

PERFORMANCE RESULTS



Sakhalinskaya GRES-2. Commissioned in 2019

Economics and finance

Key financial indicators¹ [103-2]

RusHydro Group's financial results reflect a decrease in electricity generation in 1H 2019 due to lower water inflow to the majority of HPP reservoirs, a drop in DAM prices in Siberia during 2H 2019, and the impairment of fixed assets reaching its peak as a result of commissioning of large hydropower plants in the Far East.

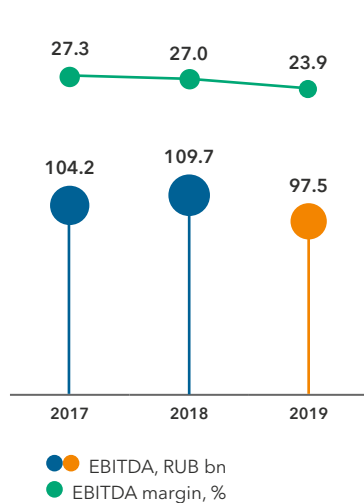
Income indicators

Metric ²	2017	2018	2019	2019-2018
EBITDA, RUB mn	104,180	109,673	97,544	-12,129
EBITDA margin, %	27.3	27.0	23.9	-3.1 p.p.
Net income, RUB mn	24,774	31,837	643	-31,194
Net margin, %	6.5	7.8	0.2	-7.6 p.p.
Earnings per share (EPS), RUB	0.0656	0.0739	0.0121	-0.0618
Return on assets (ROA), %	2.8	3.4	0.1	-3.3 p.p.
ROE, %	4.5	5.5	0.1	-5.4 p.p.
Adjusted net income, RUB mn	65,738	70,757	51,547	-19,210

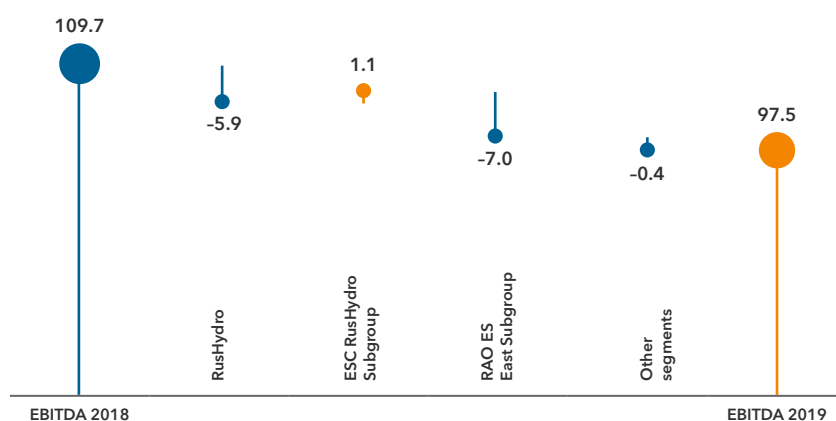
In the reporting period, EBITDA declined by 11.1% y-o-y to RUB 97.5 bn.

Net income amounted to RUB 643 mn (down by 98.0%), while adjusted net income totaled RUB 51,547 mn (down by 27.1%).

EBITDA and EBITDA margin



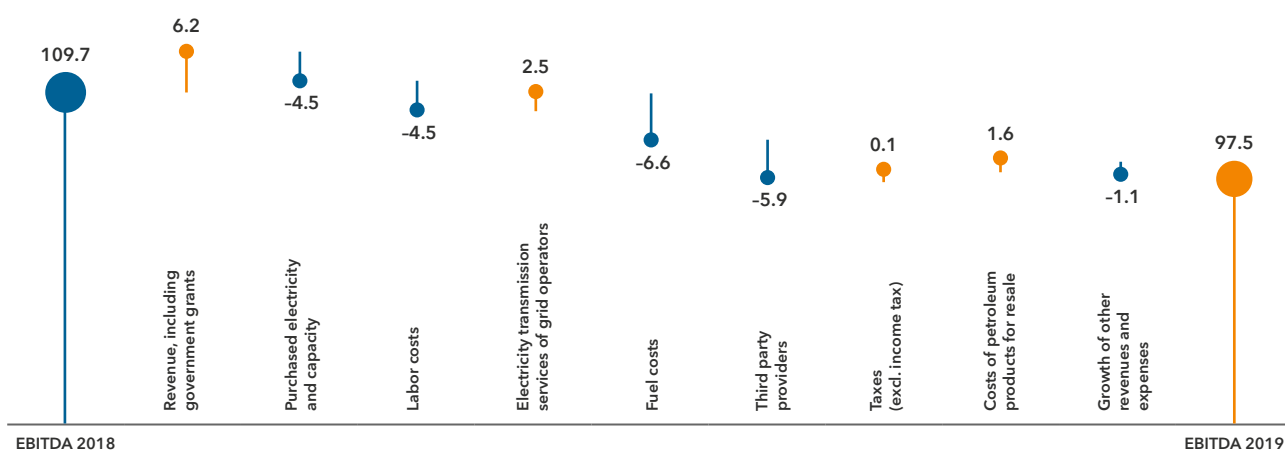
Factor analysis of EBITDA by segment, RUB bn



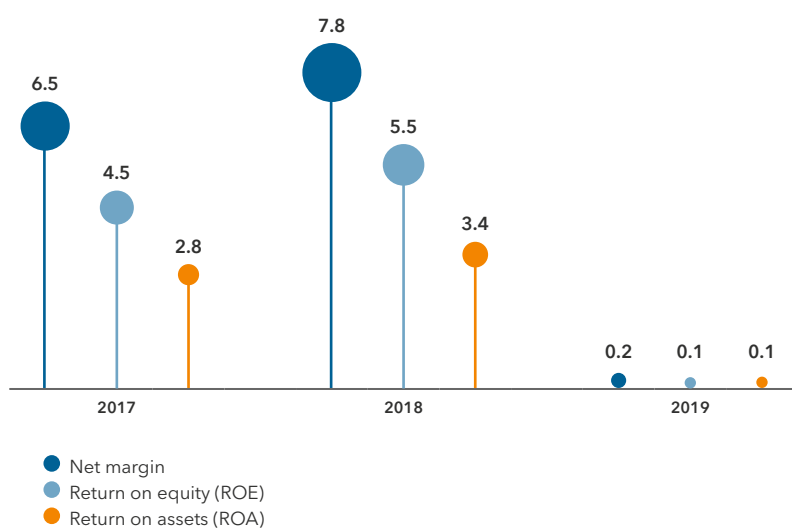
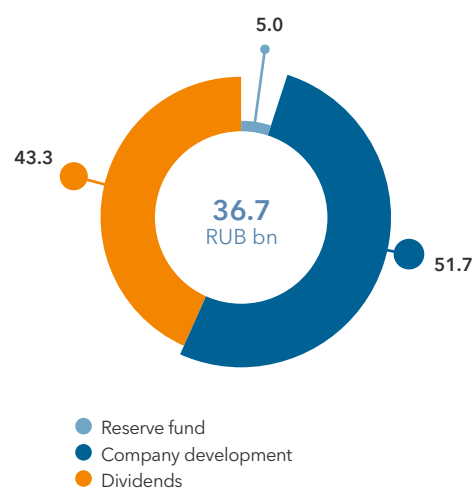
¹ This section provides data in line with RusHydro Group's 2018 and 2019 IFRS consolidated statements (unless stated otherwise) incorporating the changes in the Group's accounting policy following the adoption of IFRS 16 Leases [102-48].

² Net margin and EBITDA margin indicators factor in other operating income generated by RusHydro Group in 2017 (RUB 0.7 bn), in 2018 (RUB 5.5 bn) and in 2019 (RUB 1.2 bn) and are calculated as gain on financial assets at fair value through profit or loss, income from court rulings awarded, and dividends received.

Factor analysis of EBITDA (expenses), RUB bn



Margin performance, %

Profit distribution for 2018¹, %

Detailed information on the distribution of profit allocated, inter alia, to the Company's development is available on the Company's website at <http://www.eng.rushydro.ru/>

¹ Net profit of PJSC RusHydro as per RAS.

Total revenue

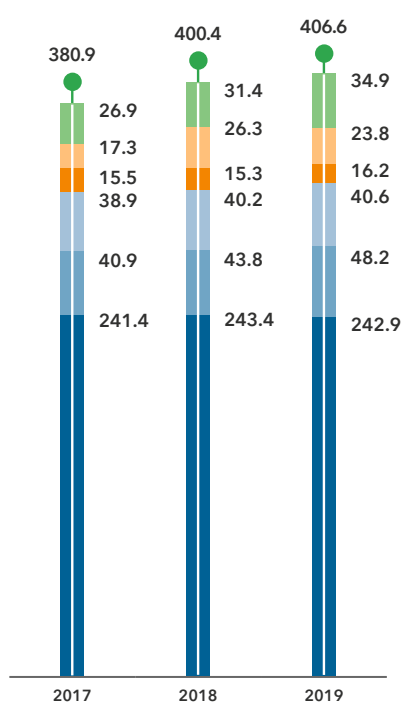
The Group's total revenue (including government grants) in 2019 increased by 1.6% y-o-y to RUB 406.6 bn against RUB 400.4 bn in the previous reporting period.

Revenue

Key drivers behind the change in revenue include:

- a 0.2% decrease in total revenue from electricity sales associated with lower power generation by RusHydro's HPPs (down by 4.4%);

Total revenue performance and breakdown, RUB bn



- Electricity sales
- Capacity sales
- Heat and hot water sales
- Government grants (regional)
- Government grants (tariff adjustment)
- Other revenue
- Total revenue

- growth in revenue from electricity sales by RAO ES East Subgroup by 4.7% as a result of higher average sales prices and volumes;
- a 1.9% increase in ESC RusHydro Subgroup revenue from the sale of electricity following the conclusion of new contracts with customers and due to higher average sales prices;
- growth in revenue from capacity sales by 9.9% on the back of higher actual prices and volumes;
- growth in revenue from heat and hot water sales by 1.2%, mainly attributable to increased heat tariffs and net supply;
- an 11.1% increase in other revenue due to substantial revenue growth on the back of the utility connection to the grids of Far Eastern Distribution Company (DRSK). At the same time, revenue from resale of petroleum products to VOSTEC and electricity transmission to Yakutskenergo dropped considerably.

Government grants [201-4]

In accordance with applicable laws of Russian regions, some companies of the Group received government grants to fund the costs for difference between the approved electricity and heat tariffs and tariffs in the economic feasibility study, as well as the costs for fuel and purchased electricity.

In 2019, RusHydro Group received RUB 39,983 mn in government grants.

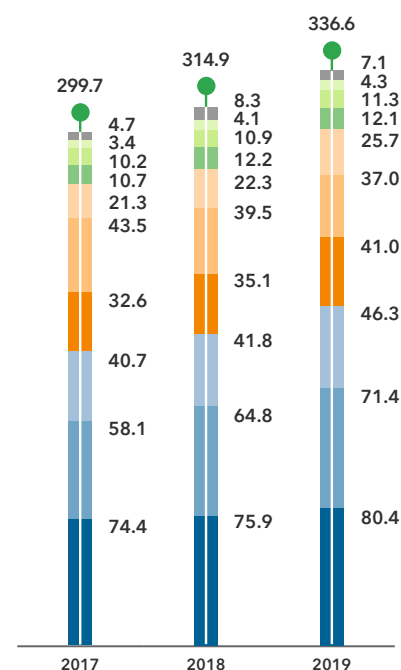
The total grants received by the Group's guaranteed suppliers under the Russian Government's Resolution No. 895 On the Establishment of Base Electricity (Capacity) Rates (Tariffs) for in the Far Eastern Federal District dated July 28, 2017 amounted to RUB 23,794 mn in 2019.

The amount of regional government grants received by RusHydro Group in 2019 totaled RUB 16,189 mn. The grants were provided to companies in the following regions: Kamchatka Territory, Republic of Sakha (Yakutia), Magadan Region, Chukotka Autonomous Area, and the Sakhalin Region.

Operating expenses

In 2019, total operating costs increased by 6.9% year-o-year, from RUB 314.9 bn to RUB 336.6 bn.

Operating costs by year and type, RUB bn



- Labor costs
- Fuel costs
- Purchased electricity and capacity
- Third party services
- Grid companies' services
- Depreciation and amortization
- Taxes (excl. income tax)
- Other materials
- Water use costs
- Other costs
- Total costs

The change in operating costs was driven by:

- a 5.9% increase in labor costs due to indexation of rates and salaries according to the effective collective bargaining agreements;
- a 10.3% rise in fuel costs resulting from higher fuel prices following procurement procedures at DGK, and the growth of purchase prices for petroleum products and their increased use due to imposed restrictions on the use of gas at Kamchatskenergo;
- a 10.8% increase in costs of purchased electricity and capacity (covered by incremental revenue) at RAO ES East Subgroup following a change in

volumes and tariffs (as a result of, inter alia, Yakutskenergo entering the WEEM);

- growth in costs for third party services by 16.8% as a result of a rise in costs of utility connection to the grids of DRSK (covered by revenue) and repair and maintenance expenses at Yakutskenergo amid the lowering of lease costs (due to the adoption of IFRS 16 Leases starting January 1, 2019) and heat purchase and transportation costs;
- a 6.4% decrease in costs of electricity transmission services of grid operators, mainly at Yakutskenergo, on the back of lowered costs of electricity transmission to Far East Energy

Management Company (as its grids became part of the Unified National Electric Grid starting January 1, 2019 and were transferred to FGC UES, resulting in a substantial reduction in the transmission tariff);

- a 15.1% rise in depreciation and amortization costs due to the commissioning of Vostochnaya CHPP and off-site facilities of Sakhalinskaya GRES-2 in 2H 2018, the launch of Nizhne-Bureyskaya HPP in 2H 2019, and the adoption of IFRS 16 Leases starting January 1, 2019, and depreciation of right-of-use assets;
- a 15.0% decrease in other expenses, including at VOSTEC as a result of reduced costs of petroleum products for resale.

Direct economic value generated and distributed ^[201-1]

Metrics, RUB bn	2017	2018	2019
Economic value generated	383.6	402.1	405.6
Operating profit	342.2	353.4	362.2
Interest income and dividends received	32.7	8.9	7.1
Losses/gains from sale of assets and indemnity payments	9.6	(1.8)	(1.6)
Government grants	(0.9)	41.6	37.9
Economic value distributed	300.8	316.6	335.7
Operating costs	190.5	201.3	215.2
Salaries, allowances and other benefits	74.4	75.9	80.4
Payments to capital providers	10.4	11.9	11.7
Payments to government	23.7	26.1	26.9
Investments in communities	1.8	1.4	1.5
Economic value retained	82.8	85.5	69.9

Assets and liabilities

As at December 31, 2019, RusHydro Group's assets declined by 0.7% (RUB 6.8 bn) y-o-y to RUB 925.1 bn.

The change in assets is mainly driven by:

- an increase in the cost of fixed assets due to the implementation of the Group's investment program (including impairment);
- an increase in other current assets due to a larger share of funds placed on deposits with maturities of over 90 days (amid a decrease in cash equivalents);
- a decline in receivables and advances paid as a result of payments under agreements on the sale of Inter RAO shares and the offset of advance payments for the utility connection of FGC UES to DRSK.

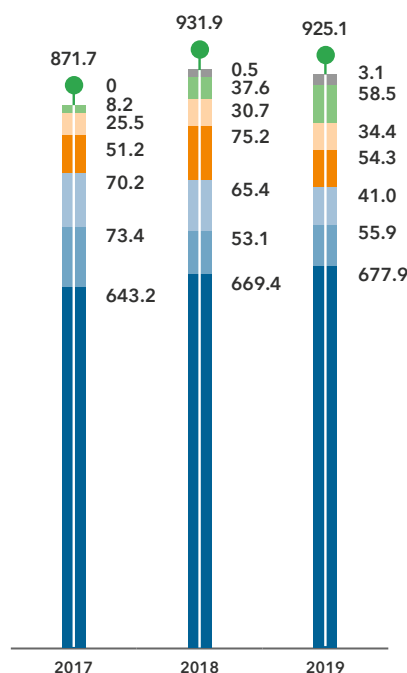
As at the end of the reporting period, the Group's liabilities grew by 2.8% (RUB 9.5 bn) y-o-y to RUB 355.2 bn.

The ratio of own and borrowed funds in 2019 amounted 62.3%.

In November 2019, RusHydro Group placed Eurobonds issued by special purpose entity RusHydro Capital Markets Eurobonds DAC. The issue size totaled RUB 15.0 bn. The Eurobonds have a maturity of five years and a coupon rate of 6.8% per annum.

As at December 31, 2019, the Group recorded a liability of RUB 7.0 bn associated with the issue of additional shares registered by the Bank of Russia on August 27, 2018. In April–May 2019, as part of the pre-emptive right exercise, RusHydro

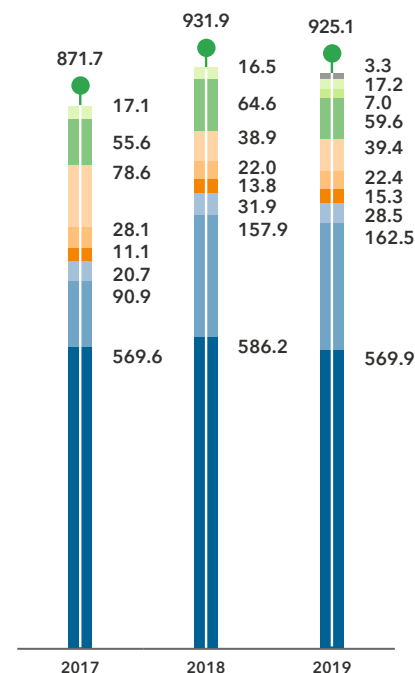
Assets, RUB bn



- Fixed assets
- Non-current assets other than fixed assets
- Cash and cash equivalents
- Receivables and advances paid
- Inventory
- Other current assets
- Non-current assets and assets of disposal group classified as held for sale
- Total assets

placed 7,000,092,298 additional shares among its shareholders (49.95% of the additional offering) with a par value of RUB 1,0 per share.

Equity and Liabilities, RUB bn



- Equity
- Long-term borrowings
- Non-deliverable forward for shares
- Deferred tax liabilities
- Other non-current liabilities
- Short-term borrowings
- Payables and other accruals
- Issued shares payables
- Tax payables
- Liabilities of disposal group classified as held for sale
- Total equity and liabilities

In December 2019, RusHydro Group signed an agreement on the sale of 90% of MEK shares to RazTES for consideration of RUB 173 mn. In accordance

with the agreement, the shares were transferred to the buyer in March 2020 after MEK refinanced its obligations to the European Bank for Reconstruction and Development and Asian Development Bank and after RusHydro's surety contracts with respect to these obligations were terminated in full¹. After the closure of the deal, RusHydro Group's financial debt went down by RUB 4 bn² and the Group's loan

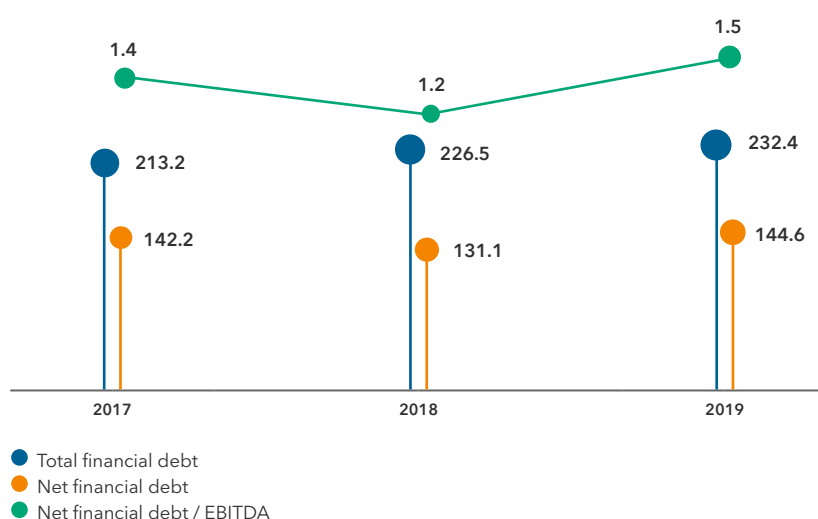
portfolio was no longer exposed to currency risks.

The fair value of the non-deliverable forward transaction for RusHydro's shares recognized in the Company's liabilities went down from RUB 31,986 mn (as at December 31, 2018) to RUB 28,510 mn (as at December 31, 2019), which helped to reduce RusHydro's leverage. The change in fair

value of the non-deliverable forward is mainly attributable to improvement in RusHydro's share price throughout the reporting period. Should the Company's share price continue on its upward trend, a further reduction in forward transaction liabilities is expected, with gains from the forward contract recognized in RusHydro Group's financial statements under the IFRS.

Debt portfolio management ^[103-2]

Total and net financial debt, RUB bn, and leverage



RusHydro Group continues to maintain a balanced debt profile. In 2019, short-term debt remained almost flat y-o-y (an increase of 1.4%), while long-term debt went up by 2.9%. At the end of 2019, RusHydro Group's total and net financial debt³ stood at RUB 232.4 bn and RUB 144.6 bn respectively.

The level of leverage confirms RusHydro Group's strong financial position. At the end of the reporting period, net financial debt / EBITDA stood at 1.48x, which is more than comfortable for RusHydro Group given the internal limit of 2.0x.

2019 saw a y-o-y decrease in long-term borrowings (down by 36%), mainly due to a reduction in the Group's activities in international capital markets following the peak year of 2018, when RusHydro completed three issues of Eurobonds for RUB 35 bn and 1.5 bn offshore Chinese renminbi, compared to just one issue of Eurobonds for RUB 15 bn in 2019.

Short-term debt demonstrated a slight increase (of 1.4%). In 2019, RusHydro Group honored all its obligations under coupon payments, loan agreements, and debt securities redemption. In April 2019, the Company fully redeemed its series BO-P04 exchange bonds for a total of RUB 15 bn.

During 2019, companies RusHydro Group worked on refinancing more expensive debt. The weighted average rate of ruble-denominated borrowings at the end of the year stood at about 7.6% per annum, compared to 8% per annum at the end of 2018.

¹ As at December 31, 2019, assets and liabilities of MEK are recognized as assets and liabilities of disposal group classified as held for sale.

² Based on the USD exchange rate as at the closure date (March 11, 2020).

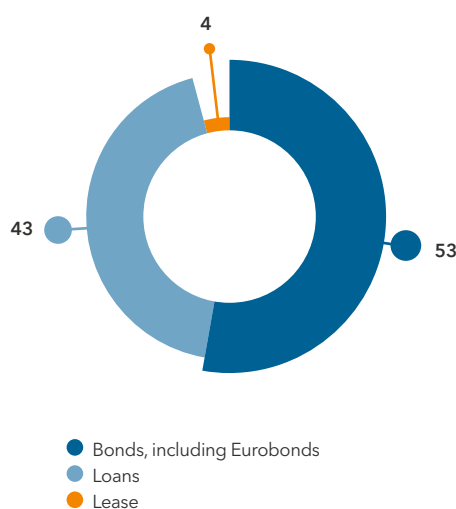
³ Net financial debt is calculated as financial debt less cash and cash equivalents (including bank deposits for up to one year) under the Group's IFRS financial statements at the end of the reporting year. Financial debt includes long-term and short-term liabilities (less accrued interest payable), including liabilities of disposal group, liabilities under the non-deliverable forward for shares, and cross currency swap liabilities in accordance with the Group's financial statements under the IFRS at the end of the reporting year.

In terms of currency and stability of the interest rate, the Group's financial debt (excluding liabilities on the non-deliverable forward for shares, cross currency swap, and lease obligations) as at December 31, 2019 had the following structure: 98% was represented by ruble-denominated debt¹, with 90% comprised by fixed-rate debt, which indicates minimum levels of currency and interest rate risks for RusHydro Group's financial debt².

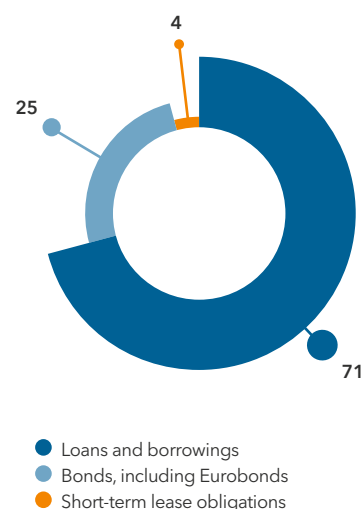
In 2019, the long-term part of the Group's borrowings increased by RUB 4.6 bn (2.9%) to RUB 162.5 bn, mainly driven by long-term financing raised through a ruble-denominated Eurobond issue in 2019.

At the end of the reporting period, the short-term part of the Group's borrowings was virtually flat y-o-y and amounted to RUB 39.4 bn (an increase of RUB 536 mn, or less than 1.4%). The Group has a balanced debt repayment schedule, including

Structure of the long-term debt to be redeemed after twelve months from the reporting date, %



Structure of the short-term debt to be redeemed within twelve months from the reporting date, %



debt due in 2020. Current short-term liabilities reflect maturing long-term loans and bonds (including local bonds totaling RUB 10 bn). As the remaining drawdown for the Group's current

loan agreements amounted to more than RUB 206 bn at the end of 2019 and substantially exceeds the need for short-term debt refinancing, financial risks are considered insignificant.

Bonds

Local bonds

As at December 31, 2019, the outstanding bonds of RusHydro include six issues for a total of RUB 55.0 bn (the aggregate value of outstanding bonds is RUB 13.2 bn).

Eurobonds

As at December 31, 2019, the outstanding bonds of RusHydro include five issues of Eurobonds for a total of RUB 70 bn and 1.5 bn offshore Chinese renminbi placed by RusHydro Capital Markets

Eurobonds DAC company on the Irish Stock Exchange under Reg S. All issues have confirmed long-term ratings from at least two leading international rating agencies and ACRA aligned with RusHydro's credit rating.

¹ Including hedging FX liabilities to issue Eurobonds denominated in offshore Chinese renminbi

² Following the sale of the Group's 90% stake in MEK in March 2020, RusHydro's loan portfolio is no longer exposed to currency risks.

Key parameters of RusHydro's bond issues

Issue parameters			Series 01 and 02 bonds	Series 07 and 08 bonds	Series 09 bonds	Series BO-P05 exchange bonds
Bond type	Non-convertible certificated interest-bearing bearer bonds with mandatory centralised custody	State registration number	4-01-55038-E 4-02-55038-E	4-07-55038-E 4-08-55038-E	4-09-55038-E	4B02-05-55038-E-001P
Face value	RUB 1,000	Registration date	23.09.2010	27.12.2012	27.12.2012	09.06.2017
Nominal amount of each issue	Series 01 – RUB 10 bn Series 02 – RUB 5 bn Series 07, 08, 09 – RUB 10 bn each Series BO-P05 – RUB 10 bn	Placement date /	25.04.2011	14.02.2013	28.04.2015	16.06.2017
		Offer date /	22.04.2016	13.02.2018	27.10.2017 21.04.2023	
		Maturity date	12.04.2021	02.02.2023	15.04.2025	12.06.2020
Offering price	100%	Coupon rate	Coupons 1-10 – 8.0% p.a. Coupons 11-20 – 9.5% p.a.	Coupons 1-10 – 8.5% p.a. Coupons 11-20 – 0.1% p.a.	Coupons 1-5 – 12.75% p.a. Coupons 6-16 – 7.5% p.a. Coupons 17-20 – coupon rate to be determined by the issuer	Coupons 1-6 – 8.2% p.a.
Form of offering	Open subscription, bookbuilding	Yield	8.16%	8.68%	13.16%	8.37%
Coupon payments	Semi-annual	Last trade yield as at December 31, 2019	Series 01 – 7.85% Series 02 – 5.12%	Series 07 – 4.12% Series 08 – 4.45%	Series 09 – 6.47%	Series BO-P05 – 5.80%

Key parameters of Eurobond issues

Offering date	Maturity date	Issue currency	Amount, bn	Coupon rate, % p. a.	Coupon payments	ISIN
28.09.2017	28.09.2022	RUB	20.0	8.125	Semi-annual	XS1691350455
15.02.2018	15.02.2021	RUB	20.0	7.40	Semi-annual	XS1769724755
21.11.2018	21.11.2021	CNH	1.5	6.125	Semi-annual	XS1912655054
27.11.2018	27.01.2022	RUB	15.0	8.975	Semi-annual	XS1912654677
25.11.2019	25.11.2024	RUB	15.0	6.80	Semi-annual	XS2082937967

Cash flows

As at December 31, 2019, RusHydro Group's cash and cash equivalents amounted to RUB 41.0 bn (compared to 65.4 bn as at December 31, 2018).

In 2019, RusHydro Group's key sources to finance its investing activities were income, depreciation charges, VAT refunds, other own funds of the Company, borrowings, and the federal budget.

