other single-industry towns across Russia are currently under development.

The Company continued to search for partner banks to participate in the project to build and operate the radiology department building of the East Siberian Cancer Centre in Irkutsk, as well as in nuclear medicine projects in other Russian cities.

In addition, in the reporting year, the Company held a number of public events in order to make the Russian nuclear industry more attractive to investors and engage strategic investors in NPP construction projects in Russia and abroad.

### Plans for 2019 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 organizations;
- To continue to centralize 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 current lenders and rating agencies;
- To discuss project financing arrangements to reduce recourse on ROSATOM and minimize the use of consolidated investment resources (including the use of project financing instruments);
- To expand the range of financing instruments used by the Company (provided it is economically feasible to do so) in order to reduce the cost of debt service and ensure timely and full financing of the investment programme of organizations in the industry on acceptable terms;
- To discuss potential areas of cooperation in the sphere of digitization with banks.

# 7.4. INVESTMENT MANAGEMENT

TO TAKE INTO ACCOUNT THE INTERESTS OF ALL VALUE CHAIN PARTICIPANTS, A LARGE NUMBER OF PEOPLE GROUPED INTO COLLECTIVE OR ADVISORY BODIES ARE ENGAGED IN INVESTMENT DECISION-MAKING.



## 7.4.1. KEY APPROACHES TO INVESTMENT MANAGEMENT

To take into account the interests of all value chain participants, a large number of decision-makers and experts grouped into collective or advisory bodies are engaged in investment management. The final decision-making authority (top management or division level) is determined by the strategic importance of a project. Decisions on key milestones of projects vital for the Company are made and the projects are monitored at the top level.

An independent verification procedure (in relation to the project initiator) has been established to improve the efficiency of investment decisions.

### Key results in 2018:

- The investment programme was 90% completed.
- Return on the investment portfolio stood at 10.5%.

A project portfolio made up of projects of all the organizations within the industry is built for a year and for the medium term based on available investment resources. The resources are calculated based on the financial stability requirements for the Holding Company and the required rate of return on investment.

Progress on projects in the organizations in the industry is monitored on a quarterly basis.



A phase-gate approach is applied to project implementation.

A comprehensive audit is conducted, which helps formulate recommendations on how to improve planning and implementation of investment projects.

Measures to raise external financing, including project financing, are being developed.

### 7.4.2. RESULTS IN 2018

In 2018, the investment programme in the Russian nuclear industry was 90% completed. Return on the investment portfolio as a whole stood at 10.5%, while return on the investment portfolio excluding unprofitable projects (projects that do not produce economic benefits) reached 21.4%. The investment programme was not implemented in full (including in ROSATOM's divisions) due to the deferral of expenditure on certain projects to subsequent reporting periods. In turn, the deferrals were necessitated by the need to revise project implementation plans in some cases given a change in the external environment in order to use the funds more efficiently.

At the same time, for the first time in the last few years, the investment programme for NPP construction in Russia (the investment programme of the Power Engineering Division) was implemented in full.

### Operations of the industry venture fund

In 2018, JSC Atomenergoprom and LLC Orbita Capital Partners founded an industry venture fund, Digital Evolution Ventures.

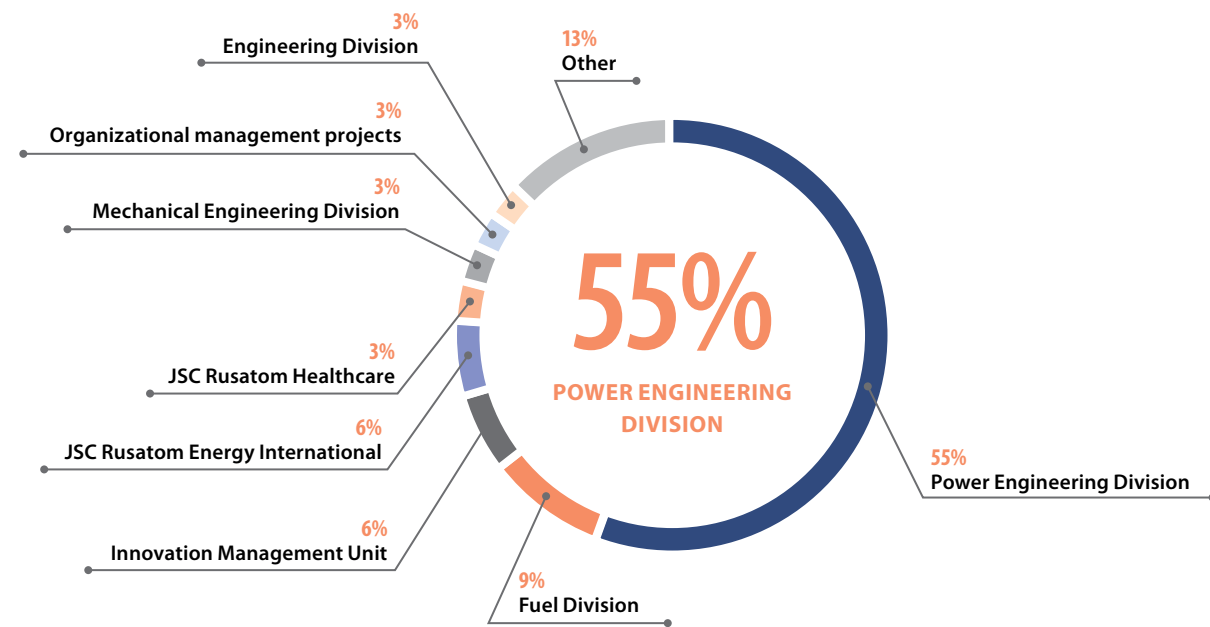
The fund will focus on developing new businesses in promising sectors of the Russian and global economy. Key investment areas will include artificial intelligence and other digital solutions for the industry and service applications, renewable and smart energy, 3D printing and new materials, and systems for the development of smart and energy-efficient cities.

The fund will invest primarily in companies at the early and seed stages, as well as companies that have entered the scaling stage. Key criteria for the selection of companies to invest in will include fast growth prospects, a potential for global technological expansion and synergy with the main areas of development of ROSATOM.

The fund was created under an investment partnership agreement and is open for co-investors. The format of the fund (an investment partnership) makes it possible to attract market investors and double or triple the amount of investments compared to the initial level.

By the end of 2018, the fund reviewed about 100 projects submitted by small innovative companies, eight of which were provisionally approved by the Investment Committee of the fund.

BREAKDOWN OF INVESTMENTS IN 2018



### Measures to improve investment efficiency

In the reporting year, the Company developed a Comprehensive Programme of Measures to Improve the Maturity of Project Management in the Russian Nuclear Industry. A pilot assessment of project maturity was carried out in nuclear organizations in accordance with the methodology developed earlier.

A system for evaluation and development of project personnel was built as part of the Project Management School in order to improve the competences of employees and, consequently, the efficiency of projects and investments.

Jointly with the Skolkovo Foundation and with assistance from the SKOLKOVO Moscow School of Management, the Company launched a programme for organizations in the industry that are responsible for developing new business areas. The programme is aimed at identifying gaps in the technological capabilities of an organization in the medium term and engaging experts and practitioners in a new business area, including identifying the growth strategies followed by competitors.

### Plans for 2019 and for the medium term

- To continue systematic development of a project methodology, including for more active involvement in the implementation of national projects;
- To implement the Comprehensive Long-Term Programme of Measures to Improve the Maturity of Project Management in the Russian Nuclear Industry;
- To enable nuclear organizations to form business partnerships in order to develop technologies, research and technological capabilities in the industry;
- To increase the level of digitization of projects and investments.



### Challenges of the reporting period and mitigation measures

Challenge	Mitigation measures
<b>Excessive centralization of investment management in new businesses</b>	<ul style="list-style-type: none"> <li>■ Decentralization of the decision-making system through an expansion of the scope of powers delegated to the divisions;</li> <li>■ Revision of the approach to managing new businesses through strategic programmes;</li> <li>■ Development of a partnership-based model of work of various functions and the business.</li> </ul>
<b>A window of opportunity for a more efficient implementation of national projects</b>	<ul style="list-style-type: none"> <li>■ Development of a project methodology for efficient participation in the implementation of national projects;</li> <li>■ An investment strategy focused on contributing to the implementation of national projects while simultaneously achieving an optimal return on the investment portfolio.</li> </ul>
<b>Organizational environment that is not sufficiently favourable for the development of new businesses</b>	<ul style="list-style-type: none"> <li>■ Formalization of approaches allowing deviations from investment targets for individual projects, provided that returns on the portfolio as a whole remain unchanged/increase ('room for mistakes'), in corporate documents;</li> <li>■ Reduction in the number of approvals and decision-making bodies in order to speed up the launch of a new business;</li> <li>■ Development of long-term incentives for the management.</li> </ul>
<b>Lack of maturity of a system for searching for potentially attractive projects and business initiatives aimed at developing new businesses in the industry</b>	<ul style="list-style-type: none"> <li>■ Development of industrial partnerships, including in priority social and economic development areas;</li> <li>■ Search for projects in key business areas through the venture fund;</li> <li>■ Organization of the Vector Start-Up Contest in order to search for and select ideas.</li> </ul>
<b>Lack of maturity and capabilities in organizations involved in projects implemented in the industry</b>	<ul style="list-style-type: none"> <li>■ Scaling up of the activities of the Project Management School at ROSATOM's Corporate Academy;</li> <li>■ Development of methodological guidelines for the assessment of maturity of project management in nuclear organizations.</li> </ul>

## 7.5. INTERNAL CONTROL SYSTEM

THE INTERNAL CONTROL SYSTEM IS BASED ON RUSSIAN LAWS AND REGULATIONS, THE IAEA REQUIREMENTS, THE COSO MODEL AND THE INTOSAI GUIDELINES FOR INTERNAL CONTROL STANDARDS FOR THE PUBLIC SECTOR.



### Key results in 2018:

- Inspections conducted in Russian nuclear organizations by Russian government bodies did not reveal any major violations that had not been detected by the Internal Control and Audit Function (ICAF).
- The industry-wide internal control system was rated highly by external organizations: the Accounts Chamber of the Russian Federation, the Federal Treasury (at 93%, with the average score totalling 80%), the Russian Ministry of Finance (100%) and the auditing commission.

- The top quality of internal control practices in the Russian nuclear industry was acknowledged by the expert community: the Company received an award in the Efficiency of the Internal Control and Audit System category (Institute of Certified Financial Managers, UK) and won in the Internal Audit Function of the Year category (Institute of Internal Auditors, Russia) and in the Best Controller category (National Association of Internal Auditors and Controllers, Russia).

The internal control system is based on:

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

### 7.5.1. RESULTS IN 2018

In the reporting year, a vision for the development of the ICAF until 2020 was formulated.

To improve the performance of control systems, experts of the ICAF actively participated in the development of the Uniform Digital Strategy, the transformation programme of the Engineering Division and the work of Change Support Teams.