In 2019, cash flow from operating activities decreased by RUB 8.9 bn, or 10.5% y-o-y. The Group's cash flows from operating activities before changes in working capital declined by RUB 12.2 bn, or 11.1%, as a result of a lower operating income.

In 2018, RusHydro Group sold its 4.9% stake in PJSC Inter RAO to Inter RAO Group for RUB 17.2 bn. RusHydro Group received the cash in several tranches: RUB 2.2 bn

in 2018 and RUB 15.0 bn in 2019. The amounts were used to finance the Group's investing activities. As a result of these proceeds, total cash outflows in investing activities in 2019 decreased by RUB 11.4 bn, or 13.2%, y-o-y.

The ten-fold y-o-y increase in cash used in financing activities in 2019 (by RUB 22.2 bn) was mainly due to a decrease in long-term borrowings and higher dividend payments.

● Cash flow from operating, investing and financing activities, RUB bn

Cash flows	2017	2018	2019
Cash flows from operating activities	78.1	84.6	75.7
Cash flows used in investing activities	(60.0)	(87.0)	(75.6)
Cash flows used in financing activities	(15.1)	(2.3)	(24.4)

Tax payments

RusHydro Group is one of the main taxpayers in the regions of its operation. In 2019, tax payments

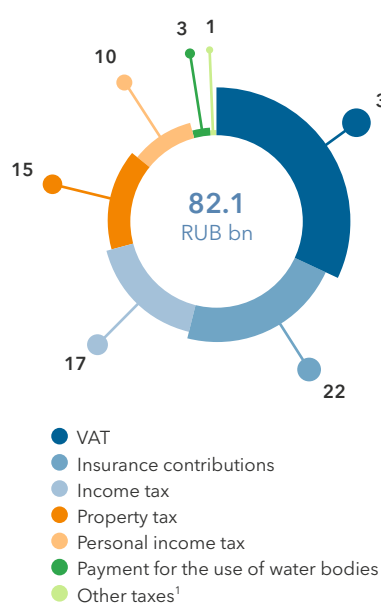
to budgets of all levels totaled RUB 82.1 bn, including RUB 35.1 bn to regional budgets.

In 2019, RusHydro Group paid taxes to regional and local budgets in 43 Russian regions.

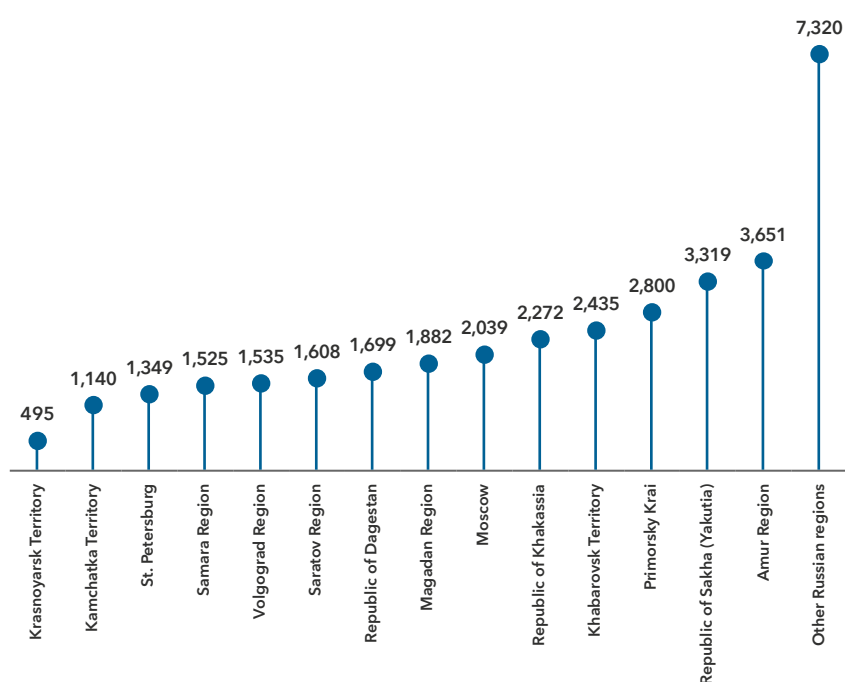
Tax payments to budgets of different levels, RUB mn

Level of budget, RUB mn	2017	2018	2019
Federal	42,904	46,168	46,458
including insurance contributions	15,963	16,864	18,043
Regional	33,653	34,275	35,069
Local	788	733	594
Total	77,345	81,176	82,121

Tax payments by RusHydro Group in 2019, %



Tax payments to regional budgets in 2019, RUB mn



For more information on taxes paid to regional and local budgets with a breakdown by Russian region, see [Appendix No. 22](#).

¹ Other taxes include:

- tax on income received by Russian entities from Russian and foreign agents;
- mineral extraction tax;
- water tax;
- transport tax;
- land tax;
- pollution charge;
- land rent.

Production and sales

Key production assets

Generating facilities

Electricity and heat production is the key business of RusHydro Group. The Group's asset structure includes over 90 renewable energy facilities in Russia, along with some thermal power plants and electrical grid assets in the Far East.

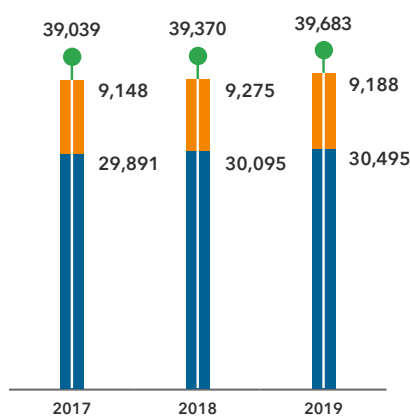
As at January 1, 2020, the installed capacity of RusHydro power plants, including Boguchanskaya HPP, totaled 39,683 MW¹, up 313 MW² y-o-y. The installed heat

capacity increased to 19,021 Gcal/h, up 97.3 Gcal/h.

The growth in the installed capacity of the Group's facilities was driven also by the commissioning of Nizhne-Bureyskaya HPP (320 MW) and Sakhalinskaya GRES-2 (120 MW) as well as the implementation of the Comprehensive Modernization Program at Saratovskaya HPP (+12 MW), Novosibirskaya HPP (+10 MW), Votkinskaya HPP (+30 MW) and Zhigulevskaya HPP (+10,5 MW).

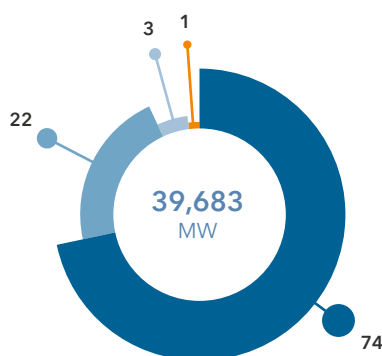
The installed capacity structure shows the prevalence of large HPPs generating 29,370 MW³, or 74.0% of the total installed capacity, while 8,506 MW, or 21.4% of the installed capacity, is generated by the TPPs of RAO ES East Subgroup. The Group's assets also include 1,200 MW Zagorskaya PSPP, 300 MW Zelenchukskaya HPP-PSPP and 16 MW Kubanskaya PSPP. The Group's renewable energy facilities, including SHPP (up to 25 MW), GeoPP, WPP and SPP, account for a total installed capacity of 291 MW.

Installed capacity, MW



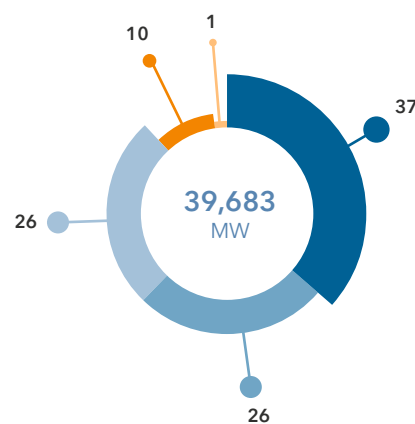
- RAO ES East Subgroup
- RusHydro Subgroup
- RusHydro Group

Installed capacity structure by generation type, % [EU1]



- HPP
- TPP
- PSPP, HPP-PSPP
- RES

Installed capacity structure by regulatory treatment, % [EU1]



- Price zone 1
- Price zone 2
- Non-price zone of UES East
- Isolated areas
- Armenian market

¹ Including PJSC Boguchanskaya HPP (a joint venture of PJSC RusHydro and RUSAL) and HPP-1, HPP-2 and HPP-3 of PJSC KamGEK, assets held in trust.

² Changes related to both commissioning and decommissioning of existing capacities

³ HPPs with an installed capacity of over 25 MW.

Electric grid

The businesses of JSC RAO ES East ensure power transmission and distribution both in UES of the East and in isolated energy systems.

As at the end of 2019, the total length of DRSK and PJSC Yakutskenergo transmission power lines in UES East and 35-220 kV isolated energy systems increased by 463 km and reached 35,429 km.

At the end of 2019, the total length of 0.4-10 kV overhead and cable power lines made up 69,592 km, down 190 km y-o-y.

At the end of the reporting period, the total number of transformer substations decreased to 21,953, down 47, with their total capacity hitting 30,514 MVA, up 1,197 MVA. The changes in the length of transmission power lines and in the number and capacity of transformer substations are

primarily associated with the housing construction in large cities of the Far East, grid upgrade, and reduction of PJSC Sakhalinenergo grid capacities.

When managed by RusHydro, grid facilities of the Far East, including JSC DRSK, have been demonstrating a robust improvement in both its operating and production performance. Net profit increased from the negative RUB 1 bn in 2012 to RUB 2.7 bn in 2019.

Measures put in place by the Company helped to bring losses down to 7.31% for 2019 (compared to 9.41% in 2007). The target by 2024 is 7.08%, which is considerably below the average across IDGCs that are part of Rosseti Group.

Per unit metrics at JSC DRSK (output per employee of RUB 5,704 thousand per

employee and productivity of RUB 3.26 thousand per man-hour) are also significantly above the average Russian levels calculated for IDGCs.

Between 2011 and 2019, JSC DRSK provided utility connections to 92 thousand applicants to the total maximum capacity of 2,716 MW. Since 2016, Far Eastern Hectare, a large-scale program, has been run across the Far Eastern Federal District. As part of the project, JSC DRSK has provided connections to electrical grids for 693 applicants, with another 457 facilities to be connected going forward.

As a result of Yakutskenergo entering the WECM in 2019, RusHydro updated the information on the length of transmission power lines and the number and capacity of transformer substations, provided below.

Length of overhead and underground transmission power lines by regulatory regime¹, km [EU4]

Grid class	2017		2018		2019	
	WECM	REM	WECM	REM	WECM	REM
Length of transmission power lines						
Overhead power lines						
220 kV	–	5,179.9	–	5,179.9	2,041	3,241.9
110 kV	7,939.7	5,903.7	7,975.2	5,898	10,568.8	3,482.5
35 kV	8,806.9	6,997.1	8,856	6,916.5	1,2479	3,471.9
Cable power lines						
110 kV	40.1	1.6	40.1	4.7	41.2	4.6
35 kV	83.5	4.0	91.6	4.0	91.6	6.1
Length of distribution power lines						
Overhead power lines						
6 (10) kV	20,539.6	10,957.3	20,621.8	11,025.4	28,035.4	3,596.2
0.4 kV	20,531.9	11,458.8	20,503.1	11,677.3	28,020.8	4,109.2
Cable power lines						
6 (10) kV	1,155.7	2,040.8	1,267.9	2,085.8	1,880.2	1,317.2
0.4 kV	1,120.4	1,450.7	1,119.7	1,480.4	1,785.6	847.2
Total	104,211.7		104,747.4		105,020.4	

¹ Measured by chain.

Number and installed capacity of 6–220 kV transformer substations [EU4]

Metric	Unit	2017		2018		2019	
		WECM	REM	WECM	REM	WECM	REM
Number of 220 kV transformer substations	pcs	1	28	1	27	8	24
Capacity of 220 kV transformer substations	MVA	80	3,652	80	3,351	1,152	3,117
Number of 110 kV transformer substations	pcs	242	140	246	139	317	73
Capacity of 110 kV transformer substations	MVA	7,371	4,496	7,667	4,694	10,119	2,596
Number of 35 kV transformer substations	pcs	476	383	479	386	656	228
Capacity of 35 kV transformer substations	MVA	4,381	1,613	4,446	1,715	4,965	1,365
Number of 6 (10) kV transformer substations	pcs	10,943	9,451	11,121	9,601	16,542	4,105
Capacity of 6 (10) kV transformer substations	MVA	3,512	3,672	3,565	3,799	5,368	1,832
Total substations	pcs	21,664		22,000		21,953	
Total capacity of substations	MVA	28,777		29,317		30,514	

In 2019, total electricity fed to the grids of the Far Eastern Federal District stood at 35,282 mn kWh, up 145 mn kWh y-o-y. The grid losses amounted to 9.8%, up 0.2% y-o-y. The change in relative losses in 2019 was driven by a different operating environment following PJSC Yakutskenergo's

accession to WECM – large consumers of Yakutia power grid switched to WECM. This resulted in lower electricity inflow in the Western energy hub of the Republic of Sakha (Yakutia) and PJSC Yakutskenergo, while the absolute losses remained flat y-o-y. [EU12]

RusHydro Group regularly implements initiatives to reduce energy losses, including meter testing and replacement, switching to less powerful transformers, installing higher accuracy class equipment, etc.

Operating performance

Electricity and heat generation

In 2019, the Group's power generation, including Boguchanskaya HPP, declined by 1.0% y-on-y and amounted to 142.8 bn kWh. According to the System Operator¹ of the Unified Energy System, last year saw the growth in Russia's electricity generation and consumption by 0.9% and 0.4%, respectively. The Group's electricity generation made up 13.0% of the Russian total power generation.

RusHydro Subgroup's electricity generation amounted to 108.4 bn kWh, down 1.3%

y-o-y due to a less favorable hydrological situation. In 2019, electricity generation at the Subgroup's Sevan-Hrazdan Cascade HPPs in Armenia grew by 2.9% y-o-y and totaled 0.4 bn kWh.

During the same period, PJSC RAO ES East power plants generated 34.4 bn kWh, down 0.3% y-o-y. The decline was attributable to an increase of generation by PJSC RusHydro HPPs in UES East by 1.2 bn kWh (+10.2%), coupled with a 3.3% total energy consumption increase in the Far Eastern Federal District (to 48.6 bn kWh)

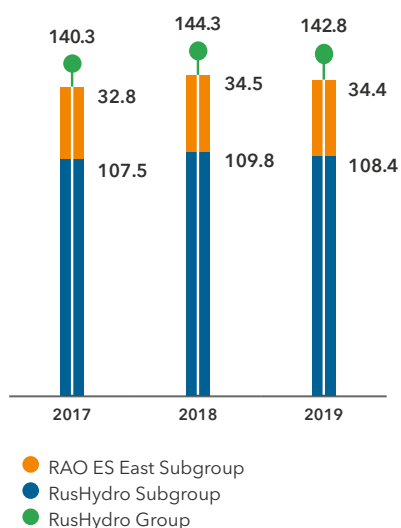
and a 0.1 bn kWh decrease in the energy outflow to UES Siberia and China (-2.7%). the heat supply stood at 30.0 mn Gcal.

In 2019, the main factors affecting the Group's electricity generation and heat supply included:

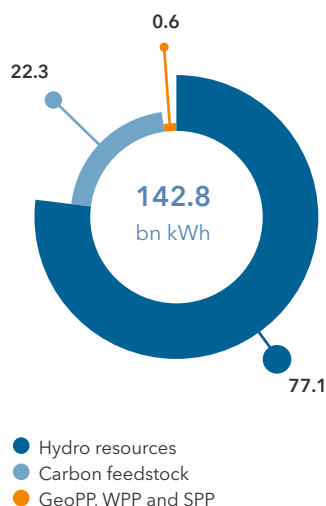
- water inflow to reservoirs of Siberia below the previous year's level;
- lower power generation by the TPPs of the Far East due to a higher generation by the PJSC RusHydro HPPs in UES East and higher consumption in the Far East;
- lower energy outflow to UES Siberia and China;
- lower outdoor temperatures.

¹ https://www.so-ups.ru/fileadmin/files/company/reports/disclosure/2020/ups_rep2019.pdf

Electricity generation, bn kWh



Generation structure by primary energy source, %

Measures for simplifying utility connection to electrical grids
[EU23]

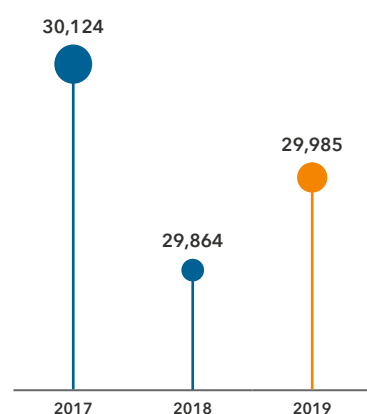
In 2019, the Group's businesses were involved in implementing the Target Model for "Utility Connection to Electrical Grids" approved by the Russian Government's Decree No. 147-r "On target models for simplifying business procedures and enhancing investment appeal of the Russian regions" dated January 31, 2017 (the "Program").

The project seeks to simplify the procedure for utility connection (the "UC") for legal entities or sole proprietors requesting the power of up to 150 kW with receiver reliability category 2 and 3 (shorter timing, enabling interaction with the grid company via a personal account without a need to visit the client office). The Group's participants in the Program comprise JSC DRSK, PJSC Kamchatskenergo, PJSC Sakhalinenergo, PJSC Magadanenergo, JSC Chukotenergo and PJSC Yakutskenergo.

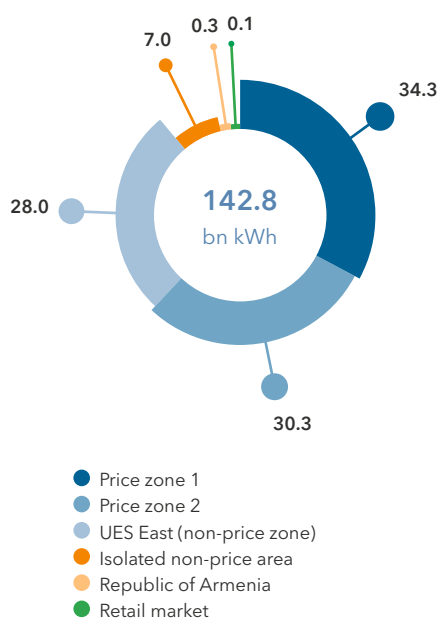
The Program made it possible to introduce an online service to the energy companies' websites featuring personal accounts for the applicant to interact with the grid company and to make preliminary calculations of the UC cost (UC tariff calculator), apply for a UC, receive a UC contract and sign the necessary UC documents, including their electronic versions.

The applications filed by the applicant through the Personal Account differ in their share across regions of the Far Eastern Federal District, with, for example, 1% at JSC Chukotenergo, 22% at JSC DRSK and 48% at PJSC Sakhalinenergo.

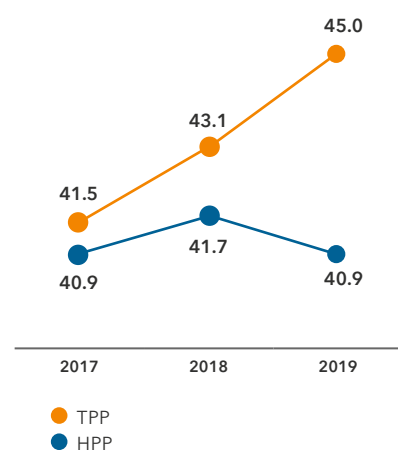
Heat supply, '000 Gcal



Generation structure by regulatory regime, % [EU2]



HPP and TPP installed capacity utilization factor (ICUF), %



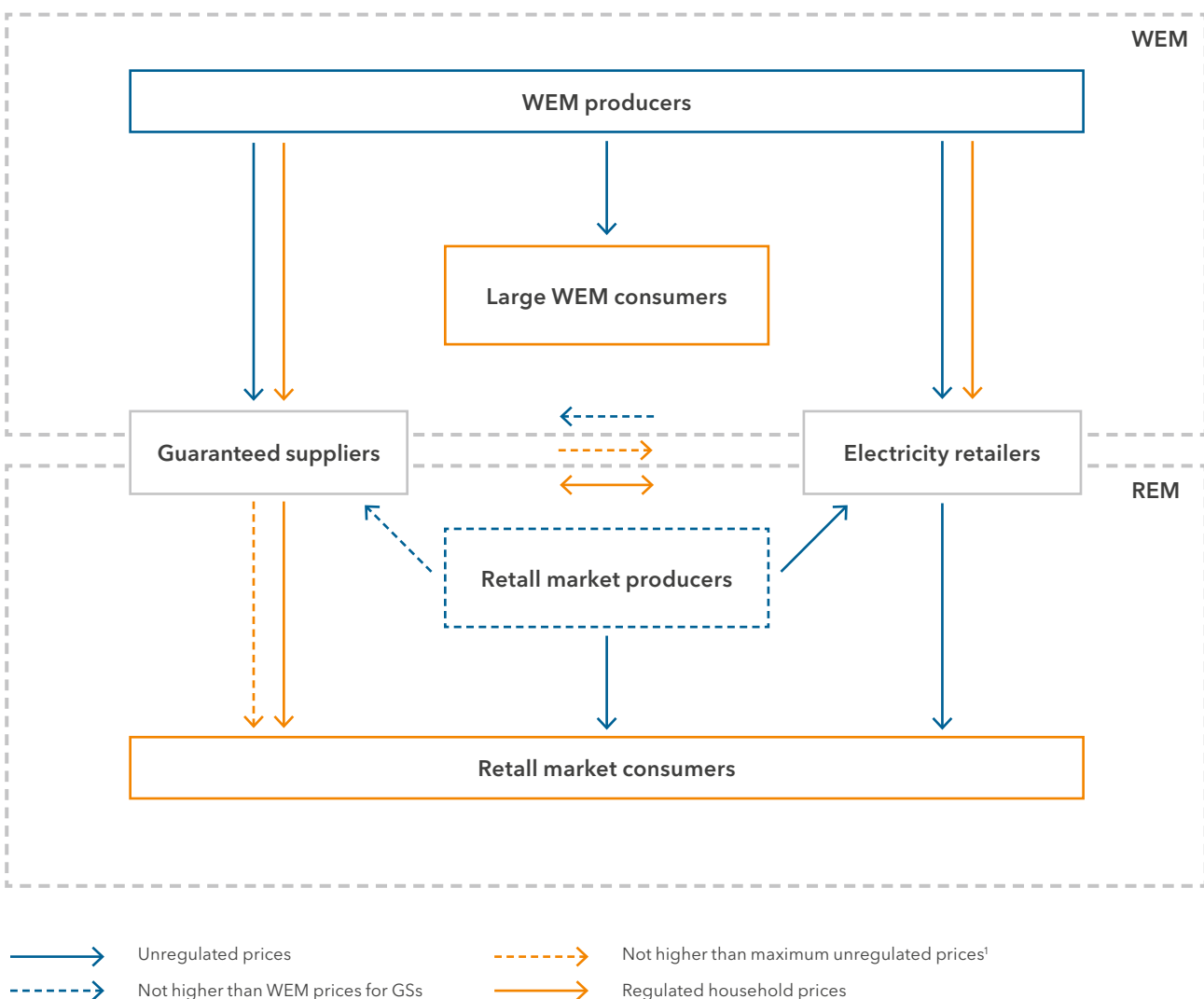
Electricity and heat sales

Efficient electricity and capacity sales in the wholesale market (WEM) and the growing retail business remain among the Group's priorities and have a major impact on its financial performance.

The Group sells electricity in Russia both in the wholesale electricity and capacity market (first and second price zones of the wholesale market and UES East's non-price zone) to

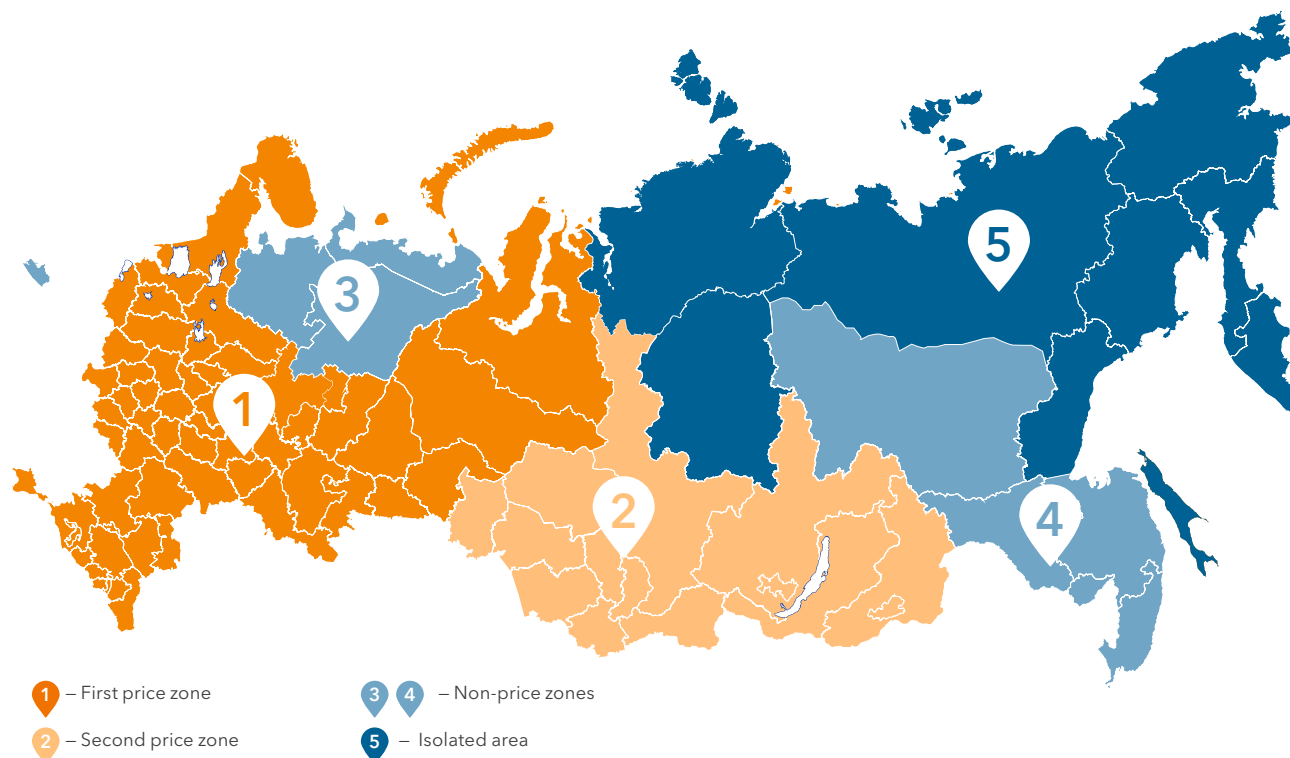
major consumers and to retail consumers via its retail companies and guaranteed suppliers.

Pricing principles on the key markets¹



¹ Maximum unregulated prices.

WECM zones



Performance in the first and second price zones

WECM sales

RusHydro directly sells electricity and capacity in the WECM's first and second price zones.

In 2019, total sales dropped y-o-y following a decline in net electricity supply as a result of lower water inflow to the key reservoirs of Siberian HPPs and to the Volga-Kama cascade reservoirs in 1H 2019.

In 2019, the average weighted DAM (day-ahead market) price was RUB 1,287.3 per MWh (+3.2%) for the European part of Russia and RUB 896.4 per MWh (+0.7%) for Siberia.

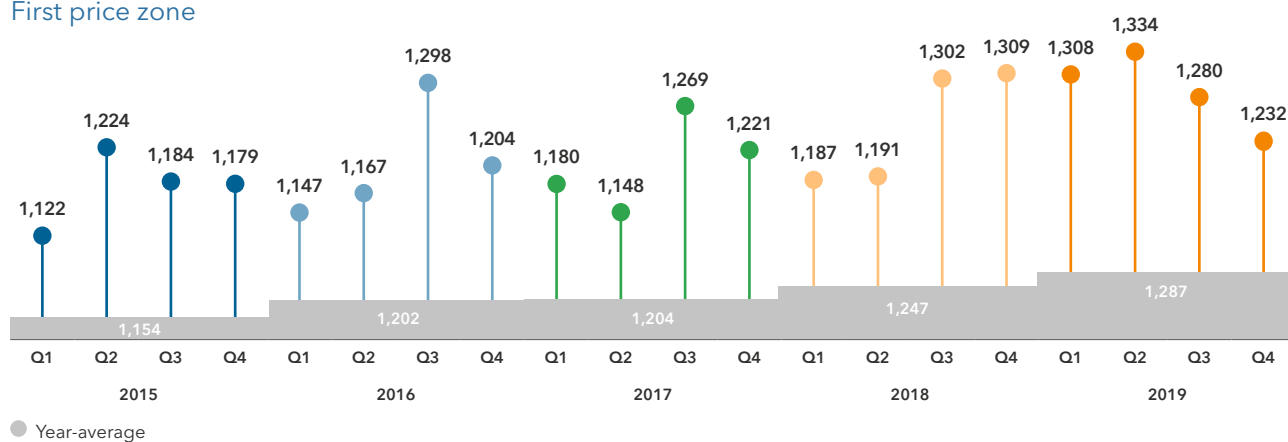
Net supply of electricity and capacity by RusHydro in the first and second price zones of WECM

Metric	2018	2019	2019/2018, %
Net supply, mn kWh	91,684	87,313	-4.8
Electricity purchased, mn kWh	10,116	9,716	-4.0
Total electricity sales, mn kWh	99,093	94,436	-4.7
Capacity sales, MW ¹	21,423	21,716	1.4

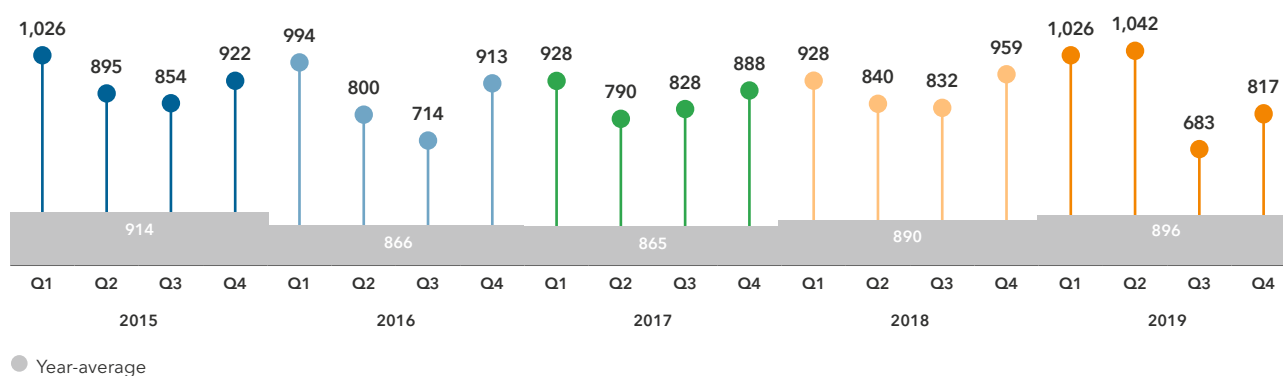
¹ Including Zeyskaya and Bureyskaya HPPs.

Electricity prices in the first and second price zones, RUB/MWh¹

First price zone



Second price zone



The growth of the DAM price in the first price zone in 2019 (+3.2% y-o-y) was driven by:
 — lower HPP output following a decline in hydropower resources;

— higher price bids from suppliers as a result of a 3.4% increase in wholesale gas prices.

The growth of the DAM price in the second price zone in 2019 y-o-y was driven by:

— higher price bids from suppliers as a result of the coal price increase starting 2H 2018;
 — lower HPP output (primarily Yenisey cascade HPPs) in May–June 2019;

RusHydro's electricity and capacity sales prices in the first and second price zones of WECM

Metric	2015	2016	2017	2018	2019	2019/2018, %
Weighted average DAM price, RUB/MWh	1,096	1,080	1,094	1,114	1,107	-0.6
1 PZ DAM price, RUB/MWh	1,207	1,267	1,224	1,285	1,298	1.0
2 PZ DAM price, RUB/MWh	883	793	824	825	774	-6.2
Weighted average KOM price, RUB / MW per month	127,564	139,781	580,558	783,822	725,757	-7.4
1 PZ KOM price, RUB / MW per month	125,524	111,628	3,212,516	4,312,779	2,922,353	-32.2
2 PZ KOM price, RUB / MW per month	131,696	178,724	283,873	342,675	347,730	1.5

¹ TSA data.

— restrictions on capacity exchange between parts of the second price zone.

Capacity sales price changes vs 2018 were attributable to the lower surcharge¹ to KOM prices in the WECM price zones.

In 2019, electricity and capacity sales declined y-o-y due to:

- lower capacity price surcharge leading to lower KOM price;
- 4.7% decline in power generation;
- 6.3% decrease in the DAM price in the second price zone.

REM sales [EC]

REM sales in the first and second price zones are consolidated within ESC RusHydro Subgroup (JSC ESC RusHydro, PJSC Krasnoyarskenergosbyt, PJSC Ryazanenergosbyt, JSC Chuvashskaya Electricity Sales Company). Electricity is supplied both directly by JSC ESC RusHydro and via its retail subsidiaries acting

as guaranteed suppliers in three Russian regions.

In 2019, ESC RusHydro Subgroup supplied electricity to 1,952,167 consumers in the retail market, including 1,892,519 households on direct contracts. The number of contracts remains stable across consumer groups, except for households and utility service providers. These groups demonstrate both positive and negative trends. Individual customers grew in number as households started signing direct contracts with RusHydro's subsidiaries under Federal Law No. 59-FZ, while consumers among management companies, condominiums and housing associations shrank as disreputable utility service providers were leaving the market and other management companies were taking over their housing stock. Total sendout of electricity by ESC RusHydro Subgroup amounted to 19,445.8 mn kWh in 2019.

Performance in non-price and isolated zones of the Far East

Non-price and isolated zones of the Far Eastern Federal District are covered by RAO ES East Subgroup and Bureyskaya and Zeyskaya HPPs.

Electricity tariffs and supply [OS]

Federal Law No. 35-FZ On Electric Power Industry dated March 26, 2003 outlines the basic principles and methods of state regulation in the electric power industry and the regulators' scope of authority. The basic principles and methods of price (tariff) regulation in the electric power industry and the procedure for setting tariffs are set out in the Russian Government's Resolution No. 1178 On Pricing in the Field of Regulated Prices (Tariffs) for Electric Power dated December 29, 2011.

Number of households and corporates in service in the first and second price zones [EU3]

Consumer	2017	2018	2019
Manufacturing industry	2 714	2 680	2 653
Transport and communications	1,226	1,232	1,282
Agriculture	2,053	2,168	2,300
State-financed	7,903	7,654	6,880
Management companies, condominiums, housing associations, etc.	2,042	1,997	2,529
Wholesalers-resellers	74	83	98
Housing and utilities	456	456	419
Heat suppliers	124	132	137
Other	41,683	42,513	43,350
Households	1,779,929	1,808,857	1,892,519
Total	1,838,204	1,867,772²	1,952,167

¹ For more details, see the [Tariff adjustment mechanism in the Far East section](#).

² Total accounts were updated from the 2018 annual report to include direct contracts signed in early 2019 with effect from December 2018.

Tariffs for electricity (capacity) supplies in the WECM are set by the FAS in line with a methodology developed by the Federal Tariff Service (FTS)¹.

The primary tariff calculation methodology for generating facilities located in the WECM non-price zone is the one based on indexation. It was approved by FTS Order No. 210-e/1 dated August 28, 2014. The base tariff calculated in 2007 is annually adjusted to factor in the index of changes in semi-fixed costs as determined by the Russian Ministry of Economic Development. The 4.3% deflator index in the 2019 tariff was in line with the PPI (excluding contribution from the energy sector). This methodology is also used for new generating facilities starting from the second year of their operation.

During the first year in the wholesale market, the tariff for generating facilities located in non-price zones is set in line with the guidelines approved by FTS Order No. 199-e/6 dated September 15, 2006. This methodology determines the economically justified amount of financial resources a company needs to operate at regulated

tariffs within a specific regulation period (the return on investments, which is accrued through amortization, is not taken into consideration).

Key WECM tariff drivers in 2019:

- tariff indexation, with the deflator index standing at 4.3%;
- increase in the fees paid for using federal water bodies for the purpose of hydropower generation with no water withdrawal operations in accordance with the Russian Government's Resolution No. 876 dated December 30, 2006².

REM sales in isolated zones are covered by RusHydro's subsidiaries which are 100% regulated since there is no free electricity (capacity) market in the region. The REM tariffs for generating facilities operating in isolated zones are set by the regional authorities in charge of tariff regulation based on economically justified expenses approved by FTS Order No. 20-e/2 dated August 6, 2004.

For the purpose of tariff determination in 2019, regulators used the following regulation methods:

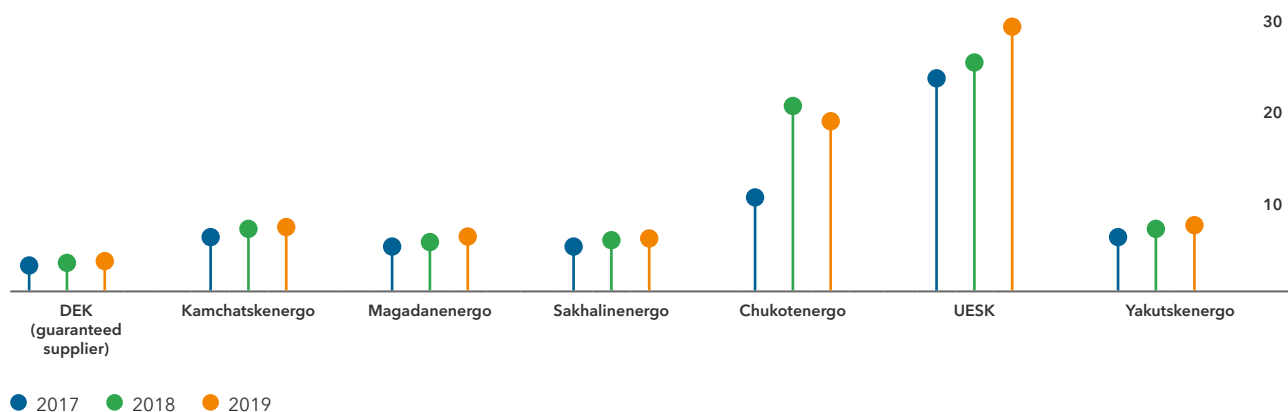
- tariffs for DGK electricity (capacity) supplies in the WECM

non-price zones (as approved by FAS Order No. 1565/18 dated November 16, 2018) were calculated using the indexation methodology;

- DRSK electricity transmission tariffs for services provided by branches of DRSK – Amur Power System were determined based on the regulatory asset base method (RAB), while tariffs for services provided by Primorsky Krai, Khabarovsk and South-Yakutsk Power Systems as well as Electric Networks of the Jewish Autonomous Region were set using long-term indexation of required gross revenue;
- sales surcharge for PJSC DEK was determined using the comparative method;
- electricity tariffs for end consumers in isolated zones were determined using the method of economically justified expenses.

Since July 1, 2016, numerical tariff values are no longer set for other consumers in the WECM non-price zone. In accordance with the estimated tariff values determined based on indicative prices, the uniform transmission tariff and the sales surcharge approved by the regulator, the tariff increase in the WECM non-price zone ranged from 0.46% to 3.24%.

Average electricity tariffs in the Far Eastern Federal District, RUB/MWh



¹ Abolished in 2015 to be succeeded by the Federal Antimonopoly Service of Russia (FAS).

² As revised by the Russian Government's Resolution No. 1690 dated December 29, 2017.

In 2019, the overall increase in average electricity tariffs for consumers in isolated energy hubs of the Far Eastern Federal District amounted to 7.6% y-o-y. The smallest increase was registered by Kamchatskenergo (2.8%), while the largest one (16.0%) was delivered by UESK. Chukotenergo reported a tariff decline by 7.8% due to the exclusion of RUB 1,063.0 mn from the required gross revenue in 2019 used to offset the cost of electricity purchased from Bilibino NPP in 2017.

DGK's weighted average electricity prices in the wholesale market rose by 9.6% in 2H 2019 over 1H 2019, while its average annual energy prices in 2019 remained flat at 0.028% y-o-y.

The weighted average energy rate for all of the DGK stations was: RUB 1,315.94 per MWh in 1H 2019 and RUB 1,366.11 per MWh in 2H 2019 (an increase of 3.8% in 2H 2019 over 1H 2019).

The key factors behind changes in the DGK electricity tariff rates in 2H 2019 compared to the rates approved for 2H 2018 included:

- 2019 gas prices under the Consortium-1 project;
- application of growth indices for coal and fuel oil in 2019.

The average DGK capacity tariff rate was RUB 272,829 / MW per month in 1H 2019 and RUB 294,717 / MW per month in 2H 2019 (an increase of 8% over 1H 2019).

Power transmission tariffs

In 2019, the branches of JSC DRSK (Primorye Power System, Amur Power System, Khabarovsk Power System, and Electric Networks of the Jewish Autonomous Region (ES EAO)) entered into the second year of the second long-term regulation period. During this period (2018–2022), electricity transmission tariffs for Amur Power System

will be regulated using the ROIC method, while tariffs for Primorye Power System, Khabarovsk Power System and Electric Networks of the Jewish Autonomous Region will be set using long-term indexation of required gross revenue.

For South-Yakutsk Power System, 2019 was the first year of the long-term regulation period, with tariffs for 2019–2023 set using the long-term indexation method.

In 2019, DRSK's required gross revenue in power transmission rose by 0.9% y-o-y.

Tariff subsidization in the Far East

[\[103-2\]](#)[\[EU23\]](#)[\[OS\]](#)

Federal Laws No. 508-FZ dated December 28, 2016 and No. 129-FZ dated June 30, 2017 On Amendments to the Federal Law On Electric Power Industry introduced a surcharge to the capacity price in the first and second price zones, helping to bring tariffs in the Far East down to the Russian base (average) rate.

These amendments provide for a surcharge to be applied to the capacity price in the WECM price zones, with proceeds from the surcharge transferred to the regional budgets of the Far Eastern Federal District in the form of target non-repayable contributions.

As part of the effort to bring electricity (capacity) prices (tariffs) for the Far Eastern consumers other than households to the base rate, the Government issued Decree No. 2739-r dated December 10, 2018 to set the base electricity (capacity) price (tariff) for 2019 at RUB 4.69 per kWh.

As part of the effort to align prices in the Far East with the Russian base rate, the surcharge amount for 2019 was approved by the Russian Government at RUB 32,076.56 mn.



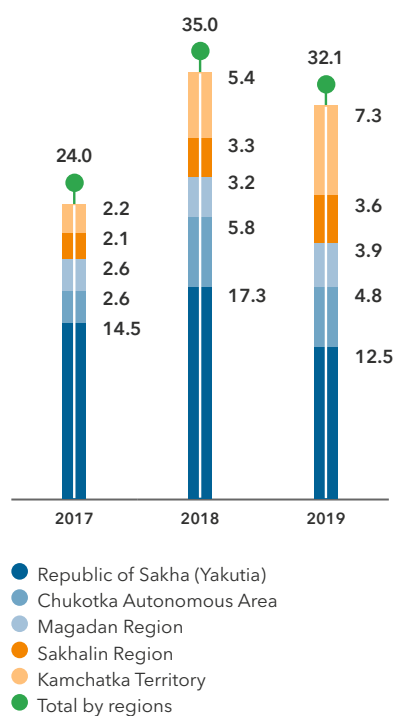
RusHydro and System Operator of the Unified Energy System have successfully partnered for many years, primarily on ensuring that the country's energy system continues stable operation. Our constructive business relationship has also become the foundation for joint work on improving the industry's regulatory framework, developing standardization, and putting in place a youth policy and a number of other activities.

RusHydro employs real professionals whose knowledge, experience, skills, and responsibility help guarantee the reliable and safe operation of existing hydropower plants, as well as the development of hydropower and renewable energy in Russia overall. The RusHydro team's success is the most crucial factor in ensuring a reliable energy supply to Russian consumers and the country's sustainable industrial growth.

Boris Ayuev,

Chairman of the Management Board of JSC SO UES

Amount of the surcharge with a breakdown by regions of the Far Eastern Federal District, RUB bn



In 2019, the alignment mechanism was used in five out of nine regions of the Far Eastern Federal District. In all of those regions, the average electricity tariff for consumers was higher than RUB 4.69 per kWh. Tariff reduction does not result in lower revenue, as it is fully

offset by government subsidies paid from the budget funds generated by surcharge to the capacity auction rate.

As a result of changes made in tariff regulation, the electricity (capacity) prices (tariffs):

- in the WECM non-price zones are set using the annual indexation method until July 1, 2020 (commencement date of the long-term indexation of required gross revenue, as provided for by the Russian Government's Resolution No. 837 dated June 29, 2019);
- in isolated energy systems are set using the method of economically justified expenses (for 2020 and beyond as provided for by the FAS Order No. 686/19 On Approval of Guidelines for Calculation of Regulated Electricity (Capacity) Prices (Tariffs) in Technologically Isolated Local Energy Systems as well as Areas not Linked to the Unified Energy System of Russia and Technologically Isolated Local Energy Systems except for Electricity (Capacity) Generated by Qualified Generating Facilities dated May 29, 2019, which was developed in pursuance of the Russian Government's Resolution No. 64 dated January 30, 2019; the long-term indexation of required gross revenue to be introduced going forward).

Electricity sales in non-price and isolated zones

In 2019, PJSC DEK, acting as the single purchaser in the non-price zone of the Far East's wholesale electricity and capacity market, purchased 36.3 bn kWh. Its commercial purchases of electricity and capacity in the WECM amounted to RUB 62.4 bn in 2019.

Electricity sales stood at 15.9 bn kWh. DEK's commercial sales of electricity and capacity in the WECM came in at RUB 28.6 bn in 2019.

On a y-o-y basis, DEK achieved considerable gains in terms of volumes and cost of electricity (capacity) purchases and sales following the integration of the Central and Western energy hubs of the Republic of Sakha (Yakutia) into the UES of East effective from January 1, 2019. In 2019, local guaranteed suppliers Yakutskenergo and Viluyskaya HPP-3, which used to service isolated energy hubs on their own, started selling electricity in the WECM via DEK as the single purchaser. In 2019, Yakutskenergo and Viluyskaya HPP-3 sold 2,988.4 mn kWh and 685.7 mn kWh, respectively, in the WECM via DEK. Transneftenergo increased consumption by 921.0 mn kWh, also contributing to DEK's higher sales.

DEK's electricity purchases and sales in the WECM non-price zone

Metric	2018	2019	2019/2018, %
WECM electricity purchases, bn kWh	31.0	36.3	17.0
Cost of WECM electricity (capacity) purchases, RUB bn	51.6	62.4	20.8
WECM electricity sales, bn kWh	11.2	15.9	42.8
Cost of WECM electricity (capacity) sales, RUB bn	20.2	28.6	41.7

Number of households and corporates in service in non-price and isolated zones of the Far Eastern Federal District [EU3]

Consumer	2017	2018	2019
Manufacturing industry	3,494	3,230	3,274
Transport and communications	2,219	2,295	2,292
Agriculture	1,725	1,712	1,783
State-financed	11,969	12,142	12,274
Management companies, condominiums, housing associations, etc.	9,287	12,154	12,960
Wholesalers-resellers	24	28	32
Housing and utilities	1,852	957	1,019
Other	56,616	56,592	56,843
Households	2,464,149	2,478,200	2,504,738
Total	2,551,335	2,567,310	2,595,215



In accordance with the Russian Government's Resolution No. 1496 dated December 8, 2018, the Western and Central energy hubs of the Republic of Sakha (Yakutia) are included in the non-price zone of the Far Eastern WECM effective from January 1, 2019.

In 2019, JSC DGK supplied 21.5 bn kWh in the non-price zone of the Far East's wholesale electricity (capacity) market. Its commercial sales of electricity and capacity in the WECM amounted to 49.4 bn kWh in 2019.

The volumes of electricity (capacity) supply declined by 4% y-o-y, mainly due to the rising electricity sales volumes by Zeyskaya and Byreyskaya HPPs.

Total sendout of electricity under RAO ES East Subgroup's retail contracts amounted to 30.1 bn kWh in 2019. In 2019, RAO ES East Subgroup served

retail market consumers under 2,595,215 electricity supply contracts, including 2,504,738 households.

Heat market in the Far East

RAO ES East Subgroup generates and distributes heat in the Far Eastern Federal District.

Heat is supplied on a centralized basis from thermal power plants and boiler stations operated by energy companies. Some energy companies engage in both heat production and distribution, while others do

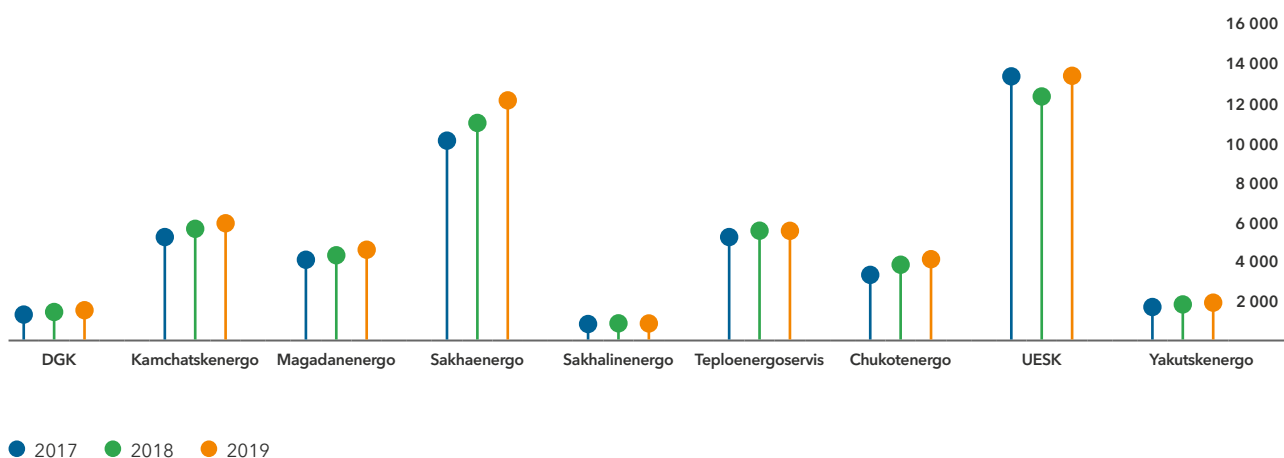
not go beyond production operations.

Heat sales are fully regulated under the Russian law.

Federal Law No. 190-FZ On Heat Supply dated July 27, 2010 sets out the basic price (tariff) regulation principles for heat supply and the scope of authority of regulators in charge of heat supply price (tariff) regulation. The Russian Government's Resolution No. 1075 On Pricing in the Field of Heat Supply dated October 22, 2012 outlines the main regulation principles and procedures for calculating and approving heat tariffs.

In the Far East, heat tariffs in 2019 were set using the long-term indexation method in line with the Guidelines for Calculation of Regulated Prices (Tariffs) for Heat Supplies approved by FTS Order No 760-e dated June 13, 2013.

Consumer tariffs for heat supplies in the Far Eastern Federal District, RUB/Gcal¹



The average tariff in DGK zones of operation rose by 4.4%, with the smallest increase (1.9%) registered by the LuTEK branch in the Primorsky Krai and the largest increase (9.4%) recorded by Neryungrinskaya GRES in the Republic of Sakha (Yakutia).

In isolated energy hubs, average consumer tariffs for heat supplies

added 4.4%, with the smallest increase (0.2%) reported by Teploenergotservis and the largest increase (9.6%) delivered by JSC UESK. Sakhalinenergo reported an average tariff decline of 0.4% compared to the rate approved for 2018 due to the exclusion of Sakhalinskaya GRES operating costs from the required gross revenue

after Sakhalinskaya GRES-2 was commissioned in 2019.

Total sendout of heat under RAO ES East Subgroup's retail contracts amounted to 23,601.9 mn Gcal in 2019. In 2019, RAO ES East Subgroup served retail market consumers under 886,960 heat supply contracts, including 865,952 households.

Number of households and corporates in service in non-price and isolated zones of the Far Eastern Federal District [EU3]

Consumer	2017	2018	2019
Manufacturing industry	445	443	406
Agriculture	33	33	30
State-financed	3,493	3,378	3,293
Management companies, condominiums, housing associations, etc.	2,334	2,516	2,463
Heat suppliers	7	10	11
Other	13,926	14,164	14,805
Households	848,529	874,030	865,952
Total	868,767	894,574	886,960

¹ Sakhalinenergo and Chukotenergo supply heat from power plants and boiling stations to the wholesale reselling consumers.

Consumer interaction [103-2]

Reduction in the accounts receivable is one of RusHydro Group's top priorities across its footprint.

To prevent receivables from growing any further, RusHydro Group relies on all remedies legally available to it to recover debts and make sure current bills are paid as they fall due.

As at December 31, 2019, RusHydro Group's receivables from buyers and consumers grew by 0.3% to RUB 65.4 bn.

RusHydro and ESC RusHydro Subgroup sell electricity and/or capacity in the first and second price zones, while RAO ES East Subgroup covers the non-price and isolated zones.

The principal debt owed to RusHydro for electricity and capacity supplies stood at RUB 7.7 bn. Total payments received by RusHydro for electricity and capacity supplies to the wholesale and retail markets amounted to 99.8% in 2019 vs 99.1% in 2018.

Debt reduction in 2019 y-o-y was driven by:

- the exclusion of Chelyabenergosbyt, Roskommunenergo and Novouralskaya Electricity Sales Company from the list of market participants and payment of their debt in full to RusHydro by successful bidders to become guaranteed suppliers in their stead;
- voluntary debt payment;

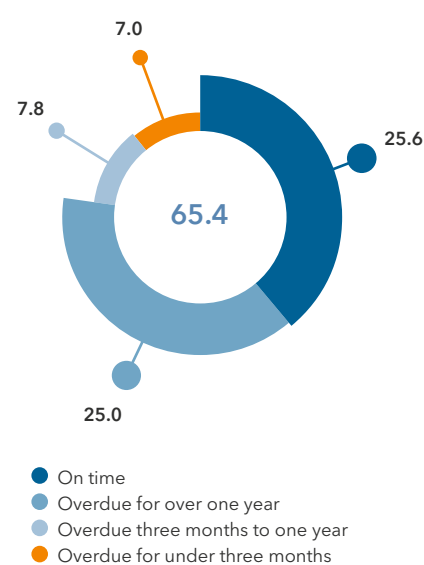
- out-of-court settlement and debt recovery through court, including enforcement proceedings.

As at December 31, 2019, ESC RusHydro Subgroup's receivables stood at RUB 9,699.2 mn, thus adding RUB 222 mn, or 2.3%, in 2019 y-o-y. 99.9% at Krasnoyarskenergosbyt (RUB 41,033 mn), 98.1% at Chuvashskaya Electricity Sales Company (RUB 14,160 mn), 99.1% at Ryazanenergosbyt (RUB 12,731 mn), and 99.1% at ESC RusHydro (RUB 6,669 mn).

In 2019, ESC RusHydro Subgroup's receivables generally saw a decline in current bills and debts overdue for 1 month to 2.5 years and an increase in moratorium debt. The latter was expanded to include 83% of the debt of Concern Tractor Plants (consumer of Chuvashskaya Electricity Sales Company) after its subsidiaries were placed under bankruptcy management, supervision or receivership.

At RAO ES East Subgroup, as at December 31, 2019, total payments received for electricity and heat totaled 98.4%, with receivables of RUB 35,102.7 mn. The company received 99.2% of payments for electricity and 96.7% for heat in retail markets. The receivables for electricity and heat amounted

Receivables from buyers and consumers, RUB bn



to RUB 15,518.0 mn and RUB 19,584.7 mn, respectively.

RusHydro Group's retail companies use the following three approaches to improve debt recovery:

- interacting with consumers and executive authorities and introducing outreach measures aimed at improving payment discipline;
- recovering debt through court;
- disconnecting the electricity supply for non-payment.

Improvement of payment discipline through outreach measures

Drawing attention to systemic non-payment of energy bills is an effective way to improve payment discipline among households, businesses and public sector.

The prompt payment culture is created through measures encouraging regular and timely payment. Given that utility service providers are among the biggest debtors, these initiatives seek to incentivize those management companies, condominiums and housing associations that fulfil their payment obligations promptly.

Other actions include regular posting of "black lists" of persistent non-payers featuring organizations with the worst payment discipline and the highest debt levels.

With a view to strengthen the payment discipline and motivate consumers to fulfil their debt obligations (legal entities), Subgroup ESC RusHydro has been actively participating in the arrangement of the regional stage of the annual federal event "Reliable Partner" for a number of years. The regional stage is meant to encourage the most diligent and responsible consumers, to set a high status for reliable consumers of power resources, as well as to support and to maintain the partnership between suppliers and consumers. The contest winners across Russian regions help to sum up the results of the event, which is arranged annually on the basis of the Federation Council. [OS]

Debt recovery through court

As part of its efforts to reduce receivables under contracts

related to electricity (capacity) sales, RusHydro Group works to enforce debt recovery through court action.

In 2019, RusHydro's debt recovery actions for non-payments translated into court awards for a total of RUB 1,586.9 mn, including arbitration awards of RUB 693.9 mn. Based on the arbitration awards, 29 writs of execution were issued in 2019 for RUB 1,249.7 mn. Of those, debt outstanding in the amount of RUB 638.105 mn was repaid in the reporting period.