A shared information space was created for internal controllers and internal auditors based on the IT system supporting the work of the ICAF.

Standardized procedures were developed for internal audit of efficiency of business process and project management controls.

2018 marked the 10<sup>th</sup> anniversary of establishment the industry-wide Internal Control and Audit Function; its employees received departmental awards.

In the reporting year, specialized internal control bodies (SICBs) conducted 726 inspections in nuclear organizations.

12 inspections were conducted by external regulators supervising compliance with the budget legislation, including 5 inspections by the Accounts Chamber of the Russian Federation. No instances of misuse or illegal use of budgetary funds or assets were detected.

An overwhelming majority (81%) of internal audits is aimed at monitoring the achievement of strategic goals and priorities in the industry.

Following the inspections conducted in 2018, 484 corrective measures were developed and scheduled for implementation. Implementation of corrective measures remains effective, which helps to reduce the risk of recurrence of violations.

Based on the findings of inspections conducted in the reporting year, disciplinary sanctions were imposed on 811 employees of ROSATOM's organizations, including the dismissal of four senior managers.





# 8 HR POLICY AND SOCIAL RESPONSIBILITY

**85,300**  
**RUB**

average monthly salary



## 8.1. PERSONNEL MANAGEMENT<sup>34</sup>

IN 2018, JSC ATOMENERGOPROM AND ITS ORGANIZATIONS EMPLOYED 121,300 PEOPLE. 66,100 EMPLOYEES HAVE A UNIVERSITY DEGREE. 980 EMPLOYEES ARE CANDIDATES AND DOCTORS OF SCIENCES. THE AGE OF EMPLOYEES AVERAGED 42.5 YEARS.



### Key results in 2018:

- The average monthly salary totalled RUB 85,300 per month.
- 30% of employees were aged under 35.

### 8.1.1. STAFF COSTS

In 2018, staff costs totalled RUB 167.4 billion, up by 11.9% year on year. The costs per employee per year increased from RUB 1,285,000 in 2017 to RUB 1,373,000 in 2018 (by 6.9% year on year).

STRUCTURE OF STAFF COSTS, %

	2016	2017	2018
<b>Payroll fund</b>	75.1	75.0	74.6
<b>Insurance contributions</b>	20.2	20.4	20.9
<b>Social and other expenses (including personnel training)</b>	4.6	4.6	4.5

<sup>34</sup> Starting from 2018, the calculation of HR metrics of JSC Atomenergoprom includes Russian NPPs, which are branches of JSC Rosenergoatom Concern. Accordingly, the figures for 2016 and 2017 have been retrospectively adjusted.

### Remuneration system

The current remuneration system in the Company:

- Provides competitive remuneration matching the compensation in the best Russian companies;
- Is result-based: the size of employees' salaries is linked to their efficiency, professionalism and achievement of key performance indicators (KPIs).

The remuneration system includes a variety of tools ensuring that employees are focused on results: regular salary reviews based on personal performance evaluation, annual and ad hoc bonuses for the achievement of targets, project bonuses and one-off bonuses for the completion of assignments that are of special importance.

Managerial KPIs are based on strategic goals, priorities and KPIs; strategic objectives set for the organizations and enterprises are converted into KPI maps of specific managers and cascaded down to business units and employees.

In 2018, the monthly average salary per employee in JSC Atomenergoprom increased by 6.3% against 2017 and totalled RUB 85,300 per month.

### 8.1.2. EXECUTIVE SUCCESSION POOL

A centralized programme to build and develop an executive succession pool (ESP) is underway in the Russian nuclear industry to ensure succession and train executives to be appointed to managerial positions.

ESP members are included in the executive 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 level that they occupy in the ESP is determined by the target position of a candidate within the ESP:

1. ROSATOM's Assets (top executives).
2. ROSATOM's Assets. Basic level.
3. ROSATOM's Capital (middle-level executives).
4. ROSATOM's Talents (promising specialists and junior executives).

Since the establishment of the executive succession pool, the number of its members has exceeded 3,600 people. 72% of ESP members were appointed to a new position in 2018.

In addition, in 2018, ESP members completed a module-based training programme aimed at developing managerial knowledge and skills.

TRAINING AS PART OF ESP DEVELOPMENT PROGRAMMES

ESP level	Development programme	Key training areas	Number of participants		
			2016	2017	2018
<b>Senior executives</b>	ROSATOM's Assets	Strategy, market-oriented thinking, strategic leadership, innovation management, marketing for high-technology companies	198	295	304
	ROSATOM's Assets. Basic level		–	114	180
<b>Middle-level executives</b>	ROSATOM's Capital	Leadership and project management, advanced managerial skills, data management	846	1,102	1,490
<b>Junior executives</b>	ROSATOM's Talents		964	1,177	1,675
<b>Total</b>			2,008	2,688	3,649



### 8.1.3. PERSONNEL TRAINING

The Company's HR policy prioritizes the development of competences and employee training. In 2018, over 59,000 employees of JSC Atomenergoprom underwent training and retraining and completed professional development programmes.

ANNUAL AVERAGE TRAINING HOURS PER EMPLOYEE BY EMPLOYEE CATEGORY

	2016	2017	2018
<b>Executives</b>	56.9	53.9	45.0
<b>Specialists and office workers</b>	24.3	35.3	21.7
<b>Workers</b>	32.2	47.8	34.9

### 8.1.4. EMPLOYEES' PARTICIPATION IN EXTERNAL AND INDUSTRY-WIDE PROFESSIONAL COMPETITIONS

#### Leaders of Russia

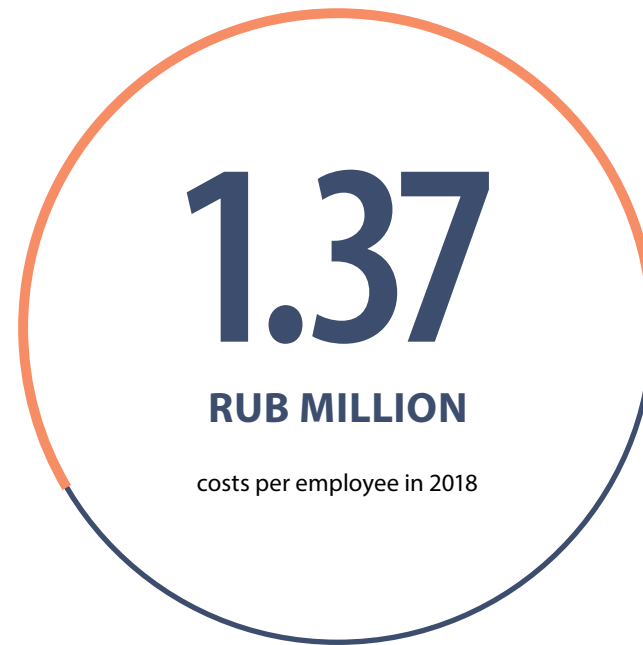
Employees of Russian nuclear organizations actively participate in the Leaders of Russia national management competition. 850 employees of industry organizations took part in the first competition held in 2017–2018. 20 people reached the semi-finals, with six people progressing to the final. Winners included Konstantin Tulupov (Vice President for Business Development of JSC TVEL as of December 31, 2018).

#### WorldSkills

WorldSkills International<sup>35</sup> is a not for profit association operating in 76 countries worldwide. The aim of WorldSkills is to provide skills training to meet market needs and to develop talent by organizing professional skill competitions. Participants of the movement include college and university students, young specialists, teachers, the government and industries.

The industry-wide team won the WorldSkills Hi-Tech National Competition of cross-industry skilled professions for workers in high-technology industries for the fourth time. The team won 34 medals (including 28 golds). ROSATOM's team was represented in 20 competences by 76 participants and 90 experts, as well as five junior teams. In addition, industry-wide teams won medals in DigitalSkills, WorldSkills 50+ and other national and international professional skills competitions.

<sup>35</sup> <https://worldskills.ru/>.



#### Work of Change Support Teams

As part of an industry-wide project titled ROSATOM's Values, Change Support Teams have been formed in 60 organizations in the industry and in ROSATOM's head office. These are informal groups comprising the most active employees.

The objective of the project is to:

- Form permanent teams that will shape a new corporate culture in enterprises;
- Engage as many active employees as possible in projects contributing to effective achievement of business goals;
- Demonstrate how the target corporate culture helps to achieve business goals, taking the teams' projects as examples.

In 2018, 97 teams were formed comprising a total of 900 people. The Change Support Teams developed over 100 projects. These include such projects as: Building a Sustainable Development Management System in ROSATOM and Its Organizations; Supporting Digital Transformation in the Industry; Onboarding of NPP Employees; Developing a Safety Culture; Creating Telehealth Centres in Nuclear Towns and Cities, and Improving Horizontal Cooperation.

In 2018, over 900 participants and experts from 74 nuclear organizations, 11 branches of NRNU MEPhI and six partner colleges participated in the AtomSkills Industry-Wide Championship.

In 2018, the AtomSkills Juniors movement was created for school students. This initiative includes running engineering and technical creativity laboratories and engineering projects during school holidays, forming and developing a community of mentors in the sphere of engineering and technical creativity comprising employees of nuclear enterprises and ROSATOM's partner universities.

### 8.1.5. SOCIAL POLICY

JSC Atomenergoprom's social policy is designed to:

- Make the Company more attractive as an employer;
- Engage and integrate young professionals and highly skilled specialists;
- Improve employee loyalty;
- Improve the efficiency of social expenses.

Employment benefits provided to employees and retirees comply with the Uniform Industry-Wide Social Policy (UISP), which is based on standardized corporate social programmes.

JSC Atomenergoprom adheres to the Industry-Wide Agreement on Nuclear Power, Industry and Science for 2018–2020. The Agreement is based on the established practice of social partnership in the nuclear industry and is aimed at implementing the Integrated Standardized Remuneration System, the Uniform Industry-Wide Social Policy and the Occupational Safety Management System.

Collective agreements in all of the Corporation's organizations provide for a minimum notice period of two months for significant operational changes, and of three months for situations that may lead to dismissals.

Collective agreements cover 85% of employees working in ROSATOM's enterprises.

The Agreement gives priority to the protection of employees' life and health (the sections 'Occupational Safety' and 'Social Policy'). Jointly with the Russian Trade Union of Nuclear Power and Industry Workers, employers maintain records of and analyse morbidity among employees, including based on records of periodic medical examinations and sick leave, and build an integrated health care programme titled Health. The Agreement incorporates the opportunities provided by legislation on the special inspection of working conditions (SIWC) and stipulates an additional mechanism for cooperating with the trade union in conducting an SIWC and analysing inspection findings.

<sup>36</sup> <https://rosatom.ru/upload/iblock/d08/d08a5dc6dedea5cf251f81e14f8742d7.pdf>.

KEY CORPORATE SOCIAL PROGRAMMES OF JSC ATOMENERGOPROM, RUB MILLION

	2016	2017	2018
<b>Voluntary health insurance</b>	1,047.0	1,123.1	1,180.8
<b>Accident and illness insurance</b>	46.0	49.2	51.1
<b>Health resort treatment and recreation for employees and their children, including:</b>			
■ health resort and rehabilitation treatment for employees	665.9	686.6	702.2
■ health resort treatment and recreation for children	2.3	161.8	178.8
<b>Provision of housing for employees</b>	760.5	830.6	714.6
<b>Private pension plans</b>	367.6	354.1	359.4
<b>Support for retirees</b>	884.6	926.5	917.6
<b>Catering arrangements</b>	27.0	24.9	32.2
<b>Sporting and cultural events</b>	844.5	884.2	955.1
<b>Assistance to employees</b>	1,191.7	1,312.2	1,392.4
<b>Other</b>	512.5	536.5	558.8
<b>Total:</b>	<b>6,347.3</b>	<b>6,727.9</b>	<b>6,864.2</b>

#### Code of Ethics

ROSATOM and JSC Atomenergoprom have in place the Code of Ethics and Professional Conduct for Employees. The Code of Ethics promotes the corporate values and establishes the relevant ethical principles of conduct in the course of interaction with a wide range of external and internal stakeholders. The rules of conduct set out in the Code concern combating corruption, ensuring the security of resources, property and information, occupational, industrial and environmental safety, preventing conflicts, resolving conflicts of interest and keeping up the corporate image.

The Code of Ethics is available on the official website of the Corporation<sup>36</sup>.

## 8.1.6. RECRUITMENT OF YOUNG PROFESSIONALS

JSC Atomenergoprom gives special focus to working with young professionals and recruiting talented young people into the nuclear industry.

In 2018, a total of 644 students attended universities under arrangements with JSC Atomenergoprom.

The Company continued to organize work placements for students from specialized universities: in 2018, 2,833 students undertook internships in the organizations of JSC Atomenergoprom.

In 2018, over 471 university graduates were hired by nuclear organizations.

One in every three young employees hired in the Russian nuclear industry in 2018 had graduated from university with honours.

According to an industry forecast of demand for specialists who have received university education or secondary vocational education until 2028, JSC Atomenergoprom is expected to hire around 900 graduates of core universities per year on average, including around 350 graduates of NRNU MEPhI and its branches.

## 8.1.7. PLANS FOR 2019 AND FOR THE MEDIUM TERM

- To develop a system for training engineers and blue-collar workers in accordance with the WorldSkills international standards;
- To enable rapid development of key business competences;
- To create a digital environment and promote employees' digital literacy;
- To train leaders at all levels;
- To develop a safety culture aligned with the Vision Zero paradigm;
- To improve the quality of employees' lives and promote a healthy lifestyle;
- To top employer rankings in terms of talent development.

### Corporate volunteering

Given a large number of volunteering initiatives in the industry and the fact that 2018 had been declared the Year of Volunteers in Russia, it was decided to develop a single corporate project in this field. Key objectives of corporate volunteering include:

- Forming a pool of social leaders comprising employees of organizations in the industry;
- Developing horizontal cooperation;
- Enhancing the image of ROSATOM and JSC Atomenergoprom as socially responsible companies.

In addition, the following areas of corporate volunteering were prioritized in the reporting year:

- Environmental protection (including waste management);
- Promoting a healthy lifestyle;
- Career guidance and mentorship;
- Intellectual volunteering;
- Supporting socially disadvantaged groups and veterans.



## 8.2. DEVELOPING THE REGIONS OF OPERATION

THE COMPANY CONTRIBUTES SIGNIFICANTLY TO THE ENERGY SECURITY OF RUSSIAN REGIONS. JSC ATOMENERGOPROM IS A LARGE TAXPAYER. THE COMPANY CREATES SKILLED JOBS.



JSC Atomenergoprom contributes to the social and economic development of its regions of operation in many ways. The Company contributes significantly to the energy security of a number of regions. JSC Atomenergoprom is a large taxpayer paying taxes to the budgets of all levels. The Company makes a substantial economic impact on the regions of its operation by providing considerable employment opportunities to skilled professionals in the nuclear industry and related industries, thus improving overall employment in the regions and providing decent working conditions and remuneration.

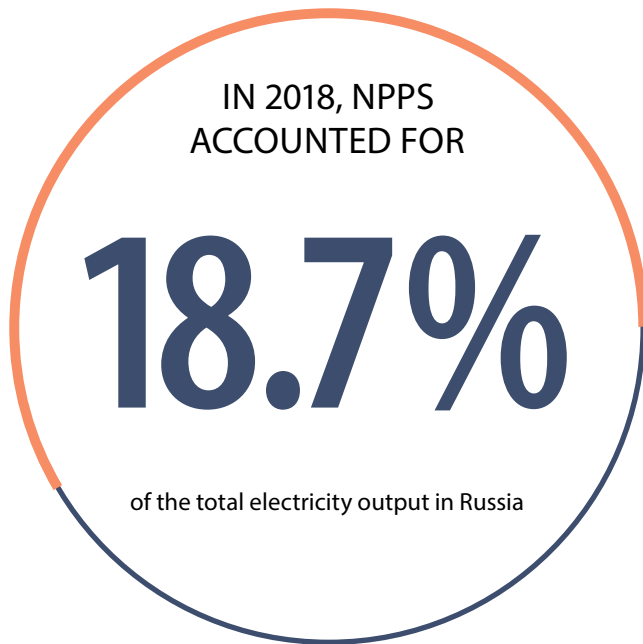


### 8.2.1. ENSURING THE ENERGY SECURITY OF RUSSIAN REGIONS

NPPs accounted for 18.7% of the total electricity output in Russia (18.9% in 2017). Nuclear power generation contributes significantly to power systems across Russia.

SHARE OF NUCLEAR POWER GENERATION IN THE OUTPUT OF INTEGRATED POWER SYSTEMS (IPSS) OF RUSSIA

	Russia	European Russia	IPS of the Centre	IPS of the Middle Volga	IPS of the North-West	IPS of the South	IPS of the Urals
<b>Nuclear power generation at JSC Rosenergoatom Concern, billion kWh</b>	204.275	204.06	94.94	31.86	39.05	29.37	8.84
<b>Share of nuclear power generation at JSC Rosenergoatom Concern, %</b>	18.7	24.6	41.0	28.1	34.5	28.1	3.4



## 8.3. STAKEHOLDER ENGAGEMENT

TARGETED WORK WITH STAKEHOLDERS IS AIMED AT ACHIEVING STRATEGIC OBJECTIVES AND GETTING THE PUBLIC ON BOARD FOR DEVELOPING NUCLEAR ENERGY.



**Key results in 2018:**

- 74.5% of the population in Russia supports the use of nuclear energy.
- Over 459,000 people visited Nuclear Energy Information Centres.
- Viewership of channels broadcasting the *Strana ROSATOM* TV programme in various regions of Russia totals 7.3 million people.

### 8.3.1. APPROACHES TO STAKEHOLDER ENGAGEMENT

Due to its scale and special characteristics of its business, JSC Atomenergoprom has a wide range of stakeholders both in Russia and worldwide. Targeted work with stakeholders is aimed at achieving strategic objectives and getting the public on board for developing nuclear energy. The Company fosters systematic and constructive stakeholder engagement in each area of its business and communicates with society as a whole.

Fundamental principles of stakeholder engagement are as follows:

- Respect and accommodation of the interests of all participants; open efficient cooperation;
- Timely and exhaustive information on the Company's activities;
- Striving to provide specific benefits to all participants;
- Fulfilment of obligations.

### 8.3.2. NUCLEAR ENERGY INFORMATION CENTRES<sup>37</sup>

A project is underway in the Russian nuclear industry to build a network of nuclear energy information centres (NEICs) in ROSATOM's regions of operation. The first centre was opened in 2008. As of December 31, 2018, the NEIC network comprised 17 centres in Russia, as well as centres in Minsk (Republic of Belarus) and Astana (Kazakhstan). In 2018, over 459,000 people visited the centres.

#### Key projects of the NEICs

In 2018, the Kstati ('By the Way') Festival of Science took place in Ekaterinburg, Novosibirsk and Rostov-on-Don, while Voronezh and Vladimir hosted the Scientific Encounters mini festival. The festivals were conducted in the form of a marathon of interactive lectures, popular science talk shows, intellectual games, workshops and film screenings. The projects had an audience of more than 18,000 people.

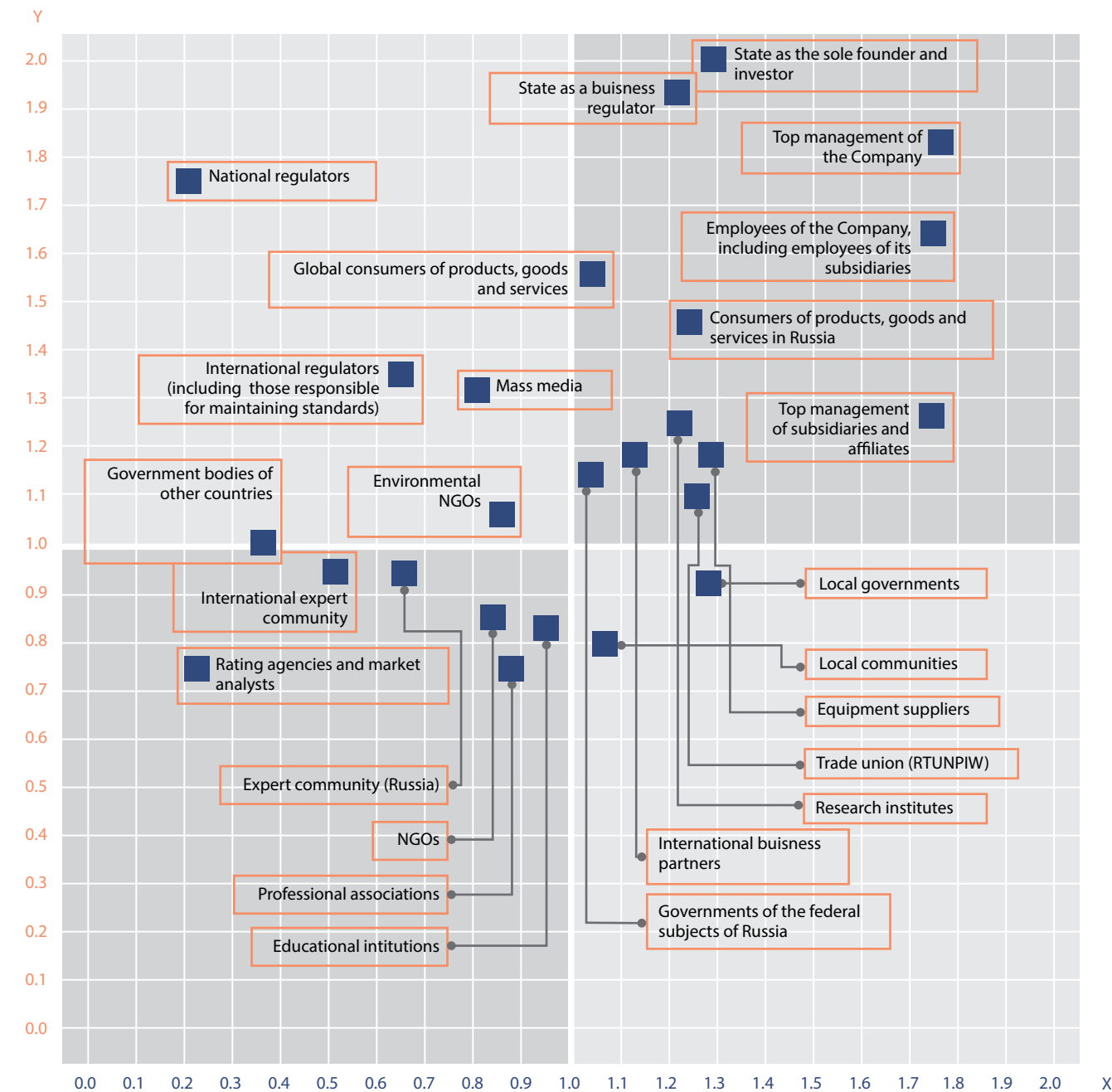
In the reporting year, the NEICs gave special focus to holding open-air popular science events. The Go Offline series of one-day science and entertainment events was held in Saratov, while Ulyanovsk hosted the Night of Science city festival. In addition, the NEIC in Saint Petersburg had its own venues at major Russian geek festivals: VK Fest and Geek Picnic. A total of over 7,000 people participated in NEIC activities at open-air summer festivals.