In 2019, ESC RusHydro Subgroup filed 48,704 claims as part of its debt collection efforts to recover debt on electricity bills for a total of RUB 3,706 mn, of which 4,313 claims were against legal entities, including grid companies purchasing electricity to offset grid losses (76 claims of RUB 499.4 mn). Most of the non-payment cases that resulted in court action were in the utilities sector, represented in particular by utility service providers, which had 1,421 claims filed against them; a total of 609 claims were lodged against utilities companies. The combined debt of these two groups came in at RUB 1,381.9 mn. Compared to 2018, the number of claims filed against state-funded organizations dropped two-fold, reflecting improved payment discipline in this consumer group. The Group's subsidiaries lodged claims with magistrates courts against 44,391 individuals for RUB 252 mn in 2019. Courts of different instances satisfied 43,820 claims for RUB 2,493.7 mn, and issued 40,348 writs of execution for over RUB 2,470 mn. The

measures that bailiffs may use for non-payment include direct debiting, freezing injunction, travel restriction, and restriction on disposal (sale, transfer by gift, etc.) of cars and real estate.

In 2019, RAO ES East Subgroup filed 227,571,000 claims to recover debt on electricity and heat bills for a total of RUB 11,454 mn, including 7,419 claims of RUB 7,464 mn against legal entities, of which 1,166 claims of RUB 1,430 mn were against state-funded organizations, and 220,152 claims of RUB 3,990 mn against individuals. Courts of different instances satisfied 204,357 claims for RUB 9,387 mn.

Limitations on energy supplies to consumers for failure to pay for electricity and heat

Limitation of electricity and heat consumption for non-payment is an effective measure, but a last resort in ensuring debt recovery.

The procedures of notifying consumers in arrears of any limitations in consumption and actual implementation of the same are in full compliance with applicable laws (Procedure for Consumption Limitations in Circumstances Other Than Power Facility Repairs or (Risk of) Emergency Operating Modes as per the Russian Government's Decree No. 624 dated May 24, 2017).

Electricity supply can be recovered in full only after the debt is fully settled (or a restructuring agreement is signed), the penalties and reconnection charges are paid.

In 2019, 581,150 notices for RUB 23,455 mn were sent to consumers of ESC RusHydro Subgroup. RUB 16,825 mn of debt was repaid by 345,119 consumers after receiving notices, and RUB 478 mn by 27,613 consumers after

limitation of consumption, including RUB 88 mn by households. The total number of consumers affected by the sanctions for non-payment amounted to 90,685 in 2019, including 88,335 consumers from the Households group.

RAO ES East Subgroup saw a total of 265,069 disconnections for non-payments in 2019, including 259,357 consumers from the Households group.

Comprehensive modernization, rehabilitation, and upgrade programs [103-2]

Comprehensive Modernization Program

As many large HPPs were commissioned in the 1950s and 1960s, the need arose in the early 2000s to upgrade or replace the existing equipment. Tough economic conditions prevented HPPs from replacing obsolete and worn-out equipment and forced it to focus on maintenance and partial replacements instead.

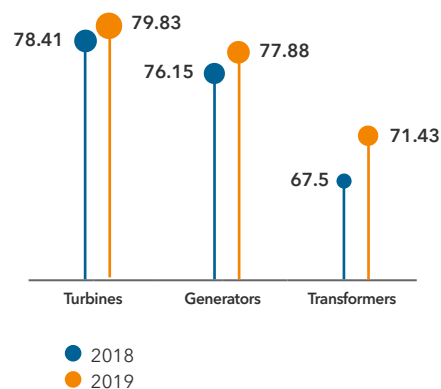
Since mid-2000s, a number of RusHydro's HPPs began replacing equipment on a case-by-case

basis, but the overall trend of ageing prevailed.

This was true until December 2011, when the Board of Directors approved the Comprehensive Modernization Program to upgrade the Company's power generation facilities by 2025. Its key priority is to ensure that no core generation equipment with expired safe operation life remains in place by then.

In 2019, Votkinskaya HPP's hydropower unit No. 5 was upgraded as part of RusHydro's

Health of RusHydro's core equipment



Key results of RusHydro's Comprehensive Modernization Program in 2019

Equipment type and HPP	2019	2020 E
Units of equipment replaced or modernized		
Turbines	11	6
Generators	9	5
Transformers	4	7
Additions to installed capacity, MW		
Zhigulevskaya HPP	10.5	0.0
Saratovskaya HPP	12.0	0.0
Novosibirskaya HPP	10.0	0.0
Votkinskaya HPP	30.0	0.0
Cascade of Verkhnevolzhskiy HPPs	0.0	10.0
Total installed capacity	62.5	10.0

Comprehensive Modernization Program, becoming the third fully modernized hydropower unit at the plant.

At Volzhskaya HPP, new hydropower units No. 3 and 7 were launched. In addition, the plant saw Russia's first ever commissioning of unprecedented innovation: a phase angle regulator, designed to support power transmission from Volzhskaya HPP. The phase angle regulator will enable redistribution of output between 200 kV and 500 kV and increase transmission via a 500 kV power line.

Kamskaya HPP celebrated the completion of a turbine upgrade at hydropower units No. 3 and 6, and Saratovskaya HPP had turbines at hydropower units No. 1 and 9 successfully replaced.

At Novosibirskaya HPP, the turbine replacement was followed by commissioning of the hydropower unit No. 2. A new main control board was also put into operation at the plant, boasting the latest digital technologies. The original main control board of Novosibirskaya HPP was commissioned back in 1957 for the plant's personnel to operate all of the HPP's equipment. After more than 60 years of operation, the board's equipment, which had still relied on electro-mechanical switches and relays, became worn-out and obsolete and needed to be replaced. The new board consists of seven sections with a total length of 14 m and two video panels, providing personnel with all the information they require. In addition, a new control desk with automated workplaces was

installed and the control room was repaired to replace power supply and HVAC systems.

Cheboksarskaya HPP put into operation hydropower units No. 3 and 11 following their upgrade, which included the recovery of the adjustable blade pitch, the replacement of the iron piece of the rotor rim, tachogenerator and stator of generator No. 3, as well as tachogenerator and stator of generator No. 11. On top of that, obsolete oil circuit breakers of the plant's 220 kV outdoor switchgear equipment were replaced with the latest gas-insulated ones.

At Rybinskaya HPP, an upgrade of hydropower unit No. 3 was completed, with a turbine and a generator replaced.

RusHydro's efforts also focused on modernizing electrical equipment at other plants. One example is the commissioning of modern switchgear at Zagorskaya PSPP.

Following the upgrade, the hydropower units underwent the re-labeling procedure to formally document their new capacities. This added 62.5 MW to the capacity of RusHydro Group's existing HPPs: 30 MW at Votkinskaya HPP, 12 MW at Saratovskaya HPP, 10.5 MW at Zhigulevskaya HPP, and 10 MW at Novosibirskaya HPP.

Rehabilitation and modernization program

The rehabilitation and modernization program of RusHydro's branches draws upon the Comprehensive Modernization Program and focuses on extending the lifespan of the core generation equipment, reducing production costs and enhancing the overall economic efficiency of hydroelectric power plants.

Driven by the need to ensure long-term reliability throughout its technological complex, JSC RAO ES East Subgroup runs its own rehabilitation and modernization program (as part of its investment program). The development and implementation of this initiative is regulated by RusHydro Group's Technical Policy.

In 2019, the rehabilitation and modernization program of RAO ES East Subgroup saw completion of several important projects, including:

- second stage of the Anadyrskaya CHPP gasification project focusing on the conversion of BKZ-160-100-20 boiler No. 1 at Anadyrskaya CHPP to combined combustion of coal and natural gas (completion of construction and installation works at boiler No. 1 in 2020 as per the contract; conversion of boiler No. 2 to gas combustion completed in 2018);



In October 2019, results of the comprehensive modernization, technical re-equipment and HPP and PSPP reconstruction programs were presented by PJSC RusHydro at the International Forum "Russian Energy Week" (REW-2019), arranged by the Ministry of Energy of the Russian Federation and the Moscow Government as part of the meeting dedicated to "Energy Efficiency and Energy Safety of Hydropower Facilities regarding Modernization of the Energy Equipment and Digital Transformation." [\[OS\]](#)

- rehabilitation of Khabarovskaya CHPP-3 with PTVM-180 boiler No. 1 of the hot-water peaking boiler plant converted to natural gas combustion (completion of construction and installation works in 2020 as per the contract);
- expansion of ash dump No. 2 (stage 1) at Khabarovskaya CHPP-

3 by 1,800,000 m³ (completion of construction and installation works in 2021 as per the contract);

- modernization of power unit No. 2 at Neryungrinskaya GRES;
- modernization of the fuel supply system at Magadanskaya CHPP (completion of construction and installation works in 2022).

The Company also paid close attention to the rehabilitation of heat supply networks and the modernization of substations and transmission lines to ensure stable power supply for existing consumers and new customers.

Reliability and safety of production facilities ^[103-2]

RusHydro Group's reliability and safety policy

One of RusHydro Group's strategic goals is to provide a reliable power supply and ensure safe operation of equipment, hydraulic structures, and production facilities. RusHydro's Technical Policy¹ plays a crucial role in this process.

The document aims to identify key operations of RusHydro Group suitable for developing and applying technical solutions and technologies designed to boost reliability, safety and efficiency of production facilities in the short and long term.

The Technical Policy comprises a range of mandatory technical solutions enabling planned changes in production facilities in line with laws and regulations in the power industry, goals of RusHydro Group's Development Strategy, and latest developments in technology.

Key objectives of RusHydro's Technical Policy are as follows:

- upgrade of production facilities and their effective operation as a way to ensure reliability and safety;
- fulfilment of presidential and government instructions focusing

on the development of energy infrastructure and envisaging the creation of economically and environmentally efficient, reliable and safe production facilities;

- development of the energy sector in the Russian Far East, including by tapping into the potential of renewables.

RusHydro Group's Technical Policy defines requirements imposed on the reliability and safety management system for equipment and structures (RSMSES) governed by the Regulations on the Reliability and Safety Management System for Hydraulic Structures and Hydroelectric Power Plants². As part of the RSMSES, dedicated operating procedures have been put in place for the Analytical Center, one of the key elements in the system assessing the state of equipment and structures, to liaise with the Company's Headquarters, branches and subsidiaries³.

RusHydro Group's Technical Policy defines requirements for the integrated process safety management system, including the industrial safety management subsystem.

The following documents were developed and adopted as part of

the industrial safety management system:

- Standard Regulations on In-Process Monitoring of Compliance with Industrial Safety Requirements at Subsidiary's Hazardous Production Facilities⁴;
- RusHydro's In-Process Monitoring Information System⁵ (fully implemented across the Company's branches).

To oversee preparation of RusHydro's facilities for special operating conditions and control corrective actions designed to eliminate gaps identified by government, institutional and internal supervisory bodies, the Company has implemented the following information systems:

- the supervisory information system put into operation by Order of the Company No. 451 of May 28, 2019 and Decree of the Company No. 358r On Supporting the Operation of the Supervisory Information System dated August 26, 2019 (the system has been rolled out across the Company's branches);
- the integrated recorder for the analytical database of supervisory activities (KRAB-3) put into operation by Decree of the Company No. 467r On Using a Data Reporting Form – Integrated

¹ RusHydro's Technical Policy was approved by the Board of Directors of PJSC RusHydro (Minutes of the Board of Directors No. 307 of April 9, 2020).

² Approved by RusHydro's Order No. 515 of August 8, 2017.

³ Approved by RusHydro's Orders No. 430 of June 20, 2018 and No. 862 of November 9, 2018.

⁴ Approved by RusHydro's Order No. 190 of March 11, 2015.

⁵ Commissioned by RusHydro's Order No. 1170 of November 27, 2013.

Recorder for the Analytical Database of Supervisory Activities dated December 8, 2015 as amended by Decree No. 157r On Using a Data Reporting Form – Integrated Recorder for the Analytical Database of Supervisory Activities dated May 14, 2018 (KRAB-3 has been rolled out across the Company's subsidiaries).

The Company's industrial safety priorities are:

- to continuously enhance and improve industrial safety of the Company's hazardous production facilities in line with the global best practices by ensuring timely upgrades of process equipment and its safe, reliable and trouble-free operation;
- to establish and maintain an efficient on-site safety monitoring system to enable industrial safety planning and tackling major challenges faced by the Company.

Meeting the above industrial safety goals helps reduce industrial risks associated with hazardous production facilities as a result of better process control, quality of repairs and industrial safety audits.

Ways of ensuring reliable and safe facility operation include:

- quality assurance at design and construction phase;
- external regulatory supervision;
- internal process monitoring;
- compliance with industry and corporate operating standards and procedures;
- implementation of the Technical Policy and engineering system controls.

In pursuance of RusHydro's Decree No. 42r On the Approval of Target Audit Schedule dated February 1, 2019, the Production Unit departments performed target audits of RusHydro's branches and subsidiaries to

improve the effectiveness and control of production process compliance with applicable safety requirements.

The dual control and monitoring of compliance with industrial safety requirements at hazardous production facilities – both internally and externally (by state supervisory bodies) – secures efficient control over safety and reliability of existing assets.

All of RusHydro Group's production facilities have put in place regulations on in-process monitoring of compliance with industrial safety requirements at hazardous production facilities. RusHydro Group has 517 hazardous production facilities registered in the State Register of Hazardous Production Facilities, including 174 facilities owned by PJSC RusHydro and 343 facilities owned by its subsidiaries.

Allocation of industrial safety responsibilities

Responsible	Functions
Member of the Management Board, First Deputy General Director – Chief Engineer	<ul style="list-style-type: none"> → General control of compliance with industrial safety requirements at hazardous production facilities of RusHydro and production subsidiaries; → Methodological support and coordination of industrial safety efforts at the Company's hydropower facilities, including recording of violations, emergency prevention and response.
Industrial and Fire Safety Office of the Industrial and Occupational Safety Department	<ul style="list-style-type: none"> → Setting up and running internal controls of compliance with industrial safety requirements at hazardous production facilities and hydropower facilities of RusHydro and its production subsidiaries; → Coordination and control of HQ units, branches and subsidiaries as regards in-process monitoring and compliance with industrial safety requirements; → Methodological support of the Company's branches and subsidiaries as regards in-process monitoring of compliance with industrial safety requirements and industrial safety management system operating procedures; → Control over the efforts of the Company's branches and subsidiaries to develop and implement annual industrial safety action plans and action plans eliminating industrial safety gaps identified by supervisory bodies.

Responsible	Functions
Directors of RusHydro's branches and subsidiaries	<ul style="list-style-type: none"> – General management of in-process monitoring and financing procedures; – Management of the development team working on initiatives to improve industrial safety and prevent environmental damage; – Coordination of efforts to prevent and manage emergencies and accidents at hazardous production facilities and to deal with their consequences; – Maintenance of buildings, structures and technical devices at hazardous production facilities to ensure their operability and safety, enforcement of occupational safety as required by the Russian Labor Code.
First Deputy General Directors – Chief Engineers of RusHydro's branches and subsidiaries	<ul style="list-style-type: none"> – Management of the in-process monitoring function and commission; – Control over experts and employees working at hazardous production facilities to make sure they promote compliance of production technologies, equipment, buildings and structures with the applicable legal requirements, standards, regulations and rules, and fulfil improvement orders issued by supervisory bodies with respect to industrial safety; – Management of the efforts to identify hazardous production facilities and include them in the relevant State Register, develop an industrial safety statement with respect to class I and II hazardous production facilities, and draft a fire safety statement and emergency response plans; – Arrangement of technical inspections, tests and expert reviews to confirm industrial safety of technical devices, buildings and structures and examine the technical documentation of hazardous production facilities; – Staff training to ensure accident and emergency preparedness at hazardous production facilities; – Implementation of action plans to eliminate industrial safety gaps at hazardous production facilities identified by the Federal Environmental, Industrial and Nuclear Supervision Service of Russia, assessment of industrial safety, control of compliance with the technical safety requirements at hazardous production facilities.
Industrial and occupational safety functions in RusHydro's branches and subsidiaries	<ul style="list-style-type: none"> – Organization and enforcement of in-process monitoring to ensure compliance with the industrial safety requirements at hazardous production facilities; – Development and implementation of industrial safety action plans; – Methodological stewardship of in-process monitoring; – Assessment of industrial safety at hazardous production facilities and analysis of accident causes; – Staff training and certification in industrial safety; – Organization of expert reviews for technical devices, buildings and structures at hazardous production facilities to ascertain their industrial safety; – Control over: <ul style="list-style-type: none"> • compliance with license requirements for operators of hazardous production facilities; • fulfilment of improvement orders issued by supervisory bodies with respect to industrial safety; • elimination of causes for emergencies, accidents and incidents at hazardous production facilities; • timely testing and inspection of technical devices, buildings and structures at hazardous production facilities, equipment maintenance and validation of check measurement units; • certification of technical devices used at hazardous production facilities for compliance with the industrial safety requirements; • availability and accuracy of operating and technical documentation for hazardous production facilities; • employee compliance with industrial safety requirements.

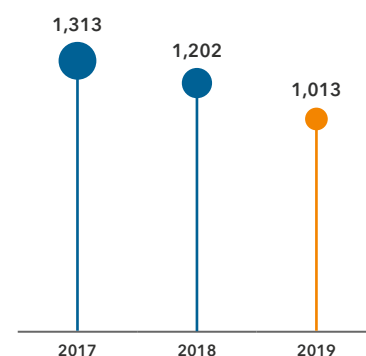
Accident rate at RusHydro Group's facilities ^{[103-2] [OS]}

In 2019, RusHydro Group's accident rate was down 16% y-o-y.

Most accidents (61%) were caused by recurrent natural hazards, third

parties not engaged in operations, and animal or bird activity.

Number of accidents involving RusHydro Group's generating facilities, electrical equipment and 110+ kV power lines



Stable Power Grid Operation in the Sakhalin Region

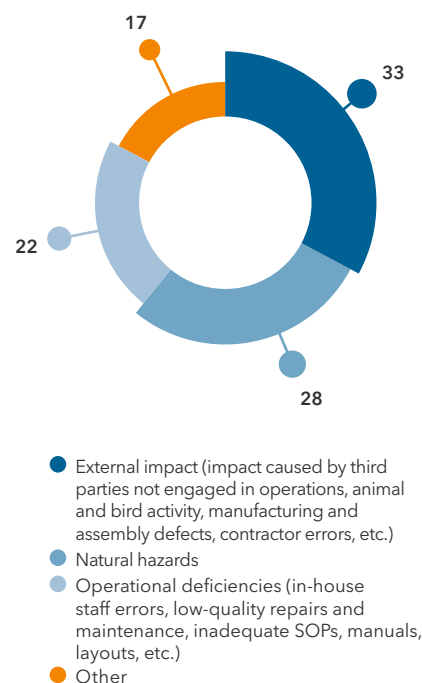
The electricity system is the backbone of the Sakhalin Region's economy. Given the island's isolated location, the electricity system is key to ensuring its sustainable social and economic development, as well as the adequate living conditions for its population.

Its stability is affected by local climatic conditions, including strong cyclonic activity, hurricanes with a speed of up to 56 m/s, high seismicity (magnitude 8-9), aggressive salt deposits, off-season icing of power lines, and frost heave. Coupled with high wear and tear of the grid infrastructure, these factors lead to frequent power failures.

As instructed by the Russian Government's Decree No. YUT-P9-13pr dated March 18, 2016, the Government of the Sakhalin Region and RusHydro Group developed the Program of Stable Power Grid Operation in the Sakhalin Region¹.

In 2019, Sakhalinenergo launched a number of initiatives funded from the available sources, including design works at eight facilities and construction and installation works at three facilities.

Cause of accidents in 2019, %



System Average Interruption Frequency Index (SAIFI)² ^[EU28]

Subsidiary	2017	2018	2019
JSC DRSK	1.18	0.87	1.64
PJSC Yakutskenergo	2.34	2.97	0.10
JSC Sakhaenergo	0.15	0.51	0.19
PJSC Magadanenergo	1.02	0.73	1.71
PJSC Sakhalinenergo	5.76	2.34	2.83
PJSC Kamchatskenergo	2.04	1.32	1.37
JSC UESK	0.20	0.18	0.05
JSC Chukotenergo	1.82	1.03	0.51

¹ The Program's priority initiatives falling within PJSC Sakhalinenergo's area of responsibility and operations are approved by the Ministry of Energy's Letter No. AT-2669/09 dated March 15, 2019, Minutes No. AN-114pr of April 2, 2019).

² The System Average Interruption Frequency Index (SAIFI) is calculated using the formula $(\sum l_i \cdot N_i) / NT$, where l_i is the total number of interruptions per annum for a group of customers N_i , and NT is the total number of customers served. The index is calculated for the entire location served.

System Average Interruption Duration Index (SAIDI), h¹ [EU29]

Subsidiary	2017	2018	2019
JSC DRSK	1.34	1.08	2.04
PJSC Yakutskenergo	4.24	6.02	0.14
JSC Sakhaenergo	1.67	0.57	0.34
PJSC Magadanenergo	1.10	1.44	1.13
PJSC Sakhalinenergo	13.22	4.93	3.85
PJSC Kamchatskenergo	5.08	1.86	2.14
JSC UESK	2.14	0.36	0.94
JSC Chukotenergo	10.14	8.16	7.45

Emergencies

Preparedness for natural disasters and emergencies

RusHydro Group is responsible for reliable and uninterrupted operation of its facilities. To this end, a dedicated system was implemented at the Company's production sites to prevent and respond to natural disasters and emergencies. In particular, efforts are made to prevent process upsets and accidents, and if an interruption occurs, the Company does its best to bring the facility operation back to normal as soon as reasonably possible. Furthermore, employees of RusHydro have regular trainings in civil defense and emergency response.

Key potential sources of natural disasters and industrial emergencies at RusHydro Group's production facilities:

- high magnitude low-frequency (once every 100 years) flood may result in boosting the headrace, overflowing hydraulic structures, waterfront destruction in junction areas, and a hydrodynamic accident followed by the flooding of adjacent areas, including flooding of power line pylons and transformer substations;

- during natural disaster alerts, there is a risk of electrical grid accidents caused by wire breaks or overlapping and short circuits at transformer stations followed by power outages for electricity consumers;
- technological emergencies affecting the equipment of power plants and grid infrastructure, which may cause interruptions or failures of power and heat generation or supply to households and economic assets;
- accidental oil spill affecting economic assets and people.

In RusHydro Group, the following functions and officials are responsible for the protection of population and territories from emergencies:

- the Situation Analysis Center and Industrial and Occupational Safety Department (as regards fire safety) at the Headquarters. They report to member of the Management Board, First Deputy Director General – Chief Engineer of the Company;
- first deputy directors – chief engineers with the direct involvement of civil defense and emergency response engineers reporting to them – at the Group's branches;

- employees authorized to deal with the issues of civil defense and protection of population from natural and industrial emergencies – at RusHydro's subsidiaries.

RusHydro Group prevents and responds to emergencies in full accordance with applicable Russian laws on hydraulic structures and hazardous production facilities. For the purpose of rescue and emergency recovery operations, the Company has established a back-up fund of documentation on RusHydro Group's hazardous facilities, which is maintained by the government.

All RusHydro Group's facilities have:

- action plans for natural and industrial emergency prevention and response, as well as action plans for oil and petrochemicals spill prevention and response approved by local bodies of the Russian Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM);
- hydraulic structures safety statements updated (revised) at least once in every five years

¹ The System Average Interruption Duration Index (SAIDI) is calculated using the formula $(\sum t_i \cdot N_i) / NT$ where t_i is the total duration of interruptions per annum for a group of customers N_i , and NT is the total number of customers served. The index is calculated for the entire location served.

subject to obligatory audit of such hydraulic structures by ad hoc commissions in collaboration with design and R&D institutions;

- facility safety certificates;
- special machinery for prompt response to potential damage or accidents (for facilities with own (or contractor's) fire stations);
- emergency and rescue equipment.

Volunteer emergency response teams, local warning systems and contracts for professional emergency response services have been put in place across RusHydro Group's facilities operating extremely dangerous and highly dangerous hydraulic structures or hazard class II and class III facilities duly assigned to respective civil defense categories.

To fulfil the requirements of HTS safety legislation, the Company provides for the mandatory insurance of public liability of those who own hazardous facilities, in respect of their harmful impact as a result of emergency (the insurance limit under the mandatory insurance contract on the HTS owner's public liability is stated by legislation in the amount of RUB 6.5 billion), as well as for the voluntary insurance of public liability, increasing the insurance amount up to RUB 35.5 billion, which corresponds to the public

liability insurance level of leading Russian power companies. [\[OS\]](#)

Functional subsystem of the National Emergency Management System

In pursuance of the Order of the Russian Ministry of Energy¹, RusHydro Group established a functional subsystem of the National Emergency Management System (NEMS).

The Company's emergency prevention and response and fire safety commission (the "Commission") is the supervisory body of the subsystem responsible for the timely situation assessment and decision-making on emergency prevention. The Commission's annual action plans stipulate efforts to facilitate the safe passage of flood water during the spring and summer period, prepare for the fall and winter peak loads, and secure the stable operation during the fire and storm seasons. The Commission manages and coordinates the operations of standing bodies and management bodies responsible for the day-to-day operation of the functional subsystem.

Permanent management bodies of the Company's functional subsystem – the Emergency Management Unit of the Situation

Analysis Center's team specializing in civil defense, emergency prevention and response, and civil defense and emergency engineers at RusHydro's generating branches and subsidiaries – are responsible for the planning of emergency prevention and response, coordination of emergency prevention and response activities in accordance with laws and regulations of the Russian Federation and internal documents of the Company.

Management bodies responsible for the day-to-day operation of the Company's functional subsystem – the Emergency Management Unit's duty shift and duty shifts at RusHydro's generating branches and subsidiaries – conduct 24/7 situation monitoring at facilities, give warnings of identified equipment failures, and carry out priority emergency prevention activities.

For the purpose of emergency prevention and response, RusHydro put in place resource stockpiles at its branches operating hydraulic structures and a dedicated financial reserve at RusHydro. The dedicated financial reserve for emergencies was established on a centralized basis in the interests of RusHydro's branches by transferring 1% of the average monthly revenue from electricity and capacity sales. All subsidiaries have established

¹ Order No. 792 On the Functional Emergency Management Subsystem at Organizations (Facilities) of the Energy Industry and Organizations (Facilities) Subordinate to the Russian Ministry of Energy dated September 24, 2018.

the required financial reserves and resource stockpiles for emergency prevention and response.

Emergency recovery exercises

Employees are trained in emergency recovery as part of the corporate civil defense and emergency response training program. The list of persons to be trained was made in accordance with Russian laws and regulations.

In line with the schedule for 2019, RusHydro Group conducted:

- 5 comprehensive exercises;
- 527 facility-based exercises;
- 109 table top exercises and training sessions;
- 37 tactical training exercises.

In 2019, 66 people took training or advanced professional training at training centers and as part of civil defense courses, including one civil defense manager and 22 chairmen and members of emergency prevention and response and fire safety commissions (with nine such members coming from the Headquarters).

Prevention of injuries and fatalities involving RusHydro Group's assets [EU25] [OS]

A special emphasis in occupational safety is placed

on the prevention of injuries among local residents arising from contact with the Group's facilities.

This issue is primarily covered through mass media (articles published in printed and online media) and school safety lessons on hazardous and harmful health impact of various power installations in the event of exposure within a hazardous distance.

In 2019, there were 16 accidents, including 11 third-party fatalities involving RusHydro Group assets. Of this number, nine fatalities resulted from approaching energized parts of power installations or overhead power lines closer than the minimum approach distance. Another two were due to traffic accidents involving vehicles of the Olekminsky electricity distribution zone (Sakhaenergo) and DRSK's branch Primorye Power System. The accidents were caused by driving under the influence and a third-party traffic violation, respectively.

Additionally, legal proceedings were launched in connection with injuries at RusHydro Group facilities. There were no legal actions lodged in response to fatalities.



As a leader among Russian energy companies, RusHydro Group is one of the world's largest organizations operating in hydropower and maintains the smooth, reliable operation of the Russian Federation's power systems.

Yevgeny Zinichev,

*Ministry of Civil Defense,
Emergencies and Disaster
Relief of the Russian
Federation*

Procurement

Procurement management [103-2]

As part of its operating activities, RusHydro Group purchases large quantities of third-party works and services, feedstock (including fuel) and materials.

Procurement operations in RusHydro Group are governed by the applicable Russian laws, including Federal Law No. 223-FZ On Procurement of Goods, Works and Services by Certain Types of Legal Entities dated July 18, 2011, and other internal regulations (by-laws) on procurement in RusHydro Group, including the Uniform Regulations on RusHydro Group's Procurement Policy¹, whereby:

- the Company's Board of Directors oversees procurement management, approves RusHydro's annual comprehensive procurement program and its progress report.
- the Central Procurement Commission (CPC) is the Company's permanent collective body which shapes and carries out the uniform procurement policy as well as exercises control and coordination of procurement activities. The CPC Chairman is responsible for procurement management across RusHydro Group.
- the CPC appoints standing procurement commissions which are directly authorized to arrange for and carry out procurement procedures. Depending on the scope of powers, there are procurement commissions of level 1 and level 2 as well as ad hoc commissions.