In 2018, 364 teams from 30 Russian cities and school students from Minsk and Astana participated in the 5<sup>th</sup> Formula of Intelligence National Simultaneous Intellectual Games Championship for School Students. Over 600 high school students took part in the 4<sup>th</sup> Matrix National Intellectual Games Championship for School Students.



<sup>37</sup> <http://www.myatom.ru>.

### STAKEHOLDER MAP



X — impact of the Company on the stakeholder

Y — stakeholder's impact on the Company



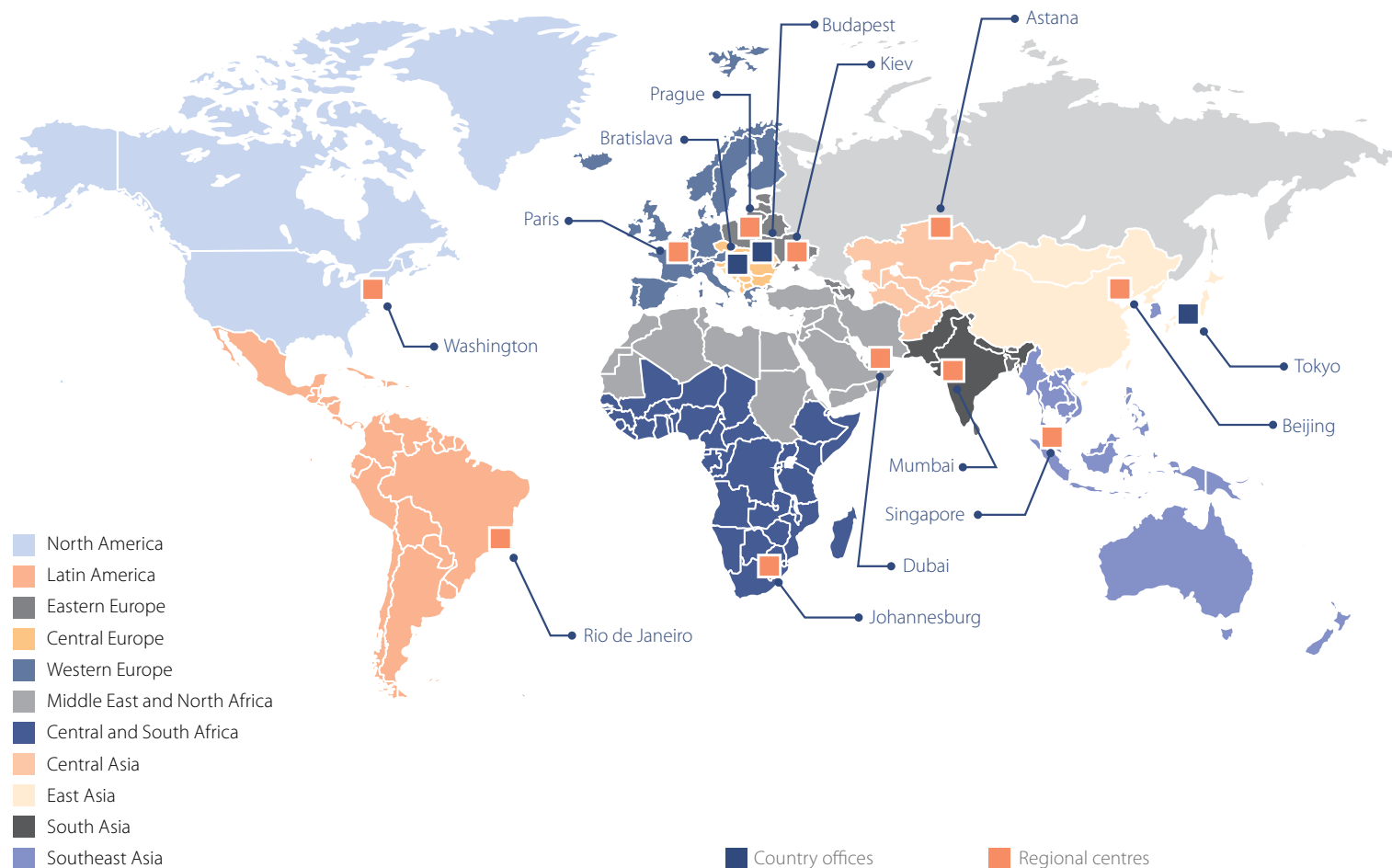
### 8.3.3. FOREIGN REGIONAL NETWORK

A foreign regional network managed by Rusatom International Network has been established in order to increase international sales and promote the products of the Russian nuclear power industry. As of December 31, 2018, the foreign regional network comprised 11 regional centres that operated in more than 60 countries around the world.

In 2018, Russian nuclear organizations participated in 16 exhibitions and hosted 12 events (forums, conferences and workshops) in 19 countries globally.

JSC Atomenergoprom regularly supports international multilingual camps for children of employees of partner organizations in the countries where the Company does business. The camps' programme includes educational, sports and artistic events which enable the participants to deepen their knowledge of various areas of science and culture, perfect their cross-cultural skills and learn about the traditions and history of other countries. Special emphasis is placed on teaching foreign children about Russia, its traditions and its rich cultural heritage. 177 children from 12 countries attended multilingual camps in 2018.

COUNTRY AND REGIONAL CENTRES OF JSC ATOMENERGOPROM



### 8.3.4. ATOMEXPO INTERNATIONAL FORUM

The ATOMEXPO International Forum is a major event in the global nuclear industry. Held annually since 2009, it is the largest exhibition and business platform for discussing the current state of the nuclear industry and setting future trends.

The Forum is attended by executives from the key companies working in the global nuclear industry, government agencies, international and non-commercial organizations, and leading experts.

In 2018, the 10<sup>th</sup> Forum was held; its key topic was 'Global Partnership — Joint Success'. The Forum was attended by over 4,000 people from 68 countries around the world. 39 agreements and other documents on cooperation and partnership, including commercial contracts, were signed on the sidelines of the ATOMEXPO 2018 Forum.

### 8.3.5. INDUSTRY MEDIA

To inform employees and other stakeholders of the news and key events at ROSATOM and in its organizations, a range of corporate media outlets under the common brand name *Strana ROSATOM* ('The Country of ROSATOM') is used in the industry:

- A newspaper (published weekly in all enterprises in the Russian nuclear industry, with a circulation of 59,000 copies and a readership of over 250,000 people);
- A radio programme (it is broadcast two or three times a week in 30 of the Corporation's organizations and has an audience of 50,000 people);
- A television programme (it is aired weekly in 20 towns and cities where nuclear organizations operate; the viewership of the channels that broadcast the programme totals 7.3 million people).

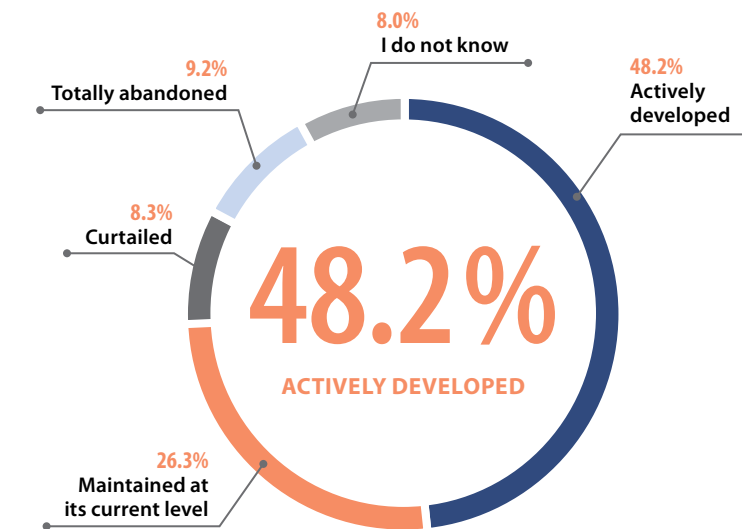
### 8.3.6. OPINION POLLS

JSC Atomenergoprom analyses the public perception of the development of nuclear power in Russia on a yearly basis and adjusts its communication with stakeholders accordingly.

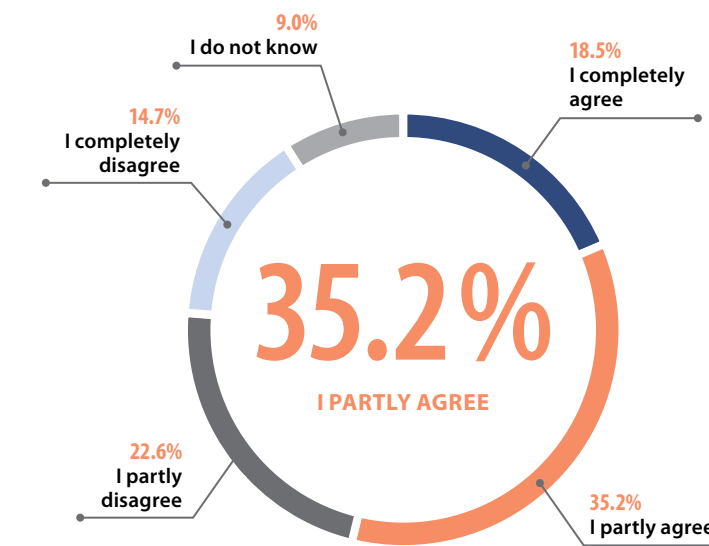
According to an independent opinion survey by Levada-Centre<sup>38</sup>, 74.5% of the Russian population supported the use of nuclear power (73.9% in 2017; over the past few years, this figure remains persistently high).

<sup>38</sup> The survey was conducted from February 7 through February 20, 2019 across a representative sample of Russian citizens consisting of 3,985 people aged 18 and above.

— Do you think that the nuclear power industry should be actively developed, maintained at its current level, curtailed or totally abandoned?



— Do you agree with the following statement: 'Nuclear energy is a "green", environmentally friendly type of power generation'?





# 9 SAFE OPERATION

**0**  
**EVENTS RATED AT  
LEVEL 2 OR HIGHER**

on the international INES scale (level 1 and 0 deviations do not pose a risk to employees operating the facilities, local residents or the environment)



# 9.1. NUCLEAR AND RADIATION SAFETY; OCCUPATIONAL SAFETY AND HEALTH

IN 2018, JSC ATOMENERGOPROM ENSURED SAFE AND STEADY OPERATION OF ENTERPRISES IN THE NUCLEAR INDUSTRY.



## 9.1.1. NUCLEAR AND RADIATION SAFETY AT NUCLEAR FACILITIES

In 2018, JSC Atomenergoprom ensured safe and steady operation of enterprises in the nuclear industry. There were no incidents involving radiation leaks. Limits on employee radiation exposure were not exceeded.

As in many recent years, in 2018, no events rated at level 2 or higher on the international INES scale were detected at Russian nuclear power plants (level 1 and 0 deviations do not pose a risk to employees operating the facilities, local residents or the environment).

### Key results in 2018:

- No events rated at level 2 or higher on the INES scale were detected.
- The injury frequency rate and the lost time injury frequency rate (LTIFR) stood at 0.25 and 0.12 respectively.
- Individual radiation risk was calculated for 64,643 people using the IRAW system.

## 9.1.2. INDUSTRY-WIDE AUTOMATED RADIATION MONITORING SYSTEM (IARMS)

The IARMS is a functional subsystem of the Integrated State Automated Radiation Monitoring System (ISARMS). Its main function is to monitor the radiation level in the areas where facilities posing nuclear and radiation hazards are located. The IARMS is one of the tools for alarm notification and providing information for decisions on accident response.

As of December 31, 2018, on-site ARMSs integrated into the IARMS operated in the locations of 31 nuclear facilities posing nuclear and radiation hazards, including all NPPs. The total number of fixed monitoring stations increased to 450 compared to 443 in 2017 (with 321 stations located outside industrial sites and 129 ARMS stations located at industrial sites of organizations in the industry).

Real-time data from the radiation monitoring stations is available on the website at [www.russianatom.ru](http://www.russianatom.ru).

## 9.1.3. PHYSICAL PROTECTION OF NUCLEAR FACILITIES

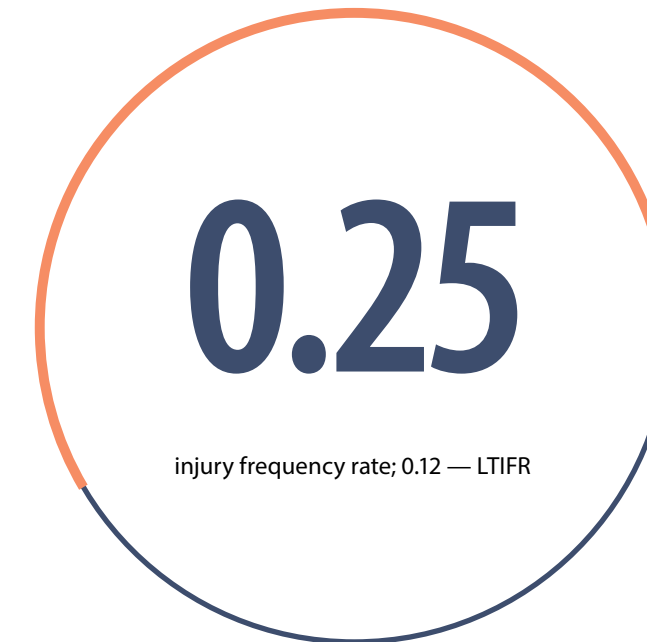
The security and physical protection of nuclear facilities posing nuclear and radiation hazards and of nuclear and radioactive materials used and stored there (including during their transportation) complies with Russian legislation. Furthermore, Russian regulatory requirements are fully consistent with the IAEA recommendations on physical protection and in some respects even exceed them.

## 9.1.4. OCCUPATIONAL SAFETY AND HEALTH

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's organizations are designed to prevent accidents and occupational diseases, facilitate systematic monitoring of working conditions and occupational safety and health performance and support occupational safety and health not only in the Company, but also in contractor and subcontractor organizations engaged in the operation of nuclear facilities.

In 2018, the injury frequency rate across the industry was relatively low compared to major Russian companies. The injury frequency rate (FR) stood at 0.25, which is almost five times lower than the national average (FR = 1.2).

In addition to the FR injury frequency rate, the Company also uses the lost time injury frequency rate (LTIFR), which enables it to benchmark the injury rate against that of other companies and countries. In 2018, the LTIFR across the Russian nuclear industry stood at 0.12.



### 9.1.5. RADIATION EXPOSURE OF EMPLOYEES

The criteria of employee radiation safety are laid down in the Radiation Safety Standards (NRB-99/2009), the Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010) and other regulations. Most enterprises in the industry provide workplace conditions that fully comply with the requirements set out in these documents.

In 2018, the average annual effective radiation dose of the Company's personnel totalled 1.64 mSv. In 2018, employee radiation exposure did not exceed regulatory limits. The total effective dose for any employee did not exceed 100 mSv over five consecutive years. The annual dose limit of 50 mSv was not exceeded. Over the past nine years, average effective employee radiation exposure and the number of people exposed to radiation have been varying insignificantly and remain low.

In 2018, the Company continued to monitor radiation risks for group A personnel using the IRAW occupational radiation risk assessment system. Individual risk was calculated for 64,643 people, or 98.8% of the total number of group A employees. The absolute majority of group A employees work in conditions of acceptable occupational risk. Over the last three years, the average individual radiation risk across the Russian nuclear industry did not exceed 7% of the regulatory limit, while the maximum individual risk has been decreasing steadily.



## 9.2. ENVIRONMENTAL SAFETY

JSC ATOMENERGOPROM ATTACHES GREAT IMPORTANCE TO ENVIRONMENTAL SAFETY AND ENVIRONMENTAL PROTECTION.



### 9.2.1. ENVIRONMENTAL SAFETY AND ENVIRONMENTAL PROTECTION MANAGEMENT

JSC Atomenergoprom attaches great importance to environmental safety and environmental protection. One of its major priorities is to minimize the negative environmental impact of nuclear facilities. The Uniform Sectoral Environmental Policy is the main regulatory document on environmental safety and environmental protection<sup>39</sup>. In 2018,

the Company completed the implementation of the Comprehensive Environmental Policy Plan for 2016–2018, which stipulated organizational, operational and technical measures to be implemented by organizations in the nuclear industry. A new Comprehensive Plan for 2019–2021 was developed and approved.

To improve environmental safety and the efficiency of environmental protection measures, organizations that make a considerable impact on the environment introduce environmental management, quality management, occupational health and safety management and energy management systems.

<sup>39</sup> <https://www.rosatom.ru/upload/iblock/74e/74eb9c650aa73e74d0b9b9aadea0c1f8.pdf>



## 9.2.2. IMPROVED ENERGY EFFICIENCY

When assessing the impact of measures aimed at improving energy efficiency, the Company uses 2015 as the base period (2015 marked the completion of the first five-year period of implementation of energy conservation programmes).

In 2018, the annual energy conservation target of 5% was exceeded. The cumulative total reduction in energy consumption against 2015 as the base year amounted to 8.9%, or RUB 2.7 billion.

### ENERGY COST REDUCTION IN 2018

Division	Cumulative total compared to 2015, RUB million (excluding VAT)	Cumulative total compared to 2015, %
Power Engineering Division	116.3	5.7
Fuel Division	1,081.8	10.8
Mining Division	163.9	9.1
Mechanical Engineering Division	213.2	21.8

An energy management system compliant with the ISO 50001 standard has been implemented in the Power Engineering Division (JSC Rosenergoatom Concern) and the Fuel Division (JSC TVEL).



## GLOSSARY

<b>BOO (Build – Own – Operate) contract</b>	a contract imposing obligations related to the construction, ownership and operation of a facility
<b>Capacity factor</b>	the ratio of actual electricity output of a reactor unit during its operation to electricity output that would have been produced during its operation at full nameplate capacity without shutdowns
<b>Closed nuclear fuel cycle</b>	a nuclear fuel cycle in which spent nuclear fuel is processed in order to extract uranium and plutonium for nuclear fuel refabrication
<b>Corporate business model</b>	a model comprising key business processes and resources (types of capital) used by the organization to create and maintain its value in the long term
<b>Corporate social responsibility</b>	a concept whereby an organization takes into account stakeholder requests. It is a set of obligations voluntarily assumed by the organization's executives to take into account the interests of employees, shareholders, local communities in the organization's operating regions, government bodies and municipal governments and other stakeholders. These obligations are funded mainly from the organization's own funds and are aimed at implementing significant internal and external social (in a broad sense) programmes whose outcomes help develop the organization, improve its reputation and image, and enable constructive stakeholder engagement
<b>Depleted uranium</b>	uranium with a lower content of the U-235 isotope than natural uranium (e.g. uranium in spent fuel from reactors fuelled with natural uranium)
<b>Dialogue with stakeholders (as part of preparation of the annual report)</b>	an event held in accordance with the international AA1000 standards to facilitate communication between the organization and representatives of key stakeholders when preparing its annual report in order to improve the organization's transparency and accountability
<b>Enrichment (isotopic)</b>	a) the amount of atoms of a specific isotope in a mixture of isotopes of the same element if it exceeds the share of this isotope in a naturally occurring mixture (expressed as a percentage); b) a process resulting in an increase in the content of a specific isotope in a mixture of isotopes
<b>EPC (Engineering – Procurement – Construction) contract</b>	a contract imposing obligations related to the turnkey construction of a facility, i.e. obligations related to the engineering, procurement and construction of a facility. Unlike a BOO contract, it does not provide for ownership of a facility to be built
<b>EPCM (Engineering – Procurement – Construction – Management) contract</b>	a contract imposing obligations related to the turnkey construction (engineering, procurement and construction) and management of a facility. Unlike a BOO contract, it does not provide for ownership of a facility to be built
<b>Fast neutrons</b>	neutrons whose kinetic energy exceeds a certain limit. This limit varies within a broad range and depends on the application (reactor physics, protection or radiation monitoring). In reactor physics, this limit is usually set at 0.1 MeV
<b>First criticality</b>	a stage in the commissioning of an NPP which involves loading nuclear fuel into the reactor, achieving first criticality and performing required physical experiments at a power level at which heat is removed from the reactor through natural heat losses
<b>Fuel assembly</b>	a set of fuel elements (rods, bars, plates, etc.) held together with spacer grids and other structural elements that are transported and irradiated in the reactor in one piece. Fuel assemblies are loaded into the reactor core