RusHydro Group has in place a number of internal regulations to prevent inappropriate and inefficient use of funds.

The objectives and principles of the Uniform Regulations on RusHydro Group's Procurement Policy

The Regulations on Procurement set out the following objectives and principles:

- procurement regulation aims to ensure timely and efficient supply of goods, works and services to the customer as well as prudent use of the customer's funds.
- procurement regulation relies on rational use of special procedures to make purchases on an arm's length basis as closely as practicable and provides for mandatory procedures to be followed by the officers in charge of procurement.

These procedures ensure:

- careful demand planning;
- market research;
- procurement transparency;
- focus on equality and fairness, with no discrimination or unreasonable restrictions on competition among participants where possible, or, if impossible, enhanced internal control;
- intended and efficient use of funds allocated for purchasing

goods, works and services (including their life cycle cost, where applicable), and implementation of cost-cutting initiatives;

- absence of restrictions on participation in the procurement in the form of non-measurable requirements for participants;
- efficient and fair selection of preferred suppliers following a comprehensive SWOT analysis (with price and quality being the key factors); and
- follow-up on contracts and use of goods, works and services purchased.

Procurement regulation is based on a systemic approach which ensures that uniform corporate rules are administered and followed, with officers in charge of procurement possessing the necessary authority and responsibility. In the light of above mentioned, the customer enjoys the following:

- benefits of a regulatory framework;
- effective platform for procurement management and follow-up control;
- qualified procurement professionals;
- well-established procurement infrastructure (information support, e-commerce tools, certification, professional consultants, etc.).

¹ Approved by resolution of RusHydro's Board of Directors No. 277 dated October 4, 2018 and amended by resolutions No. 292 dated June 24, 2019 and No. 300 dated December 4, 2019.

RusHydro Group publishes information on planned procurement activities and places up-to-date official announcements describing the scope of procurement (item name), material terms of the competitive procurement and other details on official Russian website at www.zakupki.gov.ru, as well as on the electronic trading platform at <https://rushydro.roseltorg.ru>. Following the competitive procedure, the Company publishes the procurement results specifying the winning bidder and the respective price.



The material terms and other details of RusHydro Group's competitive procurement can be found on the official website of the Russian Federation at <https://zakupki.gov.ru/>



Electronic trading platform:: <https://rushydro.roseltorg.ru/>

Procurement improvement plans in 2020

RusHydro Group's key procurement improvement initiatives include:

- optimization of procurement processes;
- further automation of the Group's procurement processes, including the development of an automated analytical reporting system;
- development of a reference data system;
- fine-tuning of category management tools in procurement.

Implementation of the annual comprehensive procurement program [102-9]

In 2019, total value of contracts awarded under procurement procedures at RusHydro Group amounted to RUB 405.3 bn (including VAT), up by 49.4% y-o-y, mainly due to:

- an increase in procurement under loan agreements by RUB 22.0 bn;
- acquisition of assets at Gotsatinskaya HPP (RUB 10.1 bn) and Zaragizhskaya HPP (RUB 3.5 bn);
- procurement of works to complete the construction of Ust-Srednekanskaya HPP (RUB 18 bn);
- procurement of main construction and installation works and manufacturing of hydropower equipment for Krasnogorskaya SHPP-1 and Krasnogorskaya SHPP-2 (RUB 7.4 bn);
- procurement of comprehensive transport services and motor vehicle leases valid for three years (RUB 4.8 bn);
- long-term contracts signed for major and minor repairs on property, plant and equipment (RUB 7.87 bn);

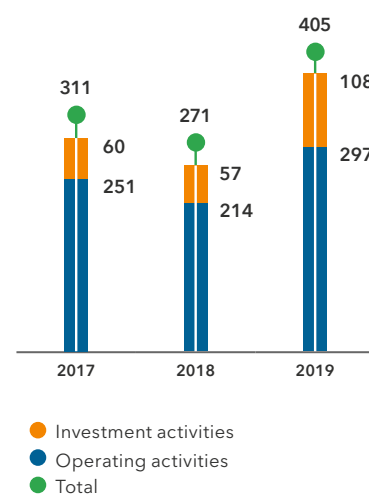
- an increase in the cost of DGK's procurements in fuel by RUB 6.2 bn and in heat by RUB 8.9 bn.

At the same time, the number of procurement procedures rose by 14% to 19,900. Open bidding accounts for over 50% of all procurement procedures, of which 99% run on an electronic trading platform.

In money terms, the largest portion of procurement focuses on works and services related to repair and investment programs (upgrade, capital construction projects) of the companies within RusHydro Group.

The procurement items include goods usually purchased by energy companies: core equipment (boilers and turbines), transformers, switchgear cells, package transformer substations, isolation valves, control valves, line accessories, cable fittings,

Procurement, RUB bn (incl. VAT)



pipelines, steam pipelines and spare parts, cabling and wiring, electrical appliances, metal goods, insulators, heat insulators, etc.

Procurement by method, %

Procurement type	2017	2018	2019
Competitive procurement, including:	51.47	49.42	50.76
electronic procurement	93.94	99.46	99.40
Non-competitive procurement, including:	48.41	49.76	21.10
single-source procurement	99.00	98.47	96.56
Procurement from related parties ¹	0.00	0.13	28.12
Procurement from related parties	0.12	0.69	0.02

One of the Group's most important strategic priorities in procurement is timely and efficient competitive awarding of contracts for fuel supplies. Following the competitive procurement procedures in 2019, the cost of coal supplies to RAO ES East Subgroup's thermal power plants rose by no more than 1.3% y-o-y as a result of the coal mix reshuffling, lower electricity and heat generation and quality discounts driving down the fuel prices. At the same time, the coal price added 10.3% y-o-y driven by higher prices for export-oriented coal grades.

In 2019, the cost of natural gas supplies grew by 9.6% y-o-y, mainly due to US dollar exchange rate fluctuations pushing up prices for natural gas supplied under the contract between DGK and the Sakhalin-1 Consortium.

The cost of fuel oil supplies to RAO ES East Subgroup rose by 33.5% following the fuel mix reshuffling at Kamchatskenergo, which started substituting natural gas with fuel oil as its supplier, Gazprom Mezhdregiongaz Far East, was facing a decline in natural gas production. On top of that, the fuel oil price added 5.3% in 2019 on the back of higher

prices for petroleum products prevailing in the domestic market when procurement was underway.

In 2019, the cost of diesel fuel supplies grew by 9.0% y-o-y driven by rising consumption. At the same time, the diesel fuel price increased marginally by 1.5% y-o-y, which is in line with the Russian Ministry of Economic Development's forecast.

In 2019, the cost of crude oil supplies dropped by 3.2% y-o-y driven by falling consumption. At the same time, the crude oil price increased marginally by 2.4%, also in line with the forecast.

Sustainable procurement ^[EC]

As one of Russia's largest purchasers of goods, products, services and raw materials, RusHydro Group is fully aware of its responsibility to the regions where it operates, communities

and environment, and therefore amended its Uniform Regulations on RusHydro Group's Procurement Policy. According to the regulation, any design works (including pre-feasibility

studies) for new hydropower and thermal power projects, their construction and modernization, any core equipment and technical specifications and the terms of contracts awarded under

¹ A related party is a legal entity which is deemed related to the customer in accordance with the Russian Tax Code and included in the customer's list of related parties (Appendices 2 and 3 to the Uniform Regulations on RusHydro Group's Procurement Policy). In 2017, the relevant item was not calculated, while in 2018 it was calculated for the period from November 1, 2018 to December 31, 2018.

procurement procedures must be aligned with the customer's approved internal sustainability regulations to ensure:

- compliance with environmental requirements;
- protection of cultural heritage sites;

- industrial and occupational safety;
- protection of indigenous peoples and socially vulnerable groups;
- control over negative footprint on climate change and environment; and

- biodiversity conservation and restoration.

Procurement procedures based on tenders or requests for bids may include relevant sustainability criteria.

Procurement through small and medium-sized businesses

To facilitate competition and development of SMEs, RusHydro Group seeks to partner with small and medium-sized businesses (SMES) as part of its procurement activities.

RusHydro launched a partnership program with small and medium-sized businesses (the "Partnership Program")¹, which was developed in accordance with the Russian Ministry of Economic Development's guidelines².

The Partnership Program and the register of small and medium-

sized businesses included in the Program are available online. The register is updated as necessary.

RusHydro's target for contracts awarded to SMEs in 2019 was determined by Russian Government's Resolution No. 1352 On Special Aspects of Participation of Small and Medium Enterprises in Procurement of Goods, Works and Services for Certain Types of Legal Entities dated December 11, 2014. As at December 31, 2019, the Group significantly exceeded the target.



Partnership Program is published on RusHydro's website at : <http://zakupki.rushydro.ru/>



The list of goods, works and services purchased from SMEs can be found on the website of the Unified Information System for Procurement at : <http://zakupki.gov.ru>

Procurement from SMEs in 2019³

Indicator	Target, %	Actual ⁴ , %	Procurement ⁵ , RUB bn (incl. VAT)
Procurement through businesses including SMEs, % of annually awarded contracts	18	77.9	66.1
Procurement only through SMEs, % of annually awarded contracts	15	27.5	23.3

¹ Approved by RusHydro's Order No. 568 of July 16, 2014.

² Letter No. 23941-EE/D28i dated November 1, 2013.

³ Procurement through SMEs is calculated as a % of total contracts awarded in 2019 by 38 companies of RusHydro Group subject to Russian Government's Resolution No. 1352 dated December 11, 2014.

⁴ Calculated based on financing.

⁵ Calculated based on financing.

Import substitution

As part of the Comprehensive Modernization Program of RusHydro's generating facilities, the Company plans to increase supplies from domestic machinery producers given that, among other things, certain types of equipment and components will be produced in Russia.

To increase supplies from local manufacturers in 2019, RusHydro implemented the following initiatives:

- RusHydro Group's Technical Policy was amended to include the requirements for increased reliance on domestic solutions starting from the design phase;
- the Uniform Regulations on RusHydro Group's Procurement Policy was amended to:
 - determine a price preference for prioritizing domestic bids when purchasing radio-electronics included in the State Register of Russian Radio-Electronics in accordance with the Russian Government's Resolution No. 878 dated July 10, 2019 On Measures for Stimulating Manufacture of Radio-Electronic Products within the

Russian Federation Applied to Public Procurements of Products, Works and Services for State and Municipal Needs, on Amending Russian Government's Resolution No. 925 dated September 16, 2016, and on Recognizing Null and Void Certain Acts of the Russian Government (altering the preference from 15% to 30% in a similar way to the Russian Government's Resolution No. 925 dated September 16, 2016, all other things being equal).

- prioritize Russian manufacturers when purchasing aluminium and/or aluminium-based products in accordance with Russian Government's Directive No. 6574p-P13 dated July 18, 2019.
- the Company's internal regulations were amended to bring the preparation of procurement specifications into line with RusHydro Group's Technical Policy;
- resolution of RusHydro's Board of Directors¹ providing for the Company's increased reliance on domestically developed software:

///



RusHydro is justly one of the largest Russian power generating companies and third-largest hydropower company of the world. A powerful foundation was built over 15 years to enable stable operations and possibility to realize ambitious projects. Due to its accumulated experience and unique technologies the Company tackles broad-scale tasks, implements automated management systems that always conform to environmental and safety requirements.

Igor Artemjev,

Head of FAS Russia

¹ Minutes No. 285 of March 26, 2019.

- approved the Action Plan for 2019-2021 providing for the Company's increased reliance on domestically developed software;
- approved KPIs to monitor the Company's migration to domestically developed software.

the Company joined efforts with the Industrial Development Fund of the Russian Ministry of Industry and Trade to implement the defence industry diversification roadmap for the enhancement of the domestic energy sector within the state industrial information system and also partnered with the Russian Energy Agency of the Russian Ministry of Energy to coordinate import substitution initiatives with the defence industry, specifically:



In 2019, the actual share of imported equipment under the TR&M program stood at 20%, which is in line with the import substitution roadmap target.

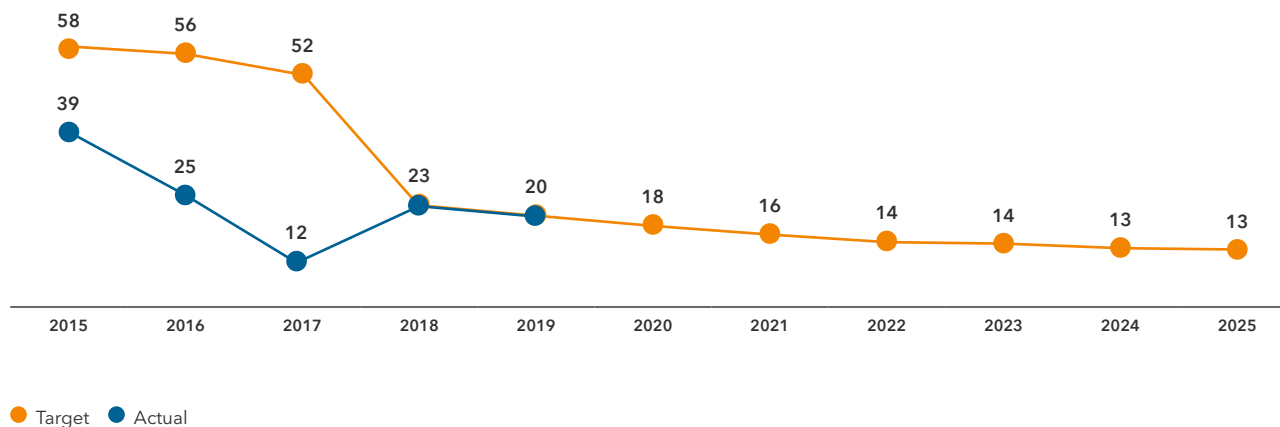
- developing the list of required hardware and software to be supplied in 2020-2024 and sent it to the Industrial Development Fund of the Russian Ministry of Industry and Trade;
- arranging for the initial population and testing of the state industrial information system;
- signing a non-disclosure agreement with the Russian Energy Agency of the Russian Ministry of Energy to coordinate import substitution

initiatives with the defence industry;

- sending proposals for manufacturing civil purpose products to the pilot list of defence industry enterprises.

As part of efforts to gradually substitute purchases of foreign-made goods, works and services with those of Russian origin having similar specifications and usability, the Company amended its import substitution roadmap until 2025¹.

Share of imported equipment in procurement, %



¹ The roadmap was amended along with RusHydro Group's updated Long-term Development Program for 2018-2022 (Minutes of the Board of Directors No. 271 of June 1, 2018).

Innovative development

Innovative Development Program and its implementation [103-2]

The Innovative Development Program of RusHydro Group for 2016–2020 with a Prospect up to 2025¹ sets out the focus and framework of the Group's innovations and specifies the amounts and sources of funds to be spent on its innovative projects.

In the medium term, it aims to improve RusHydro Group's economic and operational efficiency by using innovative engineering, technical and management solutions focused on:

- extending lifespans and improving performance of equipment;
- enhancing reliability and economic efficiency of equipment;
- improving the quality of equipment diagnoses coupled with proactive identification and mitigation of operational risks;

- import substitution and reducing the dependence on imported equipment;
- reducing the environmental footprint;
- improving energy efficiency and cutting losses.

In the long term, the Innovative Development Program of RusHydro Group aims to:

- Assure the Company's position as one of the most technologically advanced energy companies, both domestic and international, via:

- development of efficient construction, modernization and repair processes for power generation facilities;
- development of real-time monitoring technologies for the core equipment;
- automation and robotization of maintenance and repair; and
- development of new innovative products based on RusHydro's know-how and expertise (e.g. energy efficiency and storage solutions, EV infrastructure, and advanced materials).

KPI for the Innovative Development Program of RusHydro Group

KPI	Target		Progress	
	2019	2020	2019	Delivered or not
R&D expenses, % of revenue	0.25	0.25	0.26	Achieved
Growth in the quantity of IP assets on the balance sheet, %	6.5	7	6.25	Delivered ²
Efficiency of hydropower capacity management, employees per 100 MW	20.36	20.13	21.14	Delivered ³
Innovative products purchased, % of total volume	1.33	1.46	0.69	Not achieved
HPP repair expenses, '000 RUB/MW (at 2000 prices)	19.8	19.6	17.58	Achieved

¹ Approved by RusHydro's Board of Directors (Minutes No. 244 dated November 23, 2016).

² Growth of 6.5% y-o-y means that in 2019 in absolute values 17.04 IP assets were to be created and booked on the balance sheet. The actual value of the IP assets created and put on the balance sheet amounted to 17 assets, so this indicator is deemed fulfilled.

³ Having regard to the fact that the approved calculation and evaluation methodology for this KPI was meant to cover the headcount involved in core operations (i.e. HPP operation). However, the Group's operations in the Far East were later reorganized, with RAO ES East transferring many of its regional management functions in charge of heat generation facilities and grids to RusHydro. As a result, RusHydro is now overstaffed with those employees who are not involved in HPP operation. Excluding such staff, this KPI may be deemed delivered. The 2019 report on progress against the Innovative Development Program deems this KPI as delivered.

- Ensure deeper engagement in green energy via:
 - development of hydropower potential in certain regions of Russia;
 - development of RES-based alternative energy infrastructure (geothermal power generation);
 - analysis and development of mini-hydro solutions.

In 2019, as resolved by the Government Commission for Economic Modernization and Innovative Development of Russia¹,

RusHydro Group updated its Innovative Development Program for 2020–2024 with a prospect up to 2029 (the Updated Innovative Development Program of RusHydro Group).

The Updated Innovative Development Program of RusHydro Group results from benchmarking of RusHydro's technological capabilities and innovation KPIs vs global peers² and factors in follow-up proposals prepared and

approved by the Company's Board of Directors³.

On December 11, 2019, RusHydro Group duly submitted its Updated Innovative Development Program for review to the relevant federal executive authorities⁴. It obtained affirmative opinions from the Russian Ministry for the Development of the Russian Far East and Arctic and Ministry of Education and Science. Its review is slated for Q2 2020 by the Interdepartmental Commission

Key innovative projects in 2019

Description	Objective
Development of a hardware and software system for monitoring and predicting the reliability of HPP hydraulic structures in geologically challenging environments.	Test and implement a hardware and software system for safety and reliability monitoring of hydraulic structures at Zagorskaya PSPP and Zagorskaya PSPP-2.
Research into new processes to repair and restore hydraulic structures, extend their lifespans and enhance their reliability, and draft implementation guidelines.	Develop robust techniques for repair and restoration of hydraulic structures.
Development of recommendations on how to assess human impact in the tailrace on the condition of machinery and hydraulic structures and HPP energy efficiency;	Develop and justify an action plan to raise and stabilize the water levels in separate outlets for better performance of HPP turbine equipment.
Modernization of reinforced-concrete penstock encasements, including application of protective coatings.	Insulate penstocks with waterproofing coatings based on advanced materials, extend time between repairs and cut repair expenses.
Development of a gravity-type energy storage driven by solid loads for a solid-state storage power plant (SSPP), including prototypes of mechanic arms required for its construction.	Develop engineering solutions to construct an industrial SSPP and automate installation works.
Development of an automated warning system to detect ruptures and measure turbine flows at RusHydro's diversion and impoundment HPPs.	Enhance safe operations across HPPs.
Reliability analysis of gas turbine units and development of a database and guidelines to assess their health.	Develop a hardware and software system for remote monitoring of gas turbine units.

¹ Meeting minutes No. 2 of October 22, 2018.

² Conducted in line with the Russian Government's Directive No. 3262p-P13 dated April 27, 2018.

³ Minutes No. 294 of August 29, 2019.

⁴ Russia's Ministry of Economic Development, Ministry of Energy, Ministry for the Development of the Russian Far East and Arctic, Ministry of Education and Science.

for Technological Development under the Government Commission for Economic Modernization and Innovative Development of Russia (the Interdepartmental Commission). Once approved by the Interdepartmental Commission, the Updated Innovative Development Program will be reviewed and approved by the Company's Board of Directors in May 2020.

Based on benchmarking of RusHydro's technological capabilities vs global peers, new solutions coming into play and potential economic efficiency benefits, the Company identified the focus of its efforts while implementing the Innovative Development Program in the reporting period and also seeking to improve its global ranking.



Integrated innovative development management for RusHydro and RAO ES East Subgroup

The innovative development programs of RusHydro Group and RAO ES East have been aligned to contribute in the same way to the following components of RusHydro's integrated KPI for innovations:

- R&D expenses, % of revenue;
- growth in the quantity of IP assets on the balance sheet in the reporting period, %;
- heat efficiency, %.

In addition, RusHydro's Board of Directors reviews and approves the innovative development programs of RAO ES East as part of the Innovative Development Program of RusHydro Group.

The Updated Innovative Development Program of RusHydro Group now covers both RusHydro and RAO ES East, which helps align innovative development priorities across the Group's footprint and save resources previously required to develop, approve and monitor two separate programs.

Amounts spent on the Innovative Development Program, RUB mn¹

	2017	2018	2019
Total, including:	2,189.4	2,372.9	2,751.1
RusHydro (including funding by design institutions)	586.7	655.4	483.3
RAO ES East Subgroup	1,602.7	1,717.5	2,267.8

Program for Intellectual Property Rights Management

The Program for Intellectual Property Rights Management within RusHydro Group is a policy paper that determines key initiatives aiming to create favorable conditions for sustainable development of the Company and its subsidiaries while implementing the Innovative Development Program of RusHydro Group as well as to achieve integrated KPI targets

in innovations while fostering a framework for intellectual property rights management.

This Program assumes that intellectual property rights management is part of innovative development with a focus on:

- promoting and identifying creations of the human mind;
- providing legal protection of intellectual property rights;

- protecting exclusive intellectual property rights;
- commercializing intellectual property rights.

To this end, the Company and its subsidiaries successfully implemented a number of initiatives in 2019, with improvements covering:

- organizational structures;
- regulatory framework;

¹ The Innovative Development Program of RusHydro Group is funded solely with its own capital.

- contracting process;
- employee incentives (motivation) and professional development.

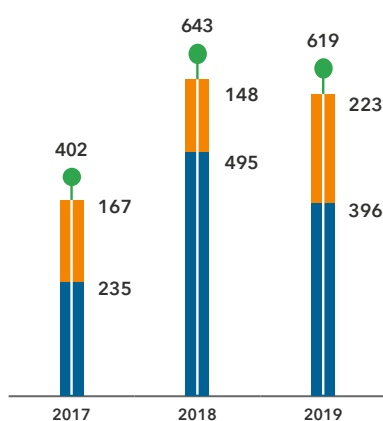
In accordance with the Russian Government's directives and the resolution of the

R&D projects

RusHydro Group is committed to ramping up its R&D investments.

In 2019, R&D spending totaled RUB 618.8 mn¹.

R&D spending, RUB mn (incl. VAT)

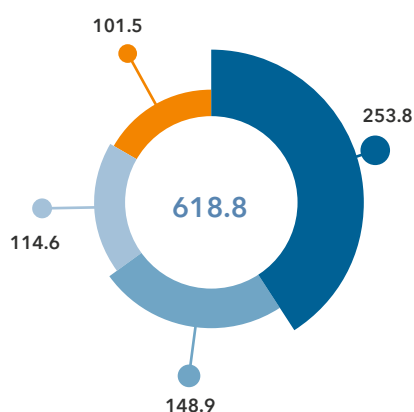


- RAO ES East Subgroup
- RusHydro Subgroup
- RusHydro Group

Company's Board of Directors, detailed progress reports on the Program for Intellectual Property Rights Management within RusHydro Group are available on Rosimushchestvo's interagency portal (<https://mvpt.rosim.ru/sitepages/enter.aspx>).

2019 R&Ds were aimed at addressing RusHydro Group's most important (critical) technology issues related to preventing potential process upsets that may result in undersupply of electricity.

R&D spending by area in 2019, RUB mn (incl. VAT)



- Plant and equipment monitoring and operation
- Design, construction, modernization and repair solutions
- Energy efficiency and water management
- Environmental protection and sustainability



PJSC RusHydro's professional staff made the company a global energy market leader. At the heart of your activity lies a desire for continuous growth and improvement of the company, the Russian economy, and industry overall. This is a unique and well-deserved occasion for each of you because the success of your confident, driving movement forward depends solely on coordinated teamwork.

Andrey Murov,

First Deputy Director General – Executive Director of PJSC Rosseti

¹ Including VAT.

Key R&D projects implemented by RusHydro Group to ensure sustainable development

Description	Progress in 2019
Development and implementation of a process to partially restore heat transfer surface elements of cogeneration heat exchange equipment (tubes) instead of replacing the entire tube bundle	
<p>Objective:</p> <ul style="list-style-type: none"> to develop and implement a process to partially restore heat transfer surface elements of cogeneration heat exchange equipment (tubes) instead of replacing the entire tube bundle and thereby improve its performance, which includes exploring the properties of a set of thermal conductive materials and developing a process and a commercial prototype for application of a protective coating to damaged elements (tubes) of a heat exchanger's tube bundle. <p>Solution:</p> <ul style="list-style-type: none"> to apply specialty epoxy coating (BLOKOR-MKK115). 	<p>Pilot testing (application of the protective coating and in situ tests) underway at Khabarovskaya CHPP-3. 2019 activities included:</p> <ul style="list-style-type: none"> submitting patent applications; drafting proposals for its implementation and rollout at other power generation facilities.
Design of a composite power line conductor core based on thermoplastic resins	
<p>Objectives:</p> <ul style="list-style-type: none"> to achieve a 50% higher current-carrying capacity and reliability vs ACSR conductors without adding weight (resulting in savings on account of the increased quantities of transmitted power); to make overhead power lines and the entire grid more reliable by reducing the ice and wind load on pylons (resulting in extended conductor lifespans); 15% to 40% lower costs of building new crossings as fewer pylons will be required. <p>Solution:</p> <ul style="list-style-type: none"> to design a composite power line conductor core based on thermoplastic matrices along with manufacturing equipment. 	<p>In 2019, RusHydro developed and launched an experimental pultrusion machine and tested core prototypes.</p>

R&D effect on the Company's risks

Damage caused by natural and industrial disasters outside RusHydro Group's facilities is one of the key risks for the Company. This risk results from the underprotection of RusHydro Group's production assets against natural disasters.

The risk management initiatives provided for by the 2019 calendar plan include the following R&D projects:

- development and testing of a technology to monitor structural stress in case of a tensiometer failure;
- development of a hardware and software system for monitoring and predicting the reliability of HPP/PSPP hydraulic structures in geologically challenging environments;
- development of an automated warning system to detect ruptures and measure turbine flows at RusHydro's diversion and impoundment HPPs;

- development of recommendations on assessing the human impact on tailraces with regard to the HPP equipment, hydraulic structures and energy efficiency;
- research into new processes to repair and restore hydraulic structures, extend their lifespans and enhance their reliability, and draft implementation guidelines;
- introduction of an expert system to support decision-making in response to incidents, accidents and emergencies at RusHydro Group's production facilities.

Research and Design Complex

The Research and Design Complex is RusHydro Group's asset which renders services to high-tech industries in Russia and consists of the Design Complex and the R&D Complex.

RusHydro Group's Design Complex includes

JSC Lenhydroproject, JSC Hydroproject Institute, JSC Mosoblhydroproject and JSC KhETC which engage in:

- design of new hydropower generation facilities as well as rehabilitation and modernization of existing ones (as general designer);

- design of RES-based generation facilities;
- integrated design of water infrastructure providing for the construction of dams, impoundments, pump stations, diversion channels and penstocks, embankments, fish passing and protection

facilities, port and navigation facilities, including water infrastructure for nuclear power plants;

- integrated on-site and table-top design and survey works when assessing various project stages, including power generation, hydraulic structures and water infrastructure;
- development of detailed design documentation and project support at all life cycle stages;
- field supervision over the ongoing energy, hydraulic and water infrastructure projects;
- construction oversight at energy, hydraulic and water management infrastructure facilities;
- use of local and regional water resources, development of local strategies for power generation and water infrastructure construction;

- advanced training programs (postgraduate studies);
- comprehensive engineering services including testing, modernization, reconstruction, design and rehabilitation of power plants and heat supply networks at JSC DGK;
- development of new activities related to converting equipment at power plants to gas – a promising fuel for the development of the energy sector in the Far East.

The R&D Complex includes JSC Vedeneyev VNIIG, JSC KhETC (the Far Eastern Analytical Center) which engage in:

- research and development covering hydropower generation and the wider energy industry, industrial and civil construction, engineering protection, surveys,

materials, technologies, technical regulations, etc.;

- competencies of the Analytical Center for the Safety and Reliability of Hydraulic Structures and Core Equipment of Hydropower and Heat Generation Facilities (under the Chief Engineer);
- research support to hydraulic projects in the energy sector and beyond, development of related project documentation (instrumentation and controls, specifications, etc.);
- research and engineering support to construction projects and other life cycle stages;
- development of technical regulations;
- advanced training programs (postgraduate and doctoral studies), including in core and unique competencies (with no similar curriculum offered elsewhere).

Achievements of RusHydro Group's design institutions in 2019

Design institution	Project	Achievements
JSC Lenhydroproject	Nizhne-Bureyskaya HPP	Adjustments made to the Adjusted Nizhne-Bureyskaya HPP Project with Updated Cost Estimates for the Hydrotechnical Complex, Including the Water Reservoir, with Russia's State Expert Review Board issuing an affirmative opinion with regard to its design documentation and results of engineering surveys. Adjusted. Detailed design documentation developed to support completing construction and commissioning of Nizhne-Bureyskaya HPP.
	Chirkeyskaya HPP	Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation and results of engineering surveys, as well as validation of cost estimates for capital construction, modernization and renovation.
	Construction of two single-circuit 110 kV Pevek-Bilibino power lines	Adjustments made with Russia's State Expert Review Board issuing an affirmative opinion with regard to design documentation and results of engineering surveys, as well as validation of cost estimates for capital construction, modernization and renovation.
	Commissioning of the third hydropower unit at Ust-Srednekanskaya HPP	Detailed design documentation developed.
	Replacement of hydropower unit No. 5 at Votkinskaya HPP	
	Completion of Zaramagskaya HPP-1	

Design institution	Project	Achievements
Hydroproject Institute	Advanced water impounding project at the Volga-Akhtuba Floodplain	Design documentation is being developed to construct a waterway, an HPP and a water reservoir with two dams.
	Construction of engineering protection facilities in Nizhneudinsk and Tulun	Design documentation is being developed to construct flood control facilities on Iya and Uda rivers as part of Irkutsk Region's Environmental Protection Program for 2019-2024.
	Design of coastal hydraulic structures and a process water supply system for Kudankulam NPP, India	Design documentation is being developed to construct coastal hydraulic structures and a process water supply system for units 1 to 6 at Kudankulam NPP and field supervision is ongoing at units 3&4.
	Design of external hydraulic structures for El Dabaa NPP, Egypt	Mathematical model of water intakes and disposals is being developed to project sediment movements in the headrace and retention basin, avoid recirculation of cooling water between water disposals and intakes and assess environmental effects. Detailed design documentation is being developed for external hydraulic structures. Engineering support to the overseas project owner with a view to obtaining an affirmative opinion and building permit from local authorities. Pressure meter tests running on rock ground.
	Paks-2 NPP, Hungary	Design and survey works underway to expand and deepen the existing headrace and water intakes, the bridgework and conjugation structures and to construct pump stations, an open tailrace and a water discharge facility at Paks-2 NPP.
	Zagorskaya PSPP and Zagorskaya PSPP-2	Design and survey works underway on the headwater pond dam, intake channel and penstocks at Zagorskaya PSPP. Works underway to upgrade the automated diagnostic control system. Detailed design documentation is being developed, with geotechnical control in place and works underway to level the station node building at Zagorskaya PSPP-2.
	Arctic LNG-2	Design documentation is being developed to construct a plant to process liquefied natural gas (LNG) and stable gas condensate (SGS), including storage facilities, the Utrenny shipping terminal, supporting coastal infrastructure and port facilities.
	Detailed design documentation for Bokang-Baling HPP, India	Detailed design documentation is being developed in cooperation with India-based SAI.
Mosoblhydroproject	Comprehensive rehabilitation and modernization of the Cascade of Kubanskiye HPPs	Affirmative opinions obtained from Russia's State Expert Review Board with regard to design documentation and results of engineering surveys covering some of Mosoblhydroproject's facilities and structures. Detailed design documentation is being developed for PSPP and Sengileevskaya HPP.
	Krasnogorskaya SHPP-1 (Krasnogorskaya SHPP): new construction	Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation. Detailed design documentation is being developed and field supervision is ongoing.
	Krasnogorskaya SHPP-2 (Pravokubanskaya SHPP): new construction	Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation. Detailed design documentation is being developed and field supervision is ongoing.
	Adygeyskaya WPP	Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation. Detailed design documentation is being developed and field supervision is ongoing.

Design institution	Project	Achievements
KhETC	Vladivostokskaya CHPP-2	The power supply system upgraded at the onshore pump station of Vladivostokskaya CHPP-2. Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation and results of engineering surveys. Adjustments made to design and cost estimates with Russia's State Expert Review Board issuing an affirmative opinion with regard to the Rehabilitation Project for the Heat Supply Network between Vladivostokskaya CHPP-2 and the Heat Pipeline to Patroclus in Vladivostok.
	Anadyrskaya CHPP-2	Adjustments made to design and cost estimates for the Gasification Project at Anadyrskaya CHPP.
	Khabarovskaya CHPP-1	Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation and results of engineering surveys for the Cooling Tower Upgrade Project at Khabarovskaya CHPP-1 (Innovative Development Program). Boiler No. 8 upgraded at Khabarovskaya CHPP-1.
	Khabarovskaya CHPP-3	Adjustments made to design and cost estimates for the Rehabilitation Project at Khabarovskaya CHPP-3 with Hot-Water Peaking Boiler Plant Converted to Natural Gas Combustion. Boiler feed water pumps upgraded at Khabarovskaya CHPP-3.
	Heat supply networks	Heat supply networks of CHPP-1 and CHPP-2 connected ranging from point No. 212 to point No. 1 in Petropavlovsk-Kamchatsky. Affirmative opinion obtained from Russia's State Expert Review Board with regard to design documentation and results of engineering surveys.

Achievements of RusHydro Group's R&D institutions in 2019

Research institute	Project	Achievements
Vedeneyev VNIIG	Assessing the human impact on tailraces with regard to the HPP equipment, hydraulic structures and energy efficiency	Key factors of the human impact on tailraces identified, including their effect on the reliability and safety of the HPP equipment and hydraulic structures. Current environmental and social effects assessed, including the effect of water levels and peak discharges on tailrace processes. Mathematical model developed to project tailrace processes and river bed evolution in a high-water season and as a result of daily runoff. Selected HPPs analyzed to assess the impact of current changes to river morphometry and tailrace processes on the operation of the HPP equipment and hydraulic structures, including the effect of tailrace levels on turbine operation. 3D model developed to project tailrace conjugation in case of flood discharge. Algorithm developed to plan tailrace protective works given the current state of river beds.
	Fostering smaller HPPs	The existing array of data and prior deliverables on hydropower potential of small and medium rivers, including suitable dam sites and watercourses, was analyzed and updated based on advanced information technologies, data modeling, processing and presentation tools and methodologies. Some 300 prospective dam sites scrutinized resulting in a selection of about 20 suitable sites meeting the required criteria, including their front-end engineering design.
	Arctic LNG-2: Wave model tests	Pilot tests run to assess the wave impact on gravity-based structures (GBS) for Arctic LNG-2. Tests were run in a wave tank to assess the wave impact (3D view of wave forces and wave force moment) and runup on GBSs, helping Arctic LNG-2 determine the maximum GBS exposure to wave impact and runup as a result of storms reoccurring once in 10, 100 and 1,000 years.
	Arctic LNG-2: Selection and validation of lightweight concrete and modified normal-density concrete mixtures, including laboratory and field studies	Lightweight and modified concrete mixtures developed and tested at the SAREN construction site in Belokamenka. Concrete pouring tests run to apply commercial batches to a dummy (prototype). Guidelines developed for concrete works on GBSs. Engineering support to concrete works at the GBS construction site. Research conducted to assess the impact of gas condensate on modified concrete used in GBSs and select the best possible protective coating.

Research institute	Project	Achievements
KhETC (the Far Eastern Analytical Center)	DGK, Kamchatsken-ergo (including Geoterm), Magadanenergo, Sakhalinenergo, Chukotenergo, Yakutskenergo	<p>The health of core equipment analyzed covering 923 units of equipment. 333 power transformers (the highest voltage category of 110 kV and above) and electric power grids evaluated across the above subsidiaries, as well as 29 power lines (ranging from 35 to 110 kV) examined for Chukotenergo (pilot project).</p> <p>In 2019, the Far Eastern Analytical Center issued 544 equipment-related recommendations seeking to significantly improve the health of core equipment, enhance its reliability and reduce breakdowns.</p> <p>Draft guidelines developed to calculate and project the health of TPP equipment (steam boilers, steam turbines, turbine-type generators) and its evolution over time with or without any impact factors, which provides for better repair planning in the medium term.</p>

International activities ^[OS]

Across its international operations, RusHydro Group focuses on attracting innovative technologies contributing to its accelerated development, as well as promoting services of its Research and Design Complex in international markets, including by enhancing competencies in target segments of the global energy sector.

RusHydro Group is committed to long-term and mutually beneficial cooperation with foreign partners in line with Russia's strategic interests.

The key areas of RusHydro Group's international activities include:

- cooperation with foreign energy companies and power equipment manufacturers in the field of construction and modernization of conventional energy projects, maintenance projects;
- implementation of advanced RES-based technologies providing for power supply to isolated areas in the Far Eastern Federal District;
- monitoring of global energy developments.

In December 2019, Hydroinvest and RazTES, part of Tashir

Group, signed an agreement (dated December 5, 2019) on the sale of 90% of its shares in MEK which owns Armenia-based Sevan-Hrazdan Cascade HPPs with a total installed capacity of 565 MW. The transaction was approved by both PJSC RusHydro's Board of Directors and Armenia's Public Services Regulatory Commission. On December 12, 2019, Hydroinvest received full payment for its shares. In Q1 2020, we made the required steps and efforts to close the transaction, including refinancing of the EBRD and ADB loans made to MEK, RusHydro's surety contracts with respect of MEK's loans.

On March 10, 2020, with the conditions precedent being satisfied, Hydroinvest transferred 90% of its shares in MEK to the buyer – RazTES. Therefore, RusHydro Group ceased to be a shareholder in MEK. Following the transaction, RusHydro Group covered its historical acquisition costs in full and reduced its consolidated debt by USD 4 mn (on the prevailing exchange rate). As a result, FX risks in RusHydro Group's loan portfolio were eliminated.

International cooperation

RusHydro Group joined efforts with Japan-based Mitsui&Co, Ltd, KOMAIHALTEC Inc and NEDO to construct wind power installations with a single capacity of 300 kW in Ust-Kamchatsk, Kamchatka Territory, in addition to its existing WPPs with a total capacity of 900 kW. RusHydro Group also continued working on its project to erect a 3.9 MW wind-diesel power plant in Tiksi, Republic of Sakha (Yakutia), using wind turbines designed by Komai (Japan) to operate in an Arctic climate and diesel generators made by Yanmar (Japan).

RusHydro Group continued cooperating with Voith Hydro on modernization projects for Saratovskaya HPP and with General Electric on equipment supply for the first stage of Yakutskaya GRES-2.

On a global scale, RusHydro Group is represented by its research and design institutions operating in 12 countries: Uzbekistan, Kyrgyzstan, Tajikistan, Laos, Vietnam, Angola, Turkey, India, Egypt, Hungary, Georgia, and Azerbaijan.

RusHydro Group's research and design institutions focus on:

- hydropower (construction of HPPs and hydraulic structures);
- nuclear power (construction of ancillary hydraulic structures).

Their services also span thermal power, construction of electric power grids, construction of oil and gas production and transportation facilities, including offshore facilities.

In the reporting year, RusHydro entered into an agreement with PowerChina (China) on cooperation for the construction of pumped storage power plants in Russia and collaboration on design and engineering projects.

Interaction with international organizations

RusHydro Group actively cooperates with international governmental and non-governmental organizations, and integration associations, including the Eurasian Economic Commission of the Eurasian Economic Union, CIS Electric Power Council, the Asia-Pacific Economic Cooperation, the Shanghai Cooperation Organization, the BRICS, etc.

Representatives of RusHydro Group participate in committees and working groups of a number

of non-profit partnerships and international organizations, to which it is a member, including:

- Global Sustainable Electricity Partnership;
- International Hydropower Association;
- International Commission on Large Dams;
- World Energy Council.

RusHydro is an active contributor to major international forums, exhibitions and conferences related to hydro and heat power, renewable energy, heat supply, and sustainable energy.

In 2019, RusHydro Group acted as a partner of the Eastern Economic Forum which is a reputable platform for establishing and strengthening relations with foreign partners, especially from the Asia-Pacific countries, and attracting investors to energy infrastructure projects in the Far East. RusHydro's representatives took part in the Russian Energy Week international forum and the 2nd Russian-Chinese Energy Business Forum. The St Petersburg International Economic Forum is another traditional platform for RusHydro's presence.

RusHydro Group participates in intergovernmental commissions on trade, economic, scientific, and technical cooperation between Russia and other countries.



Voith Hydro and RusHydro have enjoyed a wonderful partnership for years. We are extremely proud to participate in RusHydro's comprehensive modernization program for hydroelectric power plants the company owns. We're equally pleased to take part in projects to build new hydropower plants by providing our know-how, supplying our top-notch equipment, and sharing our knowledge. By doing so, we can make a considerable contribution to developing Russian hydropower. In 2019, the VolgaHydro plant opened in Balakovo. This company was established by RusHydro and Voith Hydro as a joint venture, and it serves as a good example of our long-lasting successful cooperation.

Dr. Leopold Heninger,

CEO & President of Voith Hydro Europe



RusHydro Group in the International Electrotechnical Commission

The International Electrotechnical Commission (IEC) is an international standards organization made up of all national committees (NCs). It promotes international cooperation on all matters relating to electrical and electronic standards.

As an active contributor, RusHydro Group continued to send its experts to the IEC's working groups. In 2019, the Company's representatives took part in such working groups as WG 25, WG 30, MT 31, WG 14, MT 28, MT 34, and the vibration working group.

Business process digitalization

RusHydro Group approved its Digitalization Program¹ to cut costs on the development and operation of its facilities by revolutionizing, intellectualizing and streamlining governance models based on the analysis of the Company's underlying business processes.

The Program includes 18 digital projects covering virtually all business lines of the Group. Key achievements in 2019:

- digital controls, i.e. modernization of collective output controls across RusHydro's HPPs with a view to making dispatch schedules from the System Operator of the Unified Energy System autoexecutable;
- remote control over switchgears;
- information system up and running to support the Situation Analysis Center.
- closer monitoring of substations.

In 2019, the Company prepared a draft Digital Transformation Blueprint (the Blueprint). The Blueprint is aligned with the Digital Power Industry national project initiated by the Russian Ministry of Energy which aims to leverage

digital technologies and platform solutions to revolutionize the energy infrastructure.

RusHydro Group's digital transformation seeks to improve operational efficiency of its core and supporting processes through:

- digital end-to-end technologies;
- all-inclusive digital ecosystem;
- digital corporate culture.

RusHydro Group's objectives for digital transformation are to:

- arrange for generating, selecting and implementing digital initiatives;
- develop a talent pool with required skills;
- implement decision making tools driven by data analytics.

The Blueprint describes the target component model and architecture for RusHydro Group's digital transformation towards 2030. The target model relies on digital end-to-end technologies which help the Company achieve operational excellence.

Its focus areas include establishing the Center of Excellence for Digital Transformation which will be seeking opportunities to improve business processes, analyse data and implement technological initiatives, i.e. options to use and combine end-to-end technologies in business solutions aimed at enhancing transparency, flexibility and efficiency of the Company's underlying processes.



Cooperation for digitalization

RusHydro and Sberbank entered into a strategic cooperation agreement covering, *inter alia*, transactions and investment banking operations whereby the parties intend to learn from experiences of blockchain management, software robotization, cloud solutions, and AI technologies. The agreement also provides for the collaboration on learning software for innovative development.

¹ Order No. 952 of December 10, 2018.

Ensuring good working conditions

HR policy and employee overview

At RusHydro, we place great emphasis on human capital, as we believe that highly skilled, responsible, and diligent employees are key to the Group's successful development. [103-2]

The Company's generating facilities in Russia and abroad are staffed with professionals with extensive operational experience and superior technical expertise. RusHydro's HR policy aims to ensure ongoing improvement of labor relations and social development, create efficient and safe work environment, facilitate career growth, and ensure decent living standards and well-being for employees across the Group and its subsidiaries.

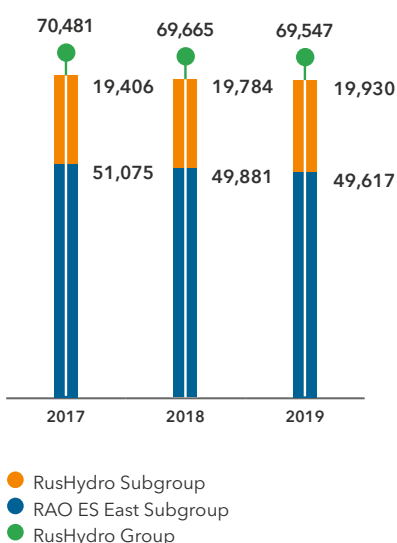
The Company's stable performance allows it to maintain its employee headcount. As at December 31, 2019, RusHydro Group employed 69,547 people, down by 0.17% as compared to the previous reporting period.

RusHydro's workforce structure breakdown by gender, age, and expertise reflects the nature of the industry. Men represent the majority of all employees (68.1%). In the management cohort, there are 3.5 times as many men as women; in the blue-collar category – 4.6 times as many men as women.

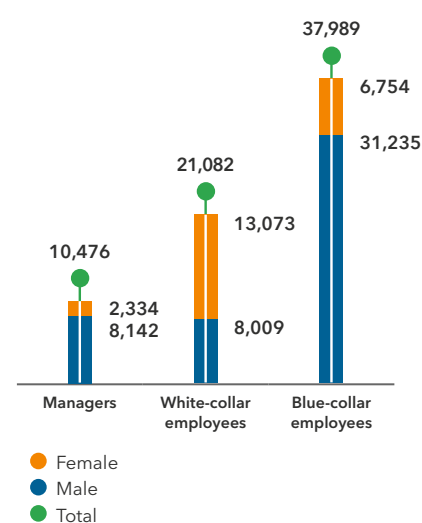
69.5 thousand employees

ensure the robust operation of RusHydro facilities

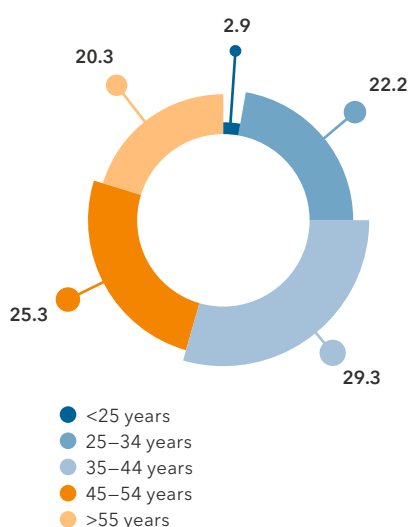
RusHydro Group – headcount, people



Headcount by gender and employee category, people (405-1)



Workforce structure by age, % (405-1)



Nonetheless, women make up 62.0% of all employees in the white-collar category. 25.1% of RusHydro Group's employees are aged 35 or younger. One of RusHydro Group's priority tasks the area of personnel management is attracting young talent.

Over 76% of RusHydro employees work in the Far Eastern Federal District, where the Group's facilities account for three fourth of total power generation providing electricity and heat transmission and distribution to end users.

Headcount by country and region in 2019 [102-7], [102-8]

Region, country	Headcount, people
Russia	
Central Federal District	4,001
Southern Federal District	655
North-Western Federal District	893
Far Eastern Federal District	52,961
Siberian Federal District	3,322
Volga Federal District	3,571
North Caucasian Federal District	3,712
Foreign countries	
Republic of Armenia ¹	402
Republic of Tajikistan	29
Republic of Uzbekistan	1

Most of RusHydro employees work full-time (98.6% for RusHydro Subgroup and 99.8% for RAO ES East Subgroup) and under permanent employment contracts (88.7% for RusHydro Subgroup and 97.7% for RAO ES East Subgroup). [102-8]

Recruitment [103-2]

RusHydro Group recruits staff, including management, on a competitive basis. This approach enables the Company to recruit motivated people who meet the qualification requirements.

Candidates regardless of gender, age and nationality compete for vacancies, where professional skills is the main selection criterion.

Percentage of employees who will reach retirement age in the next 5 and 10 years by category² [EU15]

Indicator	5 years		10 years	
	people	%	people	%
RusHydro Group, including:	5,481	7.9	10,356	14.9
Management	822	1.2	1,721	2.5
White-collar employees	1,126	1.6	2,220	3.2
Blue-collar employees	3,533	5.1	6,415	9.2

In 2019, RusHydro Group hired 13,173 people and created 1,569 new jobs following inauguration of additional generating capacities, increased scope of service projects, and transition to direct contracts with electricity consumers. On top of that, the Company increased electricity sales and opened single billing and payment centers in the Far East.

The employee departure rate³ varies by region of operation from 3.7% in the Republic of Armenia to 25.8% in the North Caucasus Federal District.



Seasonal employment

RusHydro Group hires seasonal labor. In 2019, 70 seasonal workers were hired

- to manage children's recreation camp Energetik and for the summer season at the Mukhinka training ground;
- 15 workers were hired for the heating season;
- 1 seasonal worker was hired to control water flows from Lake Sevan;
- 13 workers were hired to restore ice fields and ski trails.



13.2 thousand employees

were recruited in 2019 with
1,569 new workplaces created

¹ In March 2020, RusHydro Group completed the sale of its stake in CJSC MEK in Armenia.

² Age of retirement on general or special terms.

³ Calculated as the number of employees who left the Company divided by the total headcount as at December 31, 2019 and then multiplied by 100.

Total number of employees hired and dismissed at RusHydro Group in 2019, people¹ [401-1]

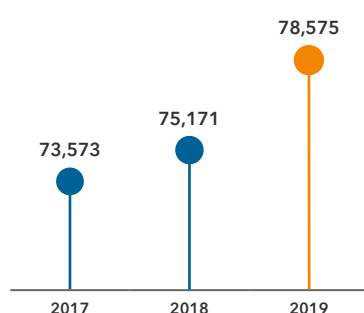
Region	<25 years		25-34 years		35-44 years		45-54 years		>55 years		Total
	M	F	M	F	M	F	M	F	M	F	
Hired											
Central Federal District	48	22	79	59	115	71	61	38	67	31	591
Southern Federal District	8	2	13	0	30	5	15	6	8	1	88
North-Western Federal District	7	7	8	8	5	5	8	1	6	5	60
Far Eastern Federal District	983	301	1,993	862	1,892	1,057	1,321	598	940	490	10,437
Siberian Federal District	24	21	84	79	49	78	59	43	39	35	511
Volga Federal District	68	11	142	26	106	30	50	11	21	8	473
North Caucasian Federal District	166	4	288	15	196	22	181	17	98	5	992
Republic of Armenia	0	0	3	0	4	1	6	0	2	0	16
Republic of Tajikistan	0	0	3	0	0	0	1	0	0	0	4
Republic of Uzbekistan	0	0	0	0	0	0	1	0	0	0	1
Total	1,304	368	2,613	1,049	2,397	1,269	1,703	714	1,181	575	13,173
Dismissed											
Central Federal District	28	16	112	72	117	92	52	33	128	78	728
Southern Federal District	4	2	17	3	34	8	21	2	21	2	114
North-Western Federal District	1	2	11	12	13	7	4	6	12	17	85
Far Eastern Federal District	531	174	1,538	818	1,662	942	1,064	632	1,544	835	9,740
Siberian Federal District	11	12	82	58	87	89	86	52	108	71	656
Volga Federal District	40	9	101	16	93	20	58	22	70	24	453
North Caucasian Federal District	114	3	269	21	175	26	133	25	169	21	956
Republic of Armenia	0	0	0	1	1	1	1	0	10	1	15
Republic of Tajikistan	0	0	2	0	2	0	2	0	0	0	6
Republic of Uzbekistan	0	0	0	0	0	0	0	0	0	0	0
Total	729	218	2,132	1,001	2,184	1,185	1,421	772	2,062	1,049	12,753

¹ The indicator does not include subsidiaries with headcount reduction due to reorganization in 2019, in particular: PJSC KamGEK and JSC Geoterm, because the companies (JSC Zaramagskiye HPPs, JSC Blagoveshchenskaya CHPP, and JSC Yakutskaya GRES-2) have not operated after commissioning the projects that are on their balance sheet but are used by respective region's operators. This table does not cover employee movement in the above entities, as they terminated their operations before the end of the reporting period or had no staff as at the end of the reporting period.

Financial motivation and remuneration

RusHydro Group's motivation and remuneration policy seeks to maintain a competitive salary level.

Average monthly salary of employees at RusHydro Group, RUB¹



The remuneration systems in RusHydro's subsidiaries are in compliance with the Russian labor legislation. They ensure increase in real wages of employees by means of annual wage indexation and financial incentives (bonuses) conditional on the company's results (key performance indicators) and employee performance (individual bonus indicators).

Depending on the region of operation, entry-level wages at RusHydro Group are equal to or 14 times higher than the statutory minimum monthly wage. [\[202-1\]](#)

RusHydro Group adheres to the principle of equality and non-discrimination on the basis of gender. We ensure equal base salary for all categories of male and female employees.

Development of employee potential [\[103-2\]](#)

Continuous employee training and development has always been a major priority for RusHydro. Our people play an important role in strengthening the Company's internal stability and help us achieve our strategic goals.

The continuous training system is in place to develop employee competencies to meet their current job requirements and be promoted as part of the talent pool arrangement. The Company offers employees professional retraining opportunities, including in accordance with occupational standards.

Key areas of employee training

Statutory training under the requirements of the Federal Environmental, Industrial and Nuclear Supervision Service of Russia, the Federal Service for Labor and Employment, and other controlling authorities

Technical training required for performing job duties

Management and leadership trainings

Project management training

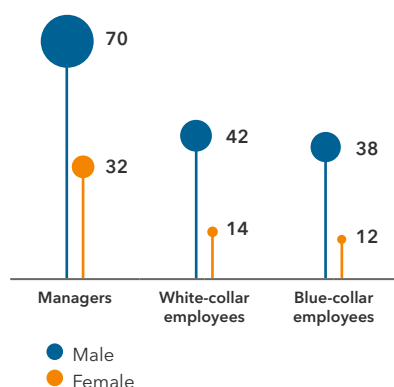
Corporate governance training

Graduate degrees

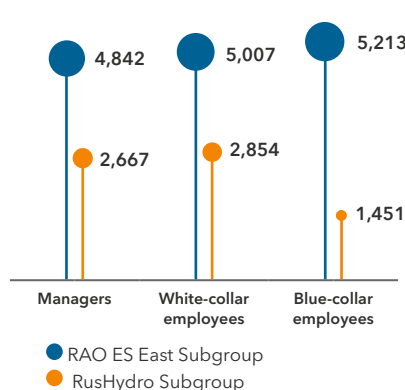
Second professional degree

¹ Including PJSC RusHydro.

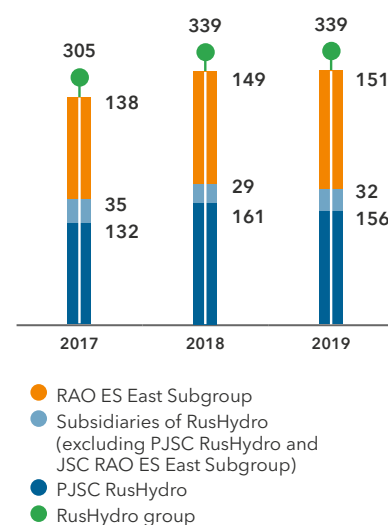
Average hours of training per employee [404-1]



Average training expenses, RUB/person



RusHydro Group's personnel development costs, RUB mn



In 2019, RusHydro Group's personnel development costs amounted to RUB 339 mn. The training is provided by the Corporate Hydropower University, a branch of RusHydro, which helps ensure an extensive personnel coverage and reduce per-course costs.

A total of 3,945 RusHydro and subsidiary employees received training at 97 courses, including:

- professional retraining – 215 employees (15 courses)
- professional development based on industry standards – 615 employees (27 courses);
- professional development – 1,512 employees (11 courses);

As many as 19,559 employees attended distance-learning courses (46 courses).

In addition to training, the Corporate Hydropower University holds competitions

and professional excellence contests among RusHydro Group employees. These events are intended to facilitate best practice sharing, identify best performers, and demonstrate the latest technologies. The reporting year saw:

- the second corporate competition for operations staff at cross-connection thermal power plants, which included 40 employees (five teams comprised of eight people each) from DGK, Kamchatskenergo, Magadanenergo, Sakhalinenergo, and Chukotenergo;
- corporate professional excellence competition in maintenance and repair of protective relaying and automation equipment based on WorldSkills standards at RusHydro's branch Volzhskaya HPP and the Volga Training Center of the Corporate Hydropower University. The event involved 21 RusHydro employees and 6 students from industry-oriented universities (Novosibirsk State Technical University, Moscow Power Engineering Institute and its branch in Volzhsky);
- the first corporate engineering case championship of innovation

and work improvement proposals called Ratsenergy. Contestants included 137 employees (37 teams) from Yakutskenergo, DGK, and Far Eastern Distribution Company (DRSK).