<b>Global Reporting Initiative (GRI)</b>	an international system for reporting on economic, environmental and social performance based on the Sustainability Reporting Standards, Technical Protocols and Sector Supplements
<b>Global Reporting Initiative (GRI) Sustainability Reporting Standards</b>	Standards establishing principles that determine report content and the quality of reporting information, outline standard disclosures (performance indicators related to an organization's economic, environmental and social impacts, approaches to managing these impacts and other parameters), and recommendations regarding specific technical aspects of reporting
<b>Integrated report</b>	a report consolidating all material data on the organization's strategy, corporate governance, performance indicators and prospects to provide a comprehensive picture of its economic, social and environmental status. The report gives a clear and precise idea of stewardship and value creation in the organization at present and in the future
<b>International Integrated Reporting Council (IIRC)</b>	an international organization responsible for the development of global integrated reporting standards that make it possible to present managerial, financial, social, environmental and other information in a clear, concise, consistent and comparable report. The objective of the IIRC is to develop universal approaches to providing corporate reports in order to promote sustainable development of the global economy
<b>Key performance indicators (KPIs)</b>	key performance indicators consistent with the goals of JSC Atomenergoprom and reflecting the efficiency and performance of organizations (and operations of divisions) and the individual performance of employees
<b>Non-financial reporting</b>	reports provided by an organization on its performance beyond its core operational and financial activities (and the management of this performance). Examples of non-financial reports include sustainability reports, corporate social responsibility reports, environmental reports, reports on philanthropy, etc.
<b>NPP safety</b>	the ability of an NPP to ensure radiation safety for personnel, the general public and the environment within required limits during normal operation and in the event of an accident
<b>Nuclear fuel</b>	material containing fissionable nuclides which, after being placed in a nuclear reactor, enables a nuclear chain reaction
<b>Nuclear fuel cycle</b>	a sequence of manufacturing processes aimed at ensuring the operation of nuclear reactors, ranging from uranium production to radioactive waste disposal
<b>Nuclear power</b>	a branch of power engineering that uses nuclear energy for electricity and heat generation
<b>Nuclear safety</b>	the ability of nuclear facilities (including NPPs) to prevent nuclear accidents and radioactive leaks
<b>Operator</b>	an organization that has obtained a permit from a regulator for the operation of an NPP or another nuclear facility
<b>Phase Gate approach</b>	an approach to planning and carrying out investment activities which involves breaking down investment projects into phases, each of which is preceded by a Gate Review of achieved results, as well as plans and risks related to further project implementation, and the decision is made to proceed to the next phase of project implementation
<b>Power start-up</b>	a stage in the commissioning of an NPP at which the NPP starts to generate energy, and the operation of the NPP is tested at various power levels, up to the level specified for commercial operation
<b>Radiation burden</b>	a sum of individual doses of radiation received or planned in the course of operation, maintenance, repairs, replacement or dismantling of equipment at a nuclear facility (e.g. an NPP)

<b>Radiation safety</b>	protection of the current and future generations and the environment against the harmful impact of ionizing radiation
<b>Radioactive discharge</b>	controlled release of radionuclides into industrial reservoirs as a result of the operation of a nuclear facility (e.g. an NPP)
<b>Radioactive release</b>	controlled atmospheric emission of radionuclides by a nuclear facility (e.g. an NPP)
<b>Radioactive waste</b>	materials and substances unsuitable for further use, as well as equipment and products with a radionuclide content above prescribed levels
<b>Radioactive waste processing and conditioning</b>	process operations aimed at ensuring that the physical form and condition of radioactive waste are appropriate for its disposal
<b>Recommendations of the Russian Union of Industrialists and Entrepreneurs (RSPP) for Use in Governance Practice and Corporate Non-Financial Reporting (basic performance indicators)</b>	a system of economic, social and environmental performance indicators for non-financial reports developed by the RSPP in order to facilitate the adoption of responsible business principles. It is based on a number of framework documents developed by UN organizations (including the UN Global Compact) and the Global Reporting Initiative, as well as methodological and procedural guidelines of the Federal State Statistics Service of the Russian Federation and guidelines developed by the RSPP (the Social Charter of Russian Business, Recommendations on the Preparation of Non-Financial Reports 'Five Steps Towards Social Sustainability of Companies', etc.)
<b>Research reactor</b>	a nuclear reactor designed for use as an object of research to obtain data on reactor physics and technology required in order to design and develop similar reactors or components thereof
<b>Separative work unit (SWU)</b>	a measure of efforts expended on the separation of a given amount of material with a specific isotopic composition into two fractions with different isotopic compositions; it does not depend on the separation process being used. Separative work is measured in kilograms, and enrichment and energy costs are calculated per kilogram of separative work performed
<b>Stakeholders</b>	individuals and/or legal entities and groups of individuals or entities that make an impact on the organization's operations through their actions and/or are affected by the organization. An organization may have different stakeholders (national and international regulatory (supervisory) authorities, shareholders, consumers of goods and services, business partners, suppliers and contractors, civil society organizations, local communities, trade unions, etc.) with differing and conflicting interests
<b>Sustainable development</b>	development meeting the needs of the present without compromising the ability of future generations to meet their own needs. Accordingly, an organization's transparency and accountability with regard to its economic, environmental and social impacts are fundamental requirements for every business entity
<b>Uranium conversion</b>	a chemical engineering process involving the transformation of uranium-containing materials into uranium hexafluoride
<b>Uranium hexafluoride</b>	a chemical compound of uranium and fluorine (UF <sub>6</sub> ), which is the only highly volatile uranium compound (when heated to 53°C, uranium hexafluoride changes directly from the solid state into the gaseous state); it is used as feedstock for the separation of uranium-238 and uranium-235 isotopes using gaseous diffusion or the gas centrifuge method and for production of enriched uranium
<b>Uranium ore enrichment</b>	a combination of processes for primary treatment of uranium-containing mineral resources in order to separate uranium from other minerals contained in the ore. The composition of minerals does not change in the process; they are only separated mechanically, with ore concentrate being produced
<b>Water-cooled water-moderated power reactor (VVER)</b>	a water-cooled water-moderated power reactor in which water is used as both a coolant and moderator. Russian NPPs typically use two versions of VVER reactors: VVER-440 and VVER-1000



## LIST OF ABBREVIATIONS

<b>ARMS</b>	automated radiation monitoring system
<b>CATF</b>	closed administrative and territorial formation
<b>CIS</b>	Commonwealth of Independent States
<b>CNFC</b>	closed nuclear fuel cycle
<b>CRMS</b>	corporate risk management system
<b>EUP</b>	enriched uranium product
<b>EurAsEC</b>	Eurasian Economic Community
<b>FTP</b>	federal target programme
<b>HEU</b>	highly enriched uranium
<b>HLW</b>	high-level waste
<b>IAEA</b>	International Atomic Energy Agency
<b>IEPRS</b>	a functional subsystem for emergency prevention and response in organizations within the jurisdiction of JSC Atomenergoprom
<b>IGA</b>	intergovernmental agreement
<b>IIDMS</b>	integrated industry-wide document management system
<b>INES</b>	International Nuclear Event Scale (INES)
<b>IP</b>	intellectual property
<b>IRAW</b>	individual risk assessment workstation
<b>IRG</b>	inert radioactive gases
<b>ISRS</b>	Integrated Standardized Remuneration System
<b>ISS</b>	inspection and search system
<b>ITER</b>	International Thermonuclear Experimental Reactor (ITER)
<b>IUEC</b>	International Uranium Enrichment Centre
<b>JSC</b>	joint-stock company
<b>JV</b>	joint venture

<b>KPI</b>	key performance indicator
<b>LC</b>	life cycle
<b>LEU</b>	low-enriched uranium
<b>LLC</b>	limited liability company
<b>LRW</b>	liquid radioactive waste
<b>MSSC</b>	multipurpose shared services centre
<b>NF</b>	nuclear facilities
<b>NFA</b>	nuclear fuel assembly
<b>NFC</b>	nuclear fuel cycle
<b>NFE</b>	nuclear fuel element
<b>NPP</b>	nuclear power plant
<b>NRS</b>	nuclear and radiation safety
<b>OECD NEA</b>	Nuclear Energy Agency of the Organization for Economic Cooperation and Development
<b>R&amp;D</b>	research and development
<b>RAW</b>	radioactive waste
<b>RBMK</b>	high-power channel-type reactor
<b>ROSATOM, Corporation</b>	State Atomic Energy Corporation Rosatom
<b>Rostekhnadzor</b>	Federal Service for Environmental, Technological and Nuclear Supervision
<b>RR</b>	research reactor
<b>RSPP</b>	Russian Union of Industrialists and Entrepreneurs
<b>Russia</b>	Russian Federation
<b>SNF</b>	spent nuclear fuel
<b>SWU</b>	separative work unit
<b>UN</b>	United Nations

## APPENDICES

## Appendix 1. Use of the GRI Sustainability Reporting Standards

GRI Standard used by the Company <sup>40</sup>	Section of the Report where the Standard is used / comment
<b>Disclosures from Standard GRI 102: General Disclosures</b>	
<b>102-1 Name of the organization</b>	Company Overview
<b>102-2 Activities, brands, products, and services</b>	JSC Atomenergoprom Today
<b>102-3 Location of headquarters</b>	Company Overview
<b>102-4 Location of operations</b>	3.1. International Cooperation 3.2. International Business
<b>102-5 Ownership and legal form</b>	Company Overview
<b>102-6 Markets served</b>	2.2. Markets Served by Atomenergoprom 3.2. International Business
<b>102-7 Scale of the organization</b>	JSC Atomenergoprom Today Financial and Economic Results
<b>102-8 Information on employees and other workers</b>	8.1. Personnel Management
<b>102-10 Significant changes to the organization and its supply chain</b>	7.1. Corporate Governance
<b>102-11 Precautionary Principle or approach</b>	9.1. Nuclear and Radiation Safety; Occupational Safety and Health
<b>102-14 Statement from senior decision-maker</b>	Address by the Chair of the Board of Directors Address by the Director
<b>102-15 Key impacts, risks, and opportunities</b>	2.1. Business Strategy until 2030 7.2. Risk Management

<sup>40</sup> The Company used the 2016 version of the GRI Standards.