In 2019, RusHydro Group provided a total of 56,561 training courses to its employees under corporate training programs, further professional education and occupational training programs. The increase in the number of courses compared to 2018 came on the back of large-scale introduction of distance-learning options and implementation of professional standards in RusHydro's operations. The respective action plan for introducing professional standards was developed and approved by RusHydro's Board of Directors for the 2016-2019 period in line with the Russian Government's Directive No. 5119p-P13 dated July 14, 2016. Following initiatives implemented under the action plan, by the end of 2019, 93% of employees met the professional standard requirements introduced in the Company.

19.6 thousand employees

passed the distant training in **46 courses**

Learning and training programs [404-2]

Form of training	Frequency
Further professional training	At least once every five years
Occupational training	As required by regulators, in case of retraining for a new career
Occupational retraining	As required for operational reasons to enable employees to do a new type of work or to receive additional qualifications as well as for talent pool training
Corporate trainings	On an as-needed basis when required to solve specific tasks
Internal training in production and technical skills	Annually
Short-term training programs (seminars, conferences, forums)	Annually, with the content depending on business needs
Distance learning	Annually, with the content depending on business needs



The Corporate Hydropower University

The Corporate Hydropower University was founded in December 2007 as a branch of RusHydro. It is a unique institution whose purpose is to build a pool of highly skilled employees by providing educational services and comprehensive specialised training programs for energy industry professionals.

Today, the Corporate Hydropower University serves as RusHydro Group's research, information, and educational (license No. 9472-I dated December 22, 2017) center, while also providing methodological and consulting services for the Group.

Since its inception, the concept of effective knowledge management has been the key focus of the university. It serves as a link between RusHydro Group's branches, contributes to the formation and strengthening of a unified corporate culture, offers training to Company experts and uses experience sharing as an educational tool.

Training at the university unlocks career development opportunities for employees and introduces them to a wide network of industry professionals.

Talent pool

RusHydro Group pays great attention to building a talent pool and training its management staff. Our management talent pool programs seek to:

- ensure a seamless and continuous management succession;
- improve the management recruitment and appointment process;
- encourage personnel to pursue career development;
- incentivize employees to enhance their professional skills and competence.

In 2019, the Company arranged and conducted the following talent pool training modules:

- Professional training in hydropower;
- Professional training in heat power engineering;
- Personal performance improvement;
- Safety culture and occupational safety;

Twenty-nine young professionals were included in RusHydro Group's talent pool based on the results of the Internal Source of Energy-4 competition in 2019. They will be trained under the first Project Management module.

In addition, the talent pool members took part in the 9th International Forum of Young Power Professionals and Industrialists called the Fast and the Furious 2019. The events also included a conference of RusHydro Group's young talent community, during which the project leaders presented the results of their work, formulated new ideas, formed a pool of projects for inclusion into the 2019-2020 work plan, and elected community leaders. The community operates on a voluntary basis to implement joint projects, share experience and practices, and search for new, more efficient approaches and solutions to deliver on RusHydro Group's strategic priorities. The community set the key project streams as follows: Technology Leadership, Professional Development, Health and Safety, Comfortable Environment in the Regions of Operation. Stream coordinators assessed the results of a number of federal and local projects implemented under their stream.

In addition to offering training modules for talent pool candidates, RusHydro Group arranged a number of other events for young employees in 2019, including participation in industry-wide competitions in innovation, the engineering training initiative Technological Leadership School, the Youth Days at the St. Petersburg International Economic Forum, and the 2019 Russian Energy Week International Forum.

The programs are divided into two levels:

Talent pool for any given position

a specially trained group of employees from the headquarters and branches who combine strong leadership competencies and professional skills commensurate with corporate requirements for a particular managerial position

Young talent pool "Internal Source of Energy"

a group of young specialists up to 30 years old, who have been assessed and selected as potential professionals and/or leaders and receive regular targeted training to improve their qualifications



Training of future employees [\[OS\]](#)

As a responsible employer, RusHydro Group is interested in developing young professionals in the regions where it operates. The Company makes every effort to generate interest in the industry among young people and create various incentives for young professionals to join the hydropower sector.

To this end, RusHydro interacts with educational institutions all across the regions.

An important part of that interaction is cooperation agreements. In 2019, the Company entered into a cooperation agreement with the Financial University under the Government of the Russian Federation to establish long-term mutually beneficial partnership to train young professionals for RusHydro and conduct methodological and research work aimed at improving educational programs and integrating innovative technologies in the educational process.

RusHydro Group offers career guidance for hydropower students to familiarize them with their future occupation by arranging practical training and helping them to take part in corporate and national competitions and events.

In 2019, 11 post-graduate students and instructors took internships at RusHydro's production facilities as part of the effort to improve the education quality at partner universities. Over 1,700 vocational school and university students (years 3-6) received practical training. In the reporting year, the Company hired 27 university graduates.

More than 50 highly qualified RusHydro staff members teach at universities and take part in the state graduation commissions for the Electrical and Heat Power Engineering discipline. RusHydro's representatives are members of the Federal educational and methodological association for the integrated group of disciplines 13.00.00 Electrical and heat power engineering.



RusHydro Group's Young Employees Community comprises around 100 people.

Personnel assessment

The Corporate Hydropower University and RusHydro's Qualifications Assessment Center established in 2018 conduct employee assessment to create a talent pool.

In 2019, assessment was conducted to select potential candidates for the position of RusHydro Branch Director. Four candidates were identified and included in the talent pool for the director's position, three potential candidates were identified for the position of first deputy branch director – chief engineer, two candidates for the position of deputy chief operations engineer,

and two candidates for the position of deputy chief technical engineer.

The Company's employees are tested for adequacy to the job and have their professional, business and personal qualities and achievements assessed. Managers and white-collar employees, regardless of gender, are assessed once every three years.

The Energy Sector Occupational Qualifications Council approved three tools for assessing professional qualifications to be used by RusHydro's Qualifications Assessment Center. RusHydro Group experts took part in the development of the tools.

Eighty employees from RusHydro's branches and subsidiaries were assessed by the Qualifications Assessment Center, with 63% successfully passing the test. In 2019,

the Energy Sector Occupational Qualifications Council authorized the Qualifications Assessment Center to conduct assessments at two additional sites in the Far Eastern Federal District: RusHydro's Sakhalinenergo and Magadanenergo training centers.

Personnel management system development plans

In 2020, the Qualifications Assessment Center will open additional assessment sites, contribute to the development of the national qualification system by establishing qualification standards in electrical and heat power engineering, provide training for experts, and conduct tests.

Talent pool and personnel development plans for 2020 include:

- the 9th All-Russia HPP Operations Staff Competition;
- professional skills competitions in the repair and maintenance of 110 kV overhead power lines;
- the 2nd Corporate Engineering Case Championship of Innovation and Work Improvement Proposals called Ratsenergy;
- the 3rd Corporate Championship WorldSkills Russia Juniors in Electrical Installations among the children from orphanages sponsored by RusHydro;
- a conference of RusHydro Group's Young Employees Community;
- Corporate Championship WorldSkills Russia Juniors in Smart Electricity Metering Systems;
- the 10th Summer Energy School for high school students interested in hydropower;
- the 11th Energy for Development national contest of students' projects.

Percentage of RusHydro Group employees who undergo periodic performance and career development appraisal (% of total headcount across the specified category), 2019. [404-3]

RusHydro Subgroup



RAO ES East Subgroup



Social policy¹

RusHydro's Social Policy is an important incentive for furthering the Company's social agenda, promoting social partnership practices, and making the Company a more attractive employer.

Tasks of the social policy:

- creation of an institutional environment for attracting and retaining young talent;
- maximization of employee commitment to RusHydro's goals and principles;
- improvement of occupational relations taking into account the interests of the employer, employees and shareholders, , including the government as the major one.

In its social policy, RusHydro Group follows international standards and best practices in the field of human rights, labor relations, environmental protection, anti-corruption initiatives and stakeholder relations. The Company relies on the Guidance

on Social Responsibility (ISO 26000) and the universal principles enshrined in the UNGC Guide to Corporate Sustainability in the field of human rights, labor relations, environmental protection and anti-corruption initiatives, as well as the Social Charter of the Russian Business and the Tariff Agreement for the Electrical Power Industry of the Russian Federation. [\[102-12\]](#)

RusHydro Group grants the following benefits to full-time employees [\[401-2\]](#):

- voluntary health insurance;
- insurance against accidents and diseases;
- disability/temporary disability compensation;
- maternity/paternity leave;

- one-off financial aid;
- other payments and benefits in accordance with collective bargaining agreements and in-house rules and regulations.

Corporate pension plans

Private pension coverage is in focus of the Company's social policy. It was introduced in 2008 to employees at RusHydro's branches by offering several pension plans designed to finance the pension savings of different employee groups.

In 2019, the Company revised its pension plan in line with changes in the Russian pension system and approved its new Regulations on Private Pension

Social policy

Work with young people,
training programs

Support for families and
mothers

Healthcare and healthy
lifestyle promotion

Pension
coverage

Housing
program

Social and professional
guidance for orphans

¹ Approved by the Board of Directors (Minutes No. 177 dated April 1, 2013)

Plan for Employees at RusHydro's Branches by Order No. 670 of August 15, 2019.

The private pension plans include:

- The parity plan is jointly financed by an employee and the Company, with their contributions dependant on the employee's period of participation in the program. To support soon-to- retire employees in accumulating pension capital, increased parity ratio has been established.

- The corporate plan (financed by the Company) consisting of:

- the "Supporting" option – the Company accumulates pension contributions on registered pension accounts of employees who, as a result of the reform of the state pension system, do not receive or have a limited opportunity to form the funded part of the work pension (for employees born before 1966);
- the "Well-deserved pension" option – the Company accumulates pension savings for employees retiring in 5 years and having a track length of

service of at least 10 years in the industry and state awards, including those of the President and Government of the Russian Federation, state agencies, and corporate awards for working on energy facilities during recent 10 years;

- the "Veterans" option – the Company accumulates pension savings on the pension accounts of its former employees as a supplementary pension for retired employees.

PJSC RusHydro continues to offer its "Co-financing" option where an employee, the Company, and the government jointly finance his or her pension savings.

Private pension plans are in place at 24 subsidiaries, including Hydroremont – VCC, Transport Company RusHydro, Kolymaenergo, DGK, Far Eastern distribution company (DRSK), Far Eastern Energy company (DEK), Kamchatskenergo, etc. The parity plan is underway in 20 subsidiaries, 13 subsidiaries have corporate plan options,

predominantly the "Supporting" one, financed, while seven have elected the government's "Co-financing" option.

Improving housing conditions for employees

RusHydro continues implementing a program to improve housing conditions for employees. The priority right to participate in the program is given to young professionals under the age of 30, who do not have their own apartment or house, relocated specialists, key and highly qualified specialists, as well as employees with many children, and single parents.

In 2019, pursuant to Regulations on Improving Employee Housing Conditions at Branches of PJSC RusHydro¹, 109 employees received compensation of interest payments on mortgage loans and lease expenses. Furthermore, in 2019 employee housing programs were introduced at Yakutskenergo, Sakha Energy, and Kolymaenergo.

Security for RusHydro Group's liabilities under pension plans² [201-3]

Indicator	Value
Net pension liabilities as at December 31, 2019, RUB mn	8,732
Estimated coverage ratio of special assets vs. liabilities under the scheme (fair value of plan assets / current value of plan liabilities), %	10.4

¹ Approved by RusHydro's Order No. 398 of May 13, 2019.

² Liabilities under IFRS as appraised by Actuarial and Financial Services LLC.

Corporate culture and volunteering ^[OS]

RusHydro Group's corporate culture is an essential tool reflecting its values and strategic business priorities, as well as leveraging employees' initiatives to deliver on the Company's long-term goals.

RusHydro Group is focused on unlocking the creative potential and promoting strong social commitment of employees. Over 1,000 employees contributed to RusHydro Planet, a video flash mob contest held as part of celebrating the Company's 15th anniversary. As many as 22 creative videos featuring flash mobs participated in the contest to demonstrate both talent and team spirit of the Group's employees on the background of its impressive energy facilities. Awards were conferred following online voting on YouTube.

The Power of Talent, another contest held to celebrate the 15th anniversary, attracted over 160 employees who made 70 stage appearances in three nominations – singing, dancing, and performance art. Online voting determined the final six and the audience award winner, while the jury of experts – prominent art professionals, directors, and actors – chose the winners.

Another important focus is health and healthy lifestyle promotion. Employees of RusHydro Group take part in all kinds of sports events – national projects (Russian Ski Track, Cross-Country Race of the Nation, GTO physical fitness tests), regional competitions (marathons, bicycle and ski races), team sport tournaments (soccer, volleyball, basketball, ice hockey, etc.), spartakiads organized by local

trade unions, such as All-Russian Electric Trade Union.

To facilitate communication among employees and award the best athletes, corporate spartakiads were introduced in 2017. Around 1,000 employees of the Headquarters, 18 branches, and 25 subsidiaries took part in the Spartakiad 2019. The Spartakiad program included the Soccer Cup of the Chairman of the Management Board.

Volunteering

RusHydro Group's corporate volunteering has been growing rapidly by attracting more and more engaged employees in events held across Russia. The volunteers greatly contribute to the Company's annual initiatives, such as Charity Fair, Blood Donor's Day, Suitcase of Goodness, The Brightest Christmas Tree, Get Ready for School, and oBEREGAi environmental program.



Suitcase of Goodness 2019

The Suitcase of Goodness is a charity project popular among volunteers from RusHydro Group. The initiative is focused on giving a helping hand to people in distress, including children with serious health conditions and lonely seniors placed in care homes or shelters.

In 2019, employees of RusHydro's Headquarters, the Company's design institutes – NIIES and Hydroproject Institutes, Hydroremont-VCC and RESK united their efforts to contribute to the Suitcase of Goodness.

The volunteers partnered the Gift of Life foundation to provide suitcases of goodness full of toys for kids battling cancer at Dmitry Rogachev National Medical Research Center of Pediatric Hematology, Oncology, and Immunology.

In the run-up to the new school year, suitcases of goodness with stationery were presented to children in need.

Employees of RusHydro Group collected gifts to cater for the basic needs of lonely elderly people from remote care homes and shelters under custody of the Joy in Old Age Foundation.

The Suitcase of Goodness initiative was acclaimed by many employees eager to help others.



PJSC RusHydro is the only company with employees volunteering to train youngsters from orphanages for the WorldSkills Junior championships.

As part of the volunteering and charitable Young Energy

program, the Group's employees facilitate social integration and provide professional guidance for children from orphanages. The volunteers mentor the kids, introducing them to power facilities and energy sector, giving them the basic knowledge of electrical installations, and offering career guidance. The Young Energy covers twelve orphanages and involves over 120 volunteers from RusHydro Group.

RusHydro's employees also arrange tours of the Group's facilities. In 2019, more than 4,000 tours were organized for students in an attempt to stir interest in engineering and energy sector professions among the youth.

Annually, RusHydro's volunteers come to schools from across the Company's footprint to give over 15,000 schoolchildren lessons about energy saving technologies and energy security.

Employee rights, trade unions [103-2] [OS]

At RusHydro Group, employees are free to fully exercise their right to freedom of association. Most of RusHydro Group's companies have trade unions in place. In 2019, 34,239 employees of RusHydro Group (49% of the headcount) were members of trade unions. [407-1]

All of RusHydro Group's generation branches and 40 subsidiaries (96% as at 2019) have collective bargaining agreements in place. [102-41]

RusHydro and its 12 subsidiaries are members of the All-Russian Industry Association of Electrical Power Industry Employers "ERA of Russia", while one more subsidiary has joined the Industry Tariff Agreement for the Electrical Power Industry of the Russian Federation.

The Industry Tariff Agreement is crucial for establishing and developing a uniform social partnership framework in the energy sector. The Agreement provides a single standard for regulating social and labor relations in the industry and sets a minimum level of guarantees for employees. All companies

that are "ERA of Russia" members comply with the key provisions of the Industry Tariff Agreement pertaining to:

- the amount and frequency of indexation of the minimum monthly rate of pay;
- one-off payments made prior to a paid leave;
- financial assistance provided in the face of certain events (marriage, childbirth, death of close relatives);
- one-off payments to retiring employees;
- compensation to families in cases of work-related fatalities and deaths caused by common diseases or home accidents; and
- other benefits provided for by the Industry Tariff Agreement if the company is financially able to make the payments (50% discount of the regular charge for electricity and heat, compensation of childcare expenses, monthly compensation payments to employees on childcare leave, etc.).

RusHydro provides employee benefits and guarantees that are higher than those set forth in the Industry Tariff Agreement in terms of both scope and amounts paid.



For more details on the Industry Tariff Agreement, visit the website of the "Era of Russia" at:
<http://www.era-rossii.ru/>

The Company complies with the Russian Labor Code specifying the minimum notice period regarding operational changes (at least two months prior to the commencement of relevant events or, where the headcount or staff reduction may result in mass dismissals, at least three month prior to the commencement of relevant events). [402-1]

In addition, under the Industry Tariff Agreement, employers must notify trade unions of the expected reorganization within 20 days after the meeting of shareholders adopts relevant resolution, and disclose the schedule of such reorganization. Under collective bargaining agreements of branches and subsidiaries, appropriate provisions of the Industry Tariff Agreement apply to reorganization, and either party may initiate mutual employment consultations.

Occupational health and workplace injuries

Workplace safety management framework

[103-2][403-1][403-7]

As RusHydro Group prioritizes health and safety over operating performance, its key occupational safety goals are:

- protecting the life and health of employees in the workplace;
- preventing occupational injuries and diseases;
- creating safe employee behavior patterns and hazard prevention skills;
- improving working conditions on an ongoing basis.

The key areas, directives, and commitments regarding employee safety are set forth in RusHydro Group's Health and

Safety Policy¹. The Company also has the following internal regulations in place:

- Regulations on Occupational and Fire Safety Day at RusHydro's branches²;
- Temporary Regulations for Authorization of Building and Fitting Contractors and Seconded Staff to Operate at RusHydro's Sites³;
- other regulations governing RusHydro's production operations and processes⁴.

RusHydro Group's occupational health and safety management framework covers management decisions on organizational, technical, sanitary and hygienic, treatment and preventive, medical and social measures aimed at ensuring safety, protection of employee capability, health and life in the workplace, monitoring of employee compliance with occupational safety, fire prevention and industrial safety requirements.



VHI forms a part of the benefits package and covers all the staff. All Group's employees are insured against accidents and diseases. The insurance coverage applies 24/7.

Distribution of responsibility for occupational health and safety management⁵ [403-3]

Member of the Management Board, First Deputy General Director – Chief Engineer	Industrial and Occupational Safety Department	Health and safety functions at branches and subsidiaries
<p>Management of health and safety activities at hydropower facilities</p> <p>Setting up and ensuring oversight over health and safety activities, including preventive measures to minimize operational risks and protect employee health</p>	<p>Development, oversight and control of occupational health and industrial safety measures at the Company level</p>	<p>Development, oversight and control of occupational health and industrial safety measures directly at branches and subsidiaries</p>

¹ Approved by RusHydro's Order No. 372 of April 20, 2015.

² Approved by RusHydro's Order No. 300 of April 25, 2016.

³ Approved by RusHydro's Order No. 736 of November 13, 2008.

⁴ Approved by RusHydro's Order No. 730 of September 10, 2019.

⁵ Approved by RusHydro's Order No. 420 of June 15, 2018.

In RusHydro Group, there are no instances of unfair treatment as a result of health condition. No health condition data (personal data) are disclosed to third parties. [403-3]

To control and monitor contractors and subcontractors operating at its facilities, RusHydro Group:

- collects data on their employees for granting access to the facilities;

- holds health and safety briefings (including fire safety and safe work practices) for contractors' employees;
- assesses the knowledge of employees authorised to issue instructions and

Key focus areas in health and safety management

Occupational safety training and knowledge assessment [403-5]

- Free-of-charge occupational safety training and knowledge assessment for employees and labor safety officers¹
- Employee training for a new job with internship in the workplace
- Emergency and fire response drills
- Occupational health and safety briefings for in-house and contractor staff
- Special and advanced staff training
- Demonstrations for crews before work authorization
- Occupational Safety Days on a monthly basis
- Thematic events, including those aimed at:
 - preventing injuries in electrical installations, work at height, confined spaces, pressure equipment, construction work, loading and unloading operations, lifting equipment, appliances and mechanisms;
 - improving production safety culture, ensuring traffic safety, training staff for autumn and winter seasons;
 - training staff for maintenance campaigns;
- staff training in safe work methods, adequate use of tools and personal protective equipment;
- assessing training effectiveness based on tests and knowledge checks (protocols) by trainees and managers, training officers, teachers, experts and dedicated assessment teams.

Identification of occupational hazards, assessment of occupational risks and investigation of accidents [403-2]

- Special assessment of working conditions to identify occupational hazards Assessment of workplace conditions, definition of their class (subclass)
- Operational control of compliance with sanitary rules as well as sanitation and epidemic prevention measures (laboratory tests, working environment surveys)
- Staff interviews and meetings
- Overviews of injuries in electrical installations and development of injury prevention measures [403-4]
- Workplace rounds to identify violations of occupational, industrial and fire safety rules by in-house and contractor staff
- Reviews of proposals from employees, trade unions or other employee authorized bodies aimed at improving working conditions and occupational safety [403-4]
- (Occupational) health and safety provisions in formal agreements with trade unions [403-4]

Occupational healthcare [403-6]

- Social guarantees and compensations to employees working in hazardous (occupational hazards conditions following the special assessment (reduced hours, additional leave, hazard pay)
- Mandatory regular medical and psychiatric examinations (check-ups)
- As part of our VHI coverage:
 - organization and provision of healthcare services in line with the outpatient and inpatient care, and emergency medical aid programs;
 - outpatient care, emergency and routine inpatient treatment, emergency medical aid and foreign travel insurance;
 - preventive measures (employee vaccination and examinations) to reduce threats to human life or health.

¹ Note: except for part-timers and probationary employees.

requests, manage and supervise operations; prepares regulatory documents for them;

— develops and implements corrective actions based on the monitoring of contractors' operations. [OS]

Plans to improve the H&S management framework

The 2020 calendar plan provides for the following initiatives:

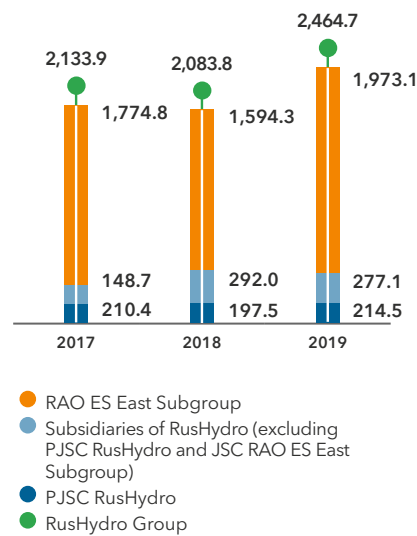
- update the Health and Safety Policy in line with the risk-based approach;
- actively engage employees in occupational health and safety improvements to boost performance and reduce occupational diseases and workplace accidents;
- maintain strong employee competencies, leverage innovative health and safety practices, ensure collaboration and exchange of information between health and safety experts and employees;
- develop and implement effective initiatives to identify, eliminate or limit hazards and risks and preserve employee life and health throughout the employment period.

Health and safety expenses

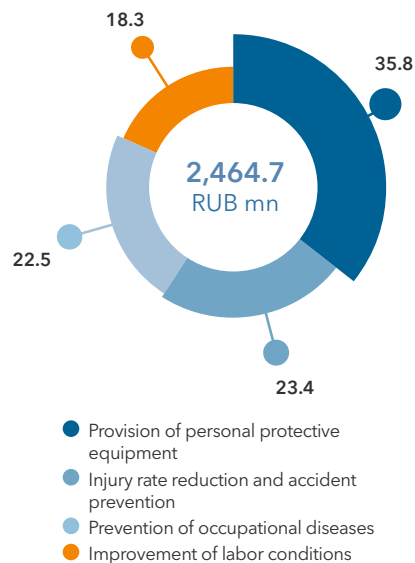
The Company consistently provides funding for health and safety and workplace injury prevention initiatives, including RUB 2,464.7 mn invested during the reporting period.

Higher health and safety expenses are due to an increased supply of personal protective

Health and safety expenses, RUB mn



Health and safety expenses in 2019, %



equipment for employees and measures to improve labor conditions and prevent occupational diseases and workplace accidents.

Health and safety measures

In 2019, RusHydro Group's health and safety measures included:

- on-site control of occupational hazards to reduce their impact on employees;
- ensuring compliance with health and safety requirements by contractors' teams engaged by the Company's branches;
- drafting RusHydro Group's accident response guidelines to prevent injuries;
- monthly and quarterly group-wide occupational safety (including fire safety) days with progress reviews;
- measures to prevent occupational injuries;
- mandatory medical examinations of employees working in hazardous and harmful conditions, and implementation of measures recommended in post-examination reports;
- mandatory psychiatric examination of employees engaged in certain activities, including high-hazard operations (with exposure to harmful substances and occupational hazards), or working in a high-risk environment;
- purchasing and restocking first-aid kits;
- potable water supply to employees;
- infectious disease prevention;
- personnel preventive vaccination;



Employee training in occupational health and safety ^[403-5]

In 2019, the Company conducted two 40-hour on-site and off-site training programs:

1. occupational health and safety for managers and specialists (28 hours of theory and 12 hours of practice);
2. safe practice of high-altitude operations (18 hours of theory and 22 hours of practice).

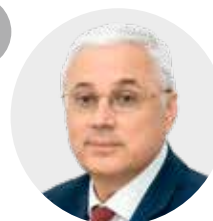
The first program is intended for employees responsible for health and safety measures, while the second one is for those in charge of organizing safe high-altitude operations, holding briefings, and drafting the plan for employee evacuation and rescue in case of emergency.

The above programs covered a total of 6,731 people, including 634 employees trained at the Corporate Hydropower University, a branch of RusHydro. The knowledge absorption was assessed as 9.47 and 9.55 out of 10 for each of the programs respectively.

The training is free for employees of the Group's branches and Headquarters. On-site training is conducted during office hours, while for off-site training the employees can choose some working time within a specified period at their convenience.

- health and safety briefings;
- inspections of workplaces;
- setting health and safety rooms and areas across the Company, purchasing stands, equipment and simulators, visual aids, learning software;
- buying technical standards documents, including their electronic versions;
- holding health and safety trainings and employee knowledge checks;

- training employees on first aid to the injured using robot simulators and distance learning;
- overviews of injuries in the Russian electric power industry;
- arranging for employee visits to sports facilities and swimming pools;
- centralized procurement of protective clothing and footwear in the uniform corporate style for the Company's subsidiaries;



Hydropower and electricity generation from renewable sources are key components of the technological core of the future of the business. That means that RusHydro's role in Russia's energy production will only expand. With RusHydro's support, the Institute of Hydropower and Renewable Energy Sources was established at the National Research University Moscow Power Engineering Institute (MPEI). RusHydro's strong ties with our university in training personnel for responsible production activities strengthen the position of Russia's leading energy holding. Many MPEI graduates have gone on to enjoy successful careers at RusHydro Group, working in electricity generation, networks, and engineering centers.

Nikolay Rogalev,

Dean of National Research University Moscow Power Engineering Institute

- providing employees with protective clothing, footwear and personal protective equipment (PPE);
- organizing PPE storage, care, repair and replacement;
- providing employees with detergents and decontaminants;
- providing milk or equivalent products to employees working in hazardous conditions;
- disinsection and deratization measures;
- assessment of working conditions and implementation of follow-up action plans to provide better and healthier working conditions.

Assessment of workplace conditions and identification of occupational hazards

One of the Company's priorities is to make sure that workplaces comply with statutory health and safety requirements. The assessment of 100% workplaces takes place as scheduled.

According to the special assessment of working conditions in 2019, 29,846 employees of RusHydro Group had workplaces with occupational hazards exceeding the regulatory (hygienic) threshold.

In 2019, RusHydro Group recorded three occupational diseases affecting one skilled specialist (a man) and two workers (a man and a woman). Occupational diseases (hazards) are caused by noise and labor severity. [\[403-10\]](#)

In each case, the Company issued a relevant report followed by stricter control over medical examinations to enable early diagnosis and minimize the risks of developing chronic diseases.

No occupational diseases were recorded by RusHydro's contractors in the reporting period.