<b>102-16 Values, principles, standards, and norms of behaviour</b>	8.1. Personnel Management
<b>102-19 Delegating authority</b>	7.1. Corporate Governance
<b>102-22 Composition of the highest governance body and its committees</b>	7.1. Corporate Governance
<b>102-23 Chair of the highest governance body</b>	7.1. Corporate Governance
<b>102-35 Remuneration policies</b>	7.1. Corporate Governance 8.1. Personnel Management
<b>102-40 List of stakeholder groups</b>	8.3. Stakeholder Engagement
<b>102-42 Identifying and selecting stakeholders</b>	8.3. Stakeholder Engagement
<b>102-43 Approach to stakeholder engagement</b>	8.3. Stakeholder Engagement
<b>102-45 Entities included in the consolidated financial statements</b>	History of JSC Atomenergoprom
<b>102-48 Restatements of information</b>	There were no restatements in the 2018 report
<b>102-49 Changes in reporting</b>	In the reporting year, no significant changes were introduced compared to the previous reporting periods
<b>102-50 Reporting period</b>	Report Profile
<b>102-51 Date of most recent report</b>	Report Profile
<b>102-52 Reporting cycle</b>	Report Profile
<b>102-53 Contact point for questions regarding the report</b>	Contact Details
<b>102-55 GRI content index</b>	Appendix 1. Use of the GRI Sustainability Reporting Standards



### Disclosures from Standard GRI 103: Management Approach

<b>103-1 Explanation of the material topic and its Boundary</b>	Report Profile
<b>103-2 The management approach and its components</b>	See sections of the Report corresponding to disclosures from topic-specific Standards
<b>103-3 Evaluation of the management approach</b>	

### Disclosures from topic-specific GRI Standards

<b>Disclosure 203-2 from Standard 203: Indirect Economic Impacts</b>	8.2. Developing the Regions of Operation
<b>Disclosure 401-2 from Standard 401: Employment</b>	8.1. Personnel Management <sup>41</sup>
<b>Disclosure 402-1 from Standard 402: Labour/Management Relations</b>	8.1. Personnel Management
<b>Disclosure 403-2 from Standard 403: Occupational Health and Safety</b>	9.1. Nuclear and Radiation Safety; Occupational Safety and Health
<b>Disclosure 404-1 from Standard 404: Training and Education</b>	8.1. Personnel Management
<b>Disclosure 404-2 from Standard 404: Training and Education</b>	8.1. Personnel Management
<b>Disclosure 404-3 from Standard 404: Training and Education</b>	8.1. Personnel Management
<b>Disclosure 416-1 from Standard 416: Customer Health and Safety</b>	7.2. Risk Management 9.1. Nuclear and Radiation Safety; Occupational Safety and Health
<b>Disclosure 302-4 from Standard 302: Energy</b>	9.2. Environmental Safety

<sup>41</sup> Benefits specified in section 8.1.5. 'Social Policy' are not provided to part-time employees.

## Appendix 2. Summary consolidated financial statements of JSC Atomenergoprom based on consolidated financial statements for the year ended December 31, 2018, and the independent auditors' report



### Joint Stock Company Atomic Energy Power Corporation

### Summarised consolidated financial statements for the year ended 31 December 2018 and Independent Auditors' Report



## Independent Auditors' Report on the Summarised Consolidated Financial Statements

### To the Shareholders and the Board of Directors JSC "Atomenergoprom"

#### Opinion

The Summarised consolidated financial statements, which comprise the Summarised consolidated statement of financial position as at 31 December 2018, the Summarised consolidated statements of profit and loss, other comprehensive income, changes in equity and cash flows for the year then ended, and a related note, are derived from the audited consolidated financial statements of JSC "Atomenergoprom" ("the Company") and its subsidiaries (the "Group") for the year ended 31 December 2018.

In our opinion, the accompanying Summarised consolidated financial statements are consistent, in all material respects, with the audited consolidated financial statements, on the basis described in Note 1.

#### Summarised Consolidated Financial Statements

The Summarised consolidated financial statements do not contain all the disclosures required by International Financial Reporting Standards. Reading the Summarised consolidated financial statements and our report thereon, therefore, is not a substitute for reading the audited consolidated financial statements and our report thereon.

#### The Audited Consolidated Financial Statements and Our Report Thereon

We expressed an unmodified audit opinion on the audited consolidated financial statements in our report dated 11 April 2019. That report also includes the communication of key audit matters.

Audited entity: JSC Atomic Energy Corporation (JSC "Atomenergoprom")  
Registration No. in the Unified State Register of Legal Entities: 1077758081664  
Moscow, Russia

Independent auditor JSC "KPMG", a company incorporated under the Laws of the Russian Federation, a member firm of the KPMG network of independent member firm affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity.

Registration No. in the Unified State Register of Legal Entities: 1027700125628

Member of the Self-regulated organization of auditors "Russian Union of auditors" (Association). The Principal Registration Number of the Entity in the Register of Auditors and Audit Organizations No. 11603053203.



JSC "Atomenergoprom"  
Independent Auditors' Report on the Summarised Consolidated Financial Statements  
Page 2

#### Management's Responsibility for the Summarised Consolidated Financial Statements

Management is responsible for the preparation of the Summarised consolidated financial statements on the basis described in Note 1.

#### Auditors' Responsibility

Our responsibility is to express an opinion on whether the Summarised consolidated financial statements are consistent, in all material respects, with the audited consolidated financial statements based on our procedures, which were conducted in accordance with International Standard on Auditing (ISA) 810 "Engagements to Report on Summary Financial Statements".



Altukhov K.V.

JSC "KPMG"

Moscow, Russia

11 April 2019



Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of financial position as at 31 December 2018  
(in millions of Russian roubles)

	31 December 2018	31 December 2017 (restated*)
<b>Assets</b>		
<b>Non-current assets</b>		
Goodwill	40 636	33 693
Property, plant and equipment	1 748 911	1 730 026
Intangible assets	181 871	92 471
Investments in equity accounted investees	28 514	39 029
Financial assets measured at fair value through other comprehensive income	79 259	-
Financial assets measured at fair value through profit and loss	14 282	-
Available-for-sale financial assets	-	98 256
Contract assets, trade and other receivables	66 102	50 250
Non-current loans given	74 755	80 770
Deferred tax assets	11 218	10 849
Other non-current assets	99 422	72 724
<b>Total non-current assets</b>	<b>2 344 970</b>	<b>2 208 068</b>
<b>Current assets</b>		
Inventories	143 616	141 528
Income tax receivable	3 857	4 890
Other taxes receivable	1 659	1 306
Bank deposits	16 624	13 906
Contract assets, trade and other receivables	232 935	272 738
Current loans given	20 228	21 325
Cash and cash equivalents	369 869	228 016
Financial assets measured at fair value through other comprehensive income	26 794	266
Other current assets	2 130	1 802
<b>Total current assets</b>	<b>817 712</b>	<b>685 777</b>
<b>Total assets</b>	<b>3 162 682</b>	<b>2 893 845</b>

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\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of financial position as at 31 December 2018  
(in millions of Russian roubles)

	31 December 2018	31 December 2017 (restated*)
<b>EQUITY AND LIABILITIES</b>		
<b>Equity</b>		
Share capital	1 035 873	1 035 873
Share premium	361	361
Reserves	33 264	19 481
Retained earnings	872 731	712 521
<b>Total equity attributable to owners of the Company</b>	<b>1 942 229</b>	<b>1 768 236</b>
Non-controlling interests	324 397	283 193
<b>Total equity</b>	<b>2 266 626</b>	<b>2 051 429</b>
<b>Non-current liabilities</b>		
Loans and borrowings	122 790	145 256
Contract liabilities, trade and other payables	230 811	169 035
Grants and other financing	10 895	9 035
Employee benefits	11 980	12 932
Provisions	135 795	151 271
Deferred tax liabilities	57 819	33 029
Pension liabilities	16 840	-
<b>Total non-current liabilities</b>	<b>586 930</b>	<b>520 558</b>
<b>Current liabilities</b>		
Loans and borrowings	61 129	39 609
Income tax payable	2 182	6 078
Other taxes payable	20 911	19 397
Contract liabilities, trade and other payables	213 020	244 752
Grants and other financing	2 388	3 839
Provisions	9 496	8 183
<b>Total current liabilities</b>	<b>309 126</b>	<b>321 858</b>
<b>Total liabilities</b>	<b>896 056</b>	<b>842 416</b>
<b>Total equity and liabilities</b>	<b>3 162 682</b>	<b>2 893 845</b>

Director

Chief Accountant

«11» *Андреев* 2019

K.B. Komarov

V.A. Andrienko

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\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of profit and loss for the year ended 31 December 2018  
(in millions of Russian roubles)

	2018	2017 (restated*)
Revenue	769 490	747 452
Cost of sales	(479 818)	(478 383)
<b>Gross profit</b>	<b>289 672</b>	<b>269 069</b>
Distribution expenses	(17 736)	(14 602)
Administrative expenses	(67 381)	(64 952)
Other income	24 412	20 537
Other expenses	(45 719)	(47 017)
<b>Results from operating activities</b>	<b>183 248</b>	<b>163 035</b>
Finance income	62 760	25 309
Finance costs	(37 399)	(37 423)
Share of net (loss)/profit of equity accounted investees	(147)	2 947
Gain from change in accounting approach of joint ventures	47 749	-
<b>Profit before income tax</b>	<b>256 211</b>	<b>153 868</b>
Income tax expense	(48 556)	(37 781)
<b>Profit for the year</b>	<b>207 655</b>	<b>116 087</b>
<b>Profit for the period attributable to:</b>		
Owners of the Company	195 480	107 373
Non-controlling interests	12 175	8 714

Director

Chief Accountant

«11» April 2019



K.B. Komarov

V.A. Andrienko

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\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of comprehensive income for the year ended 31 December 2018  
(in millions of Russian roubles)

	2018	2017 (restated*)
<b>Profit for the year</b>	<b>207 655</b>	<b>116 087</b>
<b>Other comprehensive income/(loss)</b>		
<b>Items that will never be reclassified subsequently to profit and loss</b>		
Remeasurement of defined benefit liability	1 157	761
Income tax on other comprehensive income	(231)	(152)
<b>Total</b>	<b>926</b>	<b>609</b>
<b>Items that may be reclassified subsequently to profit and loss</b>		
Net change in fair value of financial assets measured in fair value	(562)	1 088
Hedging reserve	87	363
Foreign currency translation differences	16 036	(5 868)
Reclassification of foreign currency translation differences to statement of profit and loss	4 214	-
Income tax on other comprehensive income	112	(218)
<b>Total</b>	<b>19 887</b>	<b>(4 635)</b>
<b>Total other comprehensive income/(loss)</b>	<b>20 813</b>	<b>(4 026)</b>
<b>Total comprehensive income for the year</b>	<b>228 468</b>	<b>112 061</b>
<b>Total comprehensive income for the year attributable to:</b>		
Owners of the Company	209 263	105 492
Non-controlling interests	19 205	6 569

Director

Chief Accountant

«11» April 2019



K.B. Komarov

V.A. Andrienko

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\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).



Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of changes in equity for the year ended 31 December 2018  
(in millions of Russian roubles)

	Equity							Total equity	
	Attributable to equity holders of the Company								
	Share capital	Share premium	Fair value reserve for financial assets measured at fair value	Foreign currency translation reserve	Other reserves	Retained earnings	Non-controlling interests		
<b>Balance at 1 January 2017</b>	1 031 787	361	22	21 256	83	630 408	1 683 917	2 39 372	1 923 289
Effect of the transaction under common control	-	-	-	-	1	3 294	3 295	372	3 667
<b>Balance at 1 January 2017 (restated*)</b>	1 031 787	361	22	21 256	84	633 702	1 687 212	239 744	1 926 956
<b>Total comprehensive income for the year</b>	-	-	-	-	-	107 373	107 373	8 714	116 087
Profit for the period	-	-	-	-	-	-	-	-	-
<b>Other comprehensive income</b>	-	-	-	-	-	-	-	-	-
Foreign currency translation differences	-	-	-	(3 723)	-	-	(3 723)	(2 145)	(5 868)
Net change in fair value financial assets measured at fair value	-	-	1 088	-	-	-	1 088	-	1 088
Remeasurements of defined benefit liability	-	-	-	-	761	-	761	-	761
Hedging reserve	-	-	-	-	363	-	363	-	363
Income tax on other comprehensive income	-	-	(218)	-	(152)	-	(370)	-	(370)
<b>Other comprehensive loss</b>	-	-	870	(3 723)	972	-	(1 881)	(2 145)	(4 026)
<b>Total comprehensive income for the year</b>	-	-	870	(3 723)	972	107 373	105 492	6 569	112 061

\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

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Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of changes in equity for the year ended 31 December 2018  
(in millions of Russian roubles)

	Equity							Total equity	
	Attributable to equity holders of the Company								
	Share capital	Share premium	Fair value reserve for available-for-sale financial assets	Foreign currency translation reserve	Other reserves	Retained earnings	Non-controlling interests		
<b>Contributions by and distributions to owners</b>	-	-	-	-	-	(10 970)	(10 970)	(1 752)	(12 722)
Dividends	-	-	-	-	-	-	-	-	-
Shares issued	4 086	-	-	-	-	-	4 086	-	4 086
<b>Total contributions by and distributions to owners</b>	4 086	-	-	-	-	(10 970)	(6 884)	(1 752)	(8 636)
Changes in non-controlling interests in subsidiaries	-	-	-	-	-	(14 465)	(14 465)	38 632	24 167
Effect of the transaction under common control	-	-	-	-	-	(3 119)	(3 119)	-	(3 119)
<b>Total transactions with owners</b>	4 086	-	-	-	-	(28 554)	(24 468)	36 880	12 412
<b>Balance at 31 December 2017 (restated*)</b>	1 035 873	361	892	17 533	1 056	712 521	1 768 236	283 193	2 051 429

\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

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Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of changes in equity for the year ended 31 December 2018  
(in millions of Russian roubles)

	Equity									
	Attributable to equity holders of the Company									
	Fair value reserve for financial assets measured at fair value	Share premium	Share capital	Share premium	Foreign currency translation reserve	Other reserves	Retained earnings	Total	Non- controlling interests	Total equity
Balance at 31 December 2017 (restated*)	892	361	1 035 873	17 533	1 056	712 521	283 193	2 051 429		
Effect of application of IFRS 9	-	-	-	-	-	(5 387)	(3 037)	(8 624)		
Effect of application of IFRS 15	-	-	-	-	-	(71)	-	(71)		
Balance at 1 January 2018	892	361	1 035 873	17 533	1 056	706 863	280 156	2 042 734		
Total comprehensive income for the year	-	-	-	-	-	195 480	12 175	207 655		
Profit for the period	-	-	-	-	-	195 480	12 175	207 655		
Other comprehensive income	-	-	-	-	13 220	-	7 030	20 250		
Foreign currency translation differences	-	-	-	-	13 220	-	7 030	20 250		
Net change in fair value of financial assets measured at fair value	(562)	-	-	-	-	-	(562)	(562)		
Remeasurements of defined benefit liability	-	-	-	-	1 157	-	1 157	1 157		
Hedging reserve	-	-	-	-	87	-	87	87		
Income tax recognized in other comprehensive income	112	-	-	-	(231)	-	(119)	(119)		
Other comprehensive income	(450)	-	-	-	1 013	-	13 783	7 030	20 813	
Total comprehensive income for the year	(450)	-	-	-	1 013	195 480	19 205	228 468		

\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

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Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of changes in equity for the year ended 31 December 2018  
(in millions of Russian roubles)

	Equity									
	Attributable to equity holders of the Company									
	Fair value reserve for available-for-sale financial assets	Share premium	Share capital	Share premium	Foreign currency translation reserve	Other reserves	Retained earnings	Total	Non- controlling interests	Total equity
Contributions by and distributions to owners	-	-	-	-	-	-	(15 564)	(15 564)	(3 966)	(19 530)
Dividends	-	-	-	-	-	-	-	-	-	-
Total contributions by and distributions to owners	-	-	-	-	-	-	(15 564)	(15 564)	(3 966)	(19 530)
Changes in non-controlling interests in subsidiaries	-	-	-	-	-	-	(13 325)	(13 325)	30 914	17 589
Effect of the transaction under common control	-	-	-	-	-	-	(723)	(723)	(1 912)	(2 635)
Total transactions with owners	-	-	-	-	-	-	(29 612)	(29 612)	25 036	(4 576)
Balance at 31 December 2018	442	361	1 035 873	30 753	2 069	872 731	1 942 229	2 266 626	324 397	2 266 626

Director  
Chief Accountant



K.B. Komarov  
V.A. Andrienko

\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

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Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of cash flows for the year ended 31 December 2018  
(in millions of Russian roubles)

	2018	2017 (restated*)
<b>CASH FLOWS FROM OPERATING ACTIVITIES</b>		
Profit before income tax	256 211	153 868
<i>Adjustments for:</i>		
Depreciation and amortization	94 036	101 885
Impairment losses on property, plant and equipment, intangible assets and investments	24 598	30 789
Loss on disposal of property, plant and equipment, intangible assets and other assets	2 927	2 937
Share of net (loss)/profit of equity accounted investees	147	(2 947)
Gain from change in accounting approach of joint ventures	(47 749)	-
Net finance (income)/costs	(25 361)	12 114
Changes in estimated allowance for expected credit losses	6 488	3 954
Impairment losses on inventories	314	977
Change and accrual of provisions	(8 839)	(8 463)
Other	1 181	(1 616)
<b>Cash from operating activities before changes in working capital</b>	<b>303 953</b>	<b>293 498</b>
Change in inventories	(204)	20 557
Change in trade and other receivables	64 536	(43 995)
Change in other taxes receivable	(353)	(806)
Change in trade and other payables	(31 538)	22 482
Change in other taxes payable	1 514	5 028
<b>Cash flows from operations before income tax and interest paid</b>	<b>337 908</b>	<b>296 764</b>
Income tax paid	(58 039)	(35 049)
Interest paid	(17 812)	(21 005)
<b>Net cash from operating activities</b>	<b>262 057</b>	<b>240 710</b>
<b>CASH FLOWS FROM INVESTING ACTIVITIES</b>		
Interest received	12 702	13 794
Dividends received from equity accounted investees	38	4 092
Acquisition of property, plant and equipment	(134 945)	(148 574)
Acquisition of intangible assets	(6 684)	(10 371)
Purchase of notes	-	(69 796)
New deposits	(29 019)	(59 681)
Redemption of deposits	26 766	47 329
Acquisition of investments	(9 599)	(3 024)
Proceeds from business combination	4 921	112
Disposal of subsidiaries	(23)	2 709
Loans given to other entities	(9 649)	(24 909)
Proceeds from loans given to other entities	25 697	13 973
Proceeds from disposal of property, plant and equipment and intangible assets	4 397	9 701
Proceeds from grants and other financing	6 009	5 881
<b>Net cash used in investing activities</b>	<b>(109 389)</b>	<b>(218 764)</b>

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\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

Joint Stock Company Atomic Energy Power Corporation  
Summarised consolidated statement of cash flows for the year ended 31 December 2018  
(in millions of Russian roubles)

	2018	2017 (restated*)
<b>CASH FLOWS FROM FINANCING ACTIVITIES</b>		
Proceeds from issue of share capital	-	1 836
Proceeds from loans and borrowings	148 710	171 545
Repayment of borrowings and bonds	(166 108)	(272 231)
Dividends paid	(18 350)	(10 333)
<b>Net cash used in financing activities</b>	<b>(35 748)</b>	<b>(109 183)</b>
<b>Net increase/(decrease) in cash and cash equivalents</b>	<b>116 920</b>	<b>(87 237)</b>
Cash and cash equivalents at the beginning of the period	227 665	312 154
Effect of movements in foreign exchange rates on cash and cash equivalents	24 989	2 748
<b>Cash and cash equivalents at the end of the period</b>	<b>369 574</b>	<b>227 665</b>

Director

Chief Accountant

«11» апреля 2019



K.B. Komarov

V.A. Andrienko

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\*Restatement due to retrospective inclusion of a transaction under common control in the consolidated financial statements (see Note 1).

Joint Stock Company Atomic Energy Power Corporation  
Note to the summarised consolidated financial statements for the year ended 31 December 2018  
(in millions of Russian roubles)

**1 The criteria for the preparation of summarised consolidated financial Statements**

These summarised consolidated financial statements, which comprise the summarised consolidated statement of financial position as at 31 December 2018, the summarised consolidated statement of profit and loss, the summarised consolidated statements of comprehensive income, the summarized consolidated statement of changes in equity and the summarised consolidated statement of cash flows for 2018 have been prepared by extraction, without any modification, the relevant statements from included in the consolidated financial statements of Joint Stock Company Atomic Energy Power Corporation and its subsidiaries prepared in accordance with International Financial Reporting Standards for the year ended 31 December 2018 (hereinafter "consolidated financial statements"). Comparative data in the consolidated financial statements was restated due to retrospective inclusion of a transaction under common control. All notes to the consolidated financial statements were not included in these summarised consolidated financial statements.

Accordingly, these summarised consolidated financial statements are consistent with those consolidated financial statements, which are available on the official website of Joint Stock Company Atomic Energy Power Corporation.





## 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](mailto: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:**

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**3. Which topics do you think should be covered in the next Report:**

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**4. Your recommendations and additional comments:**

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**5. Please specify which stakeholder group you represent:**

- |  |  |
|--|--|
| <input type="checkbox"/> Employee of JSC Atomenergoprom or ROSATOM                                 | <input type="checkbox"/> Representative of a customer / consumer of goods and services |
| <input type="checkbox"/> Employee of an organization forming part of JSC Atomenergoprom or ROSATOM | <input type="checkbox"/> Representative of a business partner                          |
| <input type="checkbox"/> Representative of the federal government                                  | <input type="checkbox"/> Representative of a non-governmental organization             |
| <input type="checkbox"/> Representative of a regional government                                   | <input type="checkbox"/> Representative of the media                                   |
| <input type="checkbox"/> Representative of a local government                                      | <input type="checkbox"/> Representative of the expert community                        |
| <input type="checkbox"/> Representative of a contractor/supplier                                   | <input type="checkbox"/> Other (please specify)  |

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