Number of casualties

Year	Indicator	PJSC RusHydro	RusHydro (excluding JSC RAO ES East Subgroup)	RAO ES East Subgroup	Total
2017	Number of injuries, employees	0	12	21	33
	incl. fatalities	0	1	3	4
	Rate of recordable work-related injuries	0.00	0.96	0.43	0.49
2018	Number of injuries, employees	5	12	24	41
	incl. fatalities	0	2	4	6
	Rate of recordable work-related injuries	1.07	0.89	0.52	0.64
2019	Number of injuries, employees	3	5	20	28
	incl. fatalities	0	0	1	1
	Rate of recordable work-related injuries	0.039	0.065	0.263	0.368

¹ In accordance with Article 14 of Federal Law No. 426-FZ On the Special Assessment of Working Conditions dated December 28, 2013

Injuries and occupational diseases [OS]

In 2019, RusHydro Group had 26 accidents to their own staff that resulted in 28 injuries, including one fatality. The accidents caused injuries to two managers (men), six skilled specialists (women), and 20 workers (men). [403-9]

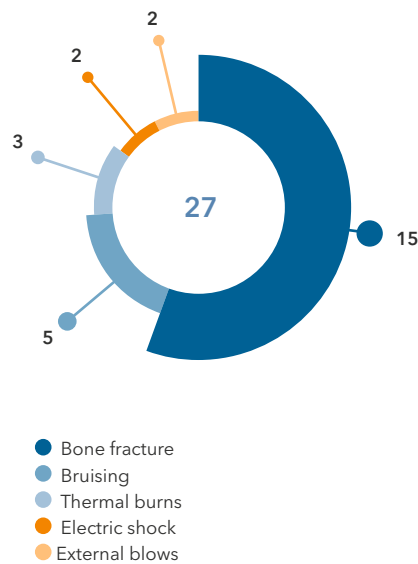
Injuries mainly occurred due to breaches of work management requirements by persons in charge. Each accident was investigated, with urgent preventive measures put in place.

In 2019, the hazards that resulted in severe injuries included:

- mechanical hazards (four severe injuries);
- electrical hazards (two severe injuries);
- thermal hazards (two severe injuries).

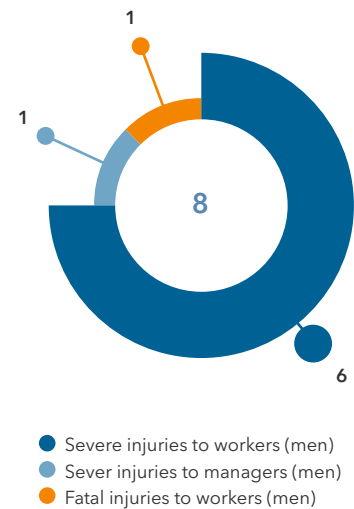
In 2019, five injuries (bruising and bone fractures) were

Number and types of injuries in 2019



recorded among workers (men) of Contractors operating at RusHydro Group's facilities where the Company is responsible for ensuring safe working conditions.

Categories of employees with fatal and severe injuries in 2019



In connection with all the accidents, the Company took urgent measures and developed an action plan to eliminate the impact on others.

Social initiatives and contribution to the growth of local communities

Charity and social projects [103-2] [203-1]

RusHydro Group plays a significant role in the development of the regions where it operates. The projects we initiate or sponsor for the benefit of the communities target tangible problems, help boost economic and social development, and contribute to improved standards of living.

The key objective of RusHydro's social and charity activities is to set the stage for sustainable development in the Group's regions of operation, foster a favorable social environment and help unlock Russia's spiritual, scientific, technical and intellectual potential.

RusHydro's charitable priorities include:

Education
Environment
Healthcare
Sports
Culture
Support of social institutions and organizations
Initiatives promoting social and economic development of Russian regions
Support of charitable foundations and non-profit organizations
Improving the living standards of low-income households and people in need

The Company's charitable activities are governed by its Charity and Sponsorship Policy¹.

Every year, the Board of Directors approves the Company's Charity and Sponsorship Program², as well as the progress and spending report³.

In 2019, RusHydro allocated RUB 1.38 bn to its Charity and Sponsorship Program. In addition to the Program, the Company's subsidiaries provided more than RUB 100 mn in charity support.

Education

Support for educational institutions translates into technical upgrade initiatives and implementation of educational projects. In 2019, RusHydro provided financial support to over 80 educational institutions for kids and teenagers, including kindergartens, secondary schools,

music schools and community centers, and centers of additional education and leisure for children and youth.

In 2019, RusHydro rendered financial aid to Russian Children's Center Ocean in Vladivostok and Educational Center Sirius in Sochi to help them arrange energy project contests and educational programs for gifted youth from across the country. The Company also contributed to renovating the Renewable Energy educational platform in the children's career guidance center Masterslavl.

During the reporting year, RusHydro provided financial support to six industry-oriented universities. Among other things, the Company implemented the project to create corporate information zones in the National Research University Moscow Power Engineering Institute and Far Eastern Federal University,



RusHydro staged the 10th edition of the Energy for Development contest for undergraduates and postgraduates of technical universities, aiming to put in place a long-term framework for consistent professional training in the energy sector and facilitate industry-specific education.

Over the years, more than 1,000 undergraduates and postgraduates submitted their applications to take part in the contest, with dozens of winners opting to pursue a career in the energy sector after the competition.

¹ Approved by the Board of Directors, Minutes No. 280 of December 7, 2019.

² Minutes No. 283 of February 21, 2019, updated Program based on minutes No. 285 of March 29, 2019, No. 289 of May 20, 2019, No. 292 of June 21, 2019, and No. 29 of September 23, 2019.

³ Minutes No. 304 of February 12, 2020.

which allow students to relax between classes while learning about the energy industry and RysHydro's activities.

Environment

In the reporting period, the Company provided assistance to 19 specially protected natural areas, including nature reserves, protected areas and national parks. RusHydro Group allocates funds to support:

- initiatives aimed at protecting ecosystems and natural habitats, and saving rare and endangered animal and bird species (the Siberian tiger, snow leopard, Persian leopard, wisent, Caucasian tur, Siberian musk deer, white-tailed eagle, Manchurian, Japanese and white-naped cranes, grus, etc.);
- efforts to raise environmental awareness;
- research;
- infrastructure and facilities of specially protected natural areas.

For details on progress under environmental initiatives, see the [Biodiversity Conservation](#) section

Healthcare

Every year, in the run-up to the Energy Worker's Day, RusHydro holds an Energy Born charity event, aiming to provide maternity hospitals, perinatal care centers and maternity wards of inpatient facilities from across the Company's footprint with state-of-the-art medical equipment.

In 2019, the Group purchased, delivered and installed advanced equipment and supplies for laboratories and diagnostics,

intensive care, midwifery and neonatology units in 23 healthcare institutions from 17 regions. RusHydro also procured ventilators, neonatal incubators, cardiotocographs / fetal monitors, neonatal phototherapy and intensive care units, and bactericidal irradiators as required by the healthcare facilities. Thanks to the help of RusHydro, doctors now have access to state-of-the-art hysteroscopic resectoscopes, electrical diagnostic and treatment tools complete with video recorders and monitors, ultrasound equipment, etc.

In the reporting year the Group also provided financing for other dedicated healthcare institutions to purchase medical equipment and carry out maintenance works.

Sports

In 2019, more than 30 sports schools and football, basketball, hockey, tennis, chess, water sports and martial arts clubs from the Company's regions of operation became eligible for charitable assistance.

RusHydro Group provided financial and organizational

support for an interregional table tennis tournament, the Cup of the Rybinsk Sea sailing competition, Golden Puck children's hockey contest and Interregional Swimming Tournament.

Financing was also granted to the Russian Union of Martial Arts, the Russian Judo Federation, the Russian Whitewater Slalom Federation, the Yenisei-STM Rugby Club and the Perm Territory's Sports Foundation for Promotion of the Kyokushin.

Culture



libraries, boarding schools, orphanages and educational institutions received books as a gift from the Company

Cooperation with the Russian Geographical Society is one of RusHydro's major projects in the realm of culture. In 2019, RusHydro Group provided financial assistance for the Society to put in place a grant fund designed to promote research on natural phenomena and rare animal species, while also



In partnership with Dom Detskoy Knigi, a foundation promoting children's literature and reading culture, we published our seventh book for kids titled "Princess Water".

The book is a compilation of legends on rivers scattered throughout the Group's regions of operation in Russia – everywhere from Murmansk to Petropavlovsk-Kamchatsky. More than 100 libraries, boarding schools, orphanages and educational institutions received these books as a gift from the Company.

supporting the organization's publishing activities and environmental and geographical expeditions.

Financing was also allocated to ensure the preservation of cultural and historical heritage by upgrading 13 cultural institutions from ten Russian regions, including museums, community centers, and libraries. The financial assistance provided by the Company made it possible to stage a large number of creative festivals, contests and exhibitions, and to promote book publishing.

Support of social institutions and organizations

RusHydro pays close attention to the problems of children without parental care and kids with special needs.

In 2019, more than 90 social establishments for children

received financial aid from the Group. The Company's charitable assistance helped upgrade and refurbish the institutions' facilities, prepare orphan undergraduates for adult life, furnish playgrounds, including those for children with special needs, purchase special learning equipment, set up rehabilitation courses, and organize educational excursions and sports competitions.

On top of that, in 2019, the Group provided assistance to a number of social and rehabilitation centers, nursing homes for lonely seniors and disabled people, and geriatric centers. By tapping into RusHydro's funds, the social institutions were able to implement a variety of nursing and recreational initiatives, provide support in the management of mental health conditions and adjustment to the social environment, organize leisure activities, and offer help

in seeking employment and addressing other problems of socially vulnerable groups.

Initiatives promoting social and economic development of Russian regions

In 2019, the Company provided financing to purchase educational equipment and furniture for a pre-university school and a boarding school for gifted children in Saratov, refurbish a pedestrian area in a municipal park of Balakovo, and support a number of socially significant events scheduled to coincide with landmarks in the history of RusHydro and regions of its operation. Additionally, hundreds of municipal and regional healthcare, educational, cultural and sports facilities annually become eligible for RusHydro's support under social infrastructure development programs. Educational institutions benefit from the Company's financial aid to make repairs, buy necessary equipment and materials, office machinery and furniture, and stage dedicated events.

Support of charitable foundations and non-profit organizations *[EC]*

RusHydro Group allocated funds to support more than 30 charitable foundations and non-profit organizations at the regional and national levels.

In 2019, charitable foundations benefiting from the Company's financial assistance included the Vera Hospice Charity Fund, Center for Humanitarian Programs, Live Now, Joy in



In 2018, RusHydro Group launched a partnership with Live Now, a foundation supporting patients suffering from ALS and other motor neuron diseases.

To receive financial aid, the Foundation sends a request to the Company. After having considered the request, RusHydro enters into a donation agreement to sponsor the Foundation's statutory activities in line with the Charity and Sponsorship Program approved by the Group's Board of Directors. This framework enables the Company to control all stages of project implementation.

The allocated funds are used to organize medical consultations for patients from Russian regions, finance inpatient and home-based nursing services and purchase, maintain and repair special medical equipment.

Upon the completion of projects, the Foundation submits a report on appropriate use of allocated funds. *[EC][OS]*

Old Age, and Creation charity organizations, regional charitable foundation "Illustrated Books for Little Blind Children", and regional branches of the Russian Childhood Foundation.

In its regions of operation, the Company supports local charitable foundations such as Your Choice, Pure Heart, Prometheus, Dedmorozim Children's Charity Foundation, Cheremushki Sports and Creativity

Promotion Foundation, Primula Environmental Foundation, etc.

Improving the living standards of low income households and people in need

As part of this initiative, financial assistance was provided to people in distress from RusHydro's regions of operation, including adults and children with serious health conditions who needed urgent or costly

medical help or rehabilitation, and veterans of war and labor. Targeted aid is allocated to the veterans of the energy sector and workers with outstanding achievements to help them purchase medications, pay for their rehabilitation therapies, and buy home appliances. Every year, RusHydro stages festive events and purchases gifts to mark the World War II Victory Day, Energy Worker's Day, New Year and other celebrations.

Investments in socially significant infrastructure [203-2]



15

socially significant facilities were gratuitously transferred to the property of Russian Regions in 2019

Energy facilities constructed by RusHydro Group represent an important contribution to the development of social infrastructure in the regions of operation. By eliminating energy shortages, reducing generation costs and minimising grid losses, the Company ensures a stable supply of energy and heat for its consumers and higher tax revenues at every government level, while also addressing local unemployment issues by creating additional jobs at new facilities.

For details on construction activities under key investment projects, see the [Construction and modernization of production facilities](#) section



In 2019, RusHydro's Board of Directors approved a gratuitous transfer of rights over an infectious disease clinic (part of the Srednekanskaya Central District Hospital in the settlement of Seymchan) to the government of the Magadan Region.

The clinic had been built as a social extension of the Ust-Srednekanskaya HPP construction project. The transfer helped improve the quality of medical services in the area and overcome the shortage of inpatient beds.

The building had been designed and constructed to meet the latest healthcare and technical requirements.

In addition to energy facilities that are socially significant by their very nature, RusHydro transfers the rights over social and infrastructure facilities constructed or financed by the Company to regions of its operation, producing a considerable positive impact on local communities and economies.

In 2019, RusHydro Group transferred ownership of 15 socially significant facilities to regions of the Russian

Federation. The transferred infrastructure facilities included a dam, motorway bridges, pedestrian and cycling lanes, a motorway, an infectious disease clinic, and heat supply networks, while the social facilities included two modular shift camp dormitories, a firefighting depot and buildings accommodating a variety of establishments, including laboratories of the Siberian Federal University. [\[EC\]](#)

Environmental protection

As the largest Russian energy holding and a major user of national water resources, RusHydro Group takes a responsible approach to operating and developing power generation capacities, working to preserving the environment and biodiversity.

Ongoing modernization initiatives together with energy conservation and higher energy

efficiency, advancement of renewable energy and innovative development are set to reduce

negative environmental footprint and increase the Company's shareholder value.

Environmental policy and compliance

Environmental impact management

RusHydro Group adheres to environment protection and sustainable use of natural resources while observing the approved Environmental Policy, which is based on Russia's national policy for environmentally sustainable development and safety, the Constitution of the Russian Federation, federal laws and regulations, and international treaties of the Russian Federation governing the same.

RusHydro Group also takes into account global standards for environmental management and international best practices applicable to energy projects.

While planning and carrying out its operations, the Group abides by the precautionary approach adopted by the UN Conference on Environment and Development in 1992¹.

The Environmental Policy takes into account the specific operating environment of RusHydro Group's hydropower and heat assets. The Policy sets out KPI seeking to increase the installed capacity of low-carbon

generation, reduce direct and per unit greenhouse gas emissions, prevent species elimination as a result of operating activities, additionally train staff in environmental protection, etc.

The plan by 2025 is to increase the installed capacity of low-carbon generation by 632.3 MW and reduce greenhouse gas emissions by more than 6% as compared to 2015 (base year recommended by the Russian Ministry of Economic Development). The intensity of CO₂ emissions is set to decrease 7.7% in the electricity generation segment and 6.4% in the heat production segment. [\[OS\]](#)

The Environmental Policy also addresses today's challenges and trends in environmental protection. The document incorporated proposals by federal government authorities: Ministry of Energy, Ministry of Economic Development and the Ministry of Natural Resources and Environment, as well as the UN Sustainable Development Goals.

The Environmental Policy is binding on all companies within RusHydro Group perimeter as well as entities that collaborate with the Group on contractual terms.

Environmental impact management framework

RusHydro Group

RusHydro's Executive Office



Member of the Management Board, First Deputy General Director – Chief Engineer



Department of Technical Regulation and Ecology



Environmental protection specialists of the Groups branches and subsidiaries

¹ "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." (Rio Declaration on Environment and Development, 1992).

Enablers of Environmental Policy

In 2019, RusHydro Group approved the Implementation Program for the Environmental Policy, which details measures and activities of the Headquarters, branches, and subsidiaries. The program was developed for the three-year period from 2019 to 2021.

Also, as part of the Rehabilitation and Modernization Program, RusHydro procures to upgrade and replace hydropower units and repair HPP turbines, including to prevent environmental contamination in the course of its operations. Bank protection efforts are ongoing to maintain water conservation zones in good repair. RusHydro Group seeks to replace oil-filled electrical equipment with vacuum or SF₆ gas, which contains no oil, or with that with lower oil content.



2019 saw no incidents or accidents causing environmental damage within RusHydro Group.

For key environmental achievements of 2019 as part of RusHydro Group's Implementation Program for the Environmental Policy, see [Appendix No. 22](#).

RusHydro Group also employs other initiatives to reduce its negative environmental footprint, including:

- construction of scrap collection sites;



Some of RusHydro's subsidiaries undergo an annual audit to confirm their compliance with the ISO 14001 environmental management system. The ISO 14001:2015 compliance certificates are held by DGK, DRSK, Yakutskenergo, and Sakhaenergo.

- rehabilitation of storm drains at HPP buildings;
- collection of floating rubbish and transfer to waste disposal facilities;
- landscaping and planting of greenery;

Technical regulations for environmental safety

RusHydro adheres to a number of technical standards providing for environmental safety. The standards also apply to RusHydro's subsidiaries.

To assess the impact on environment and ensure industrial control, RusHydro introduced corporate standards such as Hydroelectric Power Plants: Environment Protection, Environmental Impact Assessment. Guidelines and Hydroelectric Power Plants: Industrial Environmental Control. Standards and Requirements.

National Standard GOST R 58 224-2018 Hydroelectric Power Plants. Loss Allowance for Turbine Oil While in Operation. Method of Calculation for Turbine Oil Losses While in Operation applies to both the Company's day-to-day management and state supervision.

Environmental impact assessment

RusHydro Group ensures environmental safety at all stages of the life cycle of its industrial facilities. Prior to starting a new project or modifying the existing facilities (at the project initiation and design stages), the Company procures to assess their impact on environment.

In 2019, public hearings were held to discuss the deliverables from the assessment of the environmental impact of Artyomovskaya CHPP-2 construction, following which it was concluded that the assessment deliverables and the construction design required no further change.

For information on assessment and controls over environmental impact at life cycle stages for RusHydro Group's projects, see [Appendix No. 22](#).

Ensuring compliance with environmental laws

It is mandatory for the Company to develop and obtain government approvals for standards applicable during the construction and operation of its facilities which establish permissible pollutant emission

and discharge limits, waste generation and disposal limits as well as design documentation related to environmental protection, which comprise initiatives to prevent and reduce negative environmental footprint, including measures to preserve biodiversity.

These documents are to be approved by the respective government agencies in charge of environmental protection, including [103-2]:

- Ministry of Natural Resources and Environment of the Russian Federation;
- Federal Service for Supervision over Natural Resources Management;
- Federal Agency for Water Resources;
- Federal Fishery Agency;
- Federal Service for Supervision over Consumer Rights Protection and Human Welfare.

The Company relies on the documents so approved to carry on its business in compliance with environmental protection standards.

Cooperation in environmental protection

RusHydro Group actively cooperates with international organizations on matters of environment protection and conservation of biological diversity. The Group supports industry-specific and international initiatives to reduce the man-made load on the environment and strives to adopt best practices for the successful implementation of its environmental projects.



Scientific and Technical Council

RusHydro Group has a permanent expert collective body, the Scientific and Technical Council (STC), which provides for a unified system of technical expertise ensuring that R&D solutions, projects and programs are examined for compliance with the Technical Policy and applicable technical regulations.

To ensure environmental safety while developing new technical solutions, the Company established the STC's task force on water reservoirs and environmental protection. It includes representatives of R&D institutions, Institute for Water Problems of the Russian Academy of Sciences, Department of Land Hydrology of the Moscow State University, Papanin Institute for Biology of Inland Waters Russian Academy of Sciences, and the Federal Agency for Water Resources.

PJSC RusHydro also acted as an initiator and an active participant of the project implemented by the Association "Hydropower of Russia" to develop the Methodological Guidelines for Assessing Impacts on Water Bioresources in the Construction and Operation of Hydropower Plants. The project, executed by the Analytical Center under the Government of the Russian Federation and the B.E.Vedeneev VNIIG, was completed in December 2019 after its consideration and approval at RTC of PJSC RusHydro. [OS]

In 2019, RusHydro continued its membership in international industry associations such as the Centre for Energy Advancement through Technological Innovation (CEATI), the International Hydropower Association (IHA) and the International Commission on Large Dams (ICOLD). Membership in these organizations enables the

Company to interact with the world community on the safe, innovative and sustainable development of hydropower.

To promote the principles of sustainable development in Russia, the Company contributes to the implementation of the Hydropower Sustainability Assessment Protocol (HSAP) as a statutory instrument.



In 2019, RusHydro was named among the leaders of environmental transparency and responsibility ranking of Russian heat and power generating enterprises compiled by World Wide Fund for Nature (WWF) Russia.

In 2013–2014, RusHydro was testing the HSAP with respect to some HPP facilities being designed or constructed. This helped identify a number of inconsistencies which require the improvement of internal decision-making processes. First of all, changes should affect

such processes as stakeholder relations, protection of cultural heritage sites and biodiversity conservation.

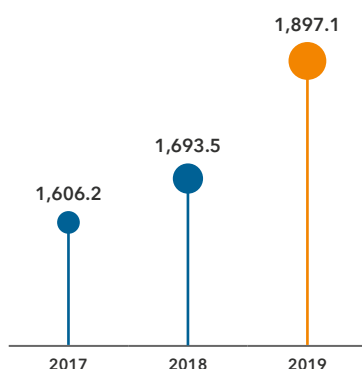
To this end, the Company established a working group tasked with developing a methodological approach

to ensuring and evaluating compliance of HPP projects with the criteria for sustainable development. RusHydro intends to prepare a local protocol ensuring compliance with the above criteria and start promoting its adoption as a statutory instrument in Russia.

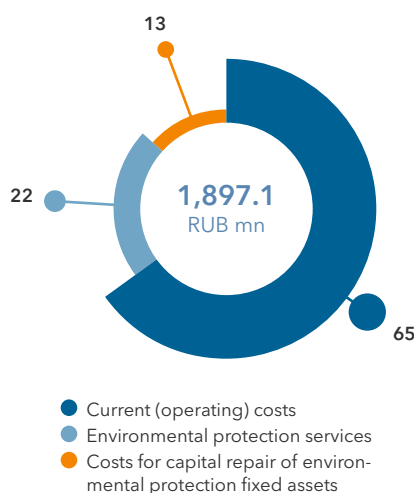
Investments in environmental protection

In 2019, total investments in environmental protection stood at RUB 1,897 mn (an increase of 12.0% y-o-y), reflecting expanded focus on making operational processes more environmentally friendly and on preventing a negative impact on the nature.

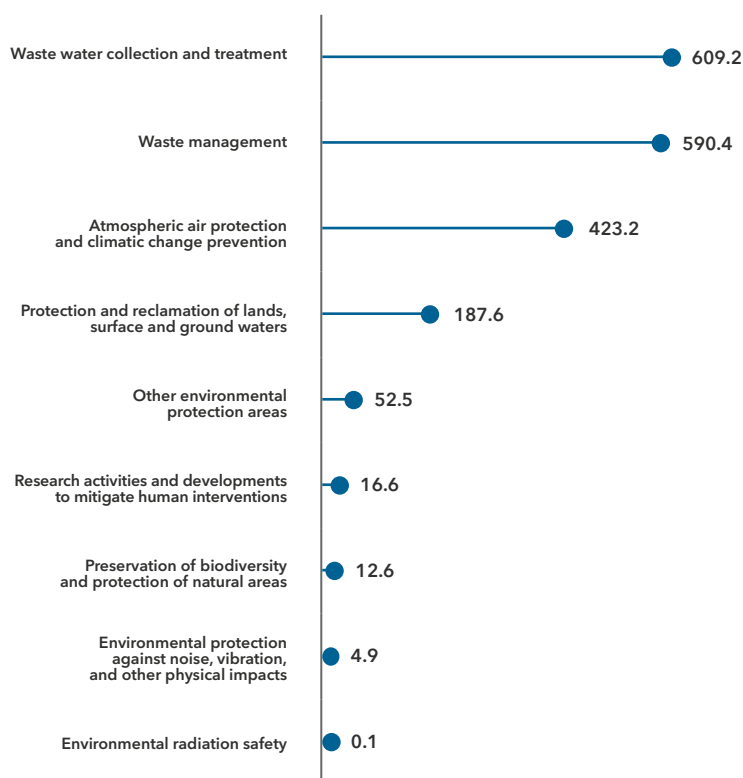
RusHydro Group's environmental protection expenses and investments, RUB mn



RusHydro Group's expenses and investments by type of costs in 2019, %



RusHydro Group's environmental expenses and investments by area, RUB mn



Environmental penalties and non-financial sanctions

Metric	2017	2018	2019
Penalties, RUB mn	1.4	2.3	1.6
Number of non-financial sanctions	60	58	35

RusHydro Group's pollution charges in 2019, RUB mn

Metric	2018	2019
Charges for air pollutant emissions by on-site facilities, including:	27.8	22.2
for volume or amount of air pollutant emissions within permissible limits	16.9	18.0
for volume or amount of air pollutant emissions within temporary permissible limits	0.7	-
for volume or amount of emissions in excess of approved limits	10.2	4.2
Charges for pollutant discharges into water bodies, including:	7.3	13.5
for volume or amount of discharges within permissible limits	0.4	0.5
for volume or amount of discharges within temporary permissible limits	0	0
for volume or amount of discharges in excess of approved limits	6.9	13.0
Charge for industrial and consumer waste disposal, including:	63.8	56.1
for waste disposal within permissible limits	56.9	52.7
for industrial and consumer waste disposal in excess of approved limits or limits set forth by the environmental impact statement and reports on industrial and consumer waste generation, usage, decontamination, and disposal.	6.9	3.4
Total	98.9	91.8

Energy consumption and efficiency

Energy consumption and efficiency

The Energy Efficiency and Development national program¹ sets out three key areas for improving energy efficiency across all types of energy resources:

- energy saving and improving energy efficiency;
- development and modernization of the electric power industry; and
- promotion of renewables.

RusHydro Group's energy saving initiatives are governed by Federal Law No. 261-FZ On Energy Saving and Improving Energy Efficiency and Amendments to Certain

Legislative Acts of the Russian Federation dated November 23, 2009 and the respective programs of energy saving and increased energy efficiency (ESEEP).

In 2019, RAO ES East's companies engaged in regulated activities² updated and approved their programs of energy saving and increased energy efficiency for 2020-2025³.

Energy efficiency of hydropower

Hydropower is a clean source of energy, causing no emissions of combustion products into the air and no greenhouse effect. By relying on water as a renewable source of energy, hydroelectric power plants are able to generate

considerable amounts of power while maintaining relatively low per unit costs and sparing the use of fossil fuel.

Also, HPPs have a number properties that drive their efficiency:

- high flexibility: ability to cover peak loads in power consumption schedules, which is a mandatory condition for joint operations with thermal and nuclear power plants as the basic sources of generation;
- use of highly reliable equipment with superior energy conversion efficiency;
- water resources of HPP water reservoirs are used for the purposes of water transportation, irrigation, water supplies, recreation, and fishery;

¹ Approved by the Russian Government's Resolution No. 321 dated April 15, 2014.

² JSC DGK, JSC DRSK, PJSC Kamchatskenergo, PJSC Magadanenergo, PJSC Mobile Energy, PJSC Sakhalinenergo, JSC Sakhaenergo, JSC Teploenergoservis, JSC Chukotenergo, JSC UESK, PJSC Yakutskenergo.

³ Based on the updated Regulations for Developing, Negotiating, Approving, Implementing and Monitoring Programs for Energy Saving and Improving Energy Efficiency for Subsidiaries Engaged in Regulated Activities (approved by the Company's Order No. 462 of July 2, 2018).

→ hydraulic facilities provide for river runoff control and mitigate the risk of severe floods, while water accumulation in the reservoirs helps to guarantee water supplies in periods of drought.

Because of their many functions, hydroelectric power plants and water reservoirs sometimes have to meet direct opposite water requirements, which makes efficiency analysis a challenge. For example, discharge of water reduces the overall energy efficiency but provides a vital river runoff. Moreover, the generators operating in the synchronous compensator mode also reduce the overall efficiency but ensures the stability of the energy system as a whole.

The focus in energy efficiency assessments for HPPs is on their own consumption, since no fuel is required for power generation.

Key areas for improving RusHydro's energy efficiency:

- modernization of interior and exterior, routine and emergency lighting systems (partially based on automatic controls);
- modernization of HVAC systems for powerhouses and auxiliary buildings (including weather controls);
- rehabilitation of heated buildings and facilities, elimination of warm air leaks, reduction in indoor infiltration;
- rehabilitation of heating and hot water supply systems, electric boiler houses, modernization of pump stations, elevators (replacing



Better use of water resources

Better usage of water resources is another way to improve the HPP energy efficiency to reduce water discharge above turbine flows, which contributes to increased hydropower generation.

RusHydro, JSC SO UPS and PJSC FGC UES teamed up to optimize the repair schedules for power generation facilities and grids at Sayano-Shushenskaya HPP, which translated into an additional output thanks to the ruling out of water discharge above turbine flows.

RusHydro efficiently redistributed automatic load-frequency control (ALFC) reserves at the Volga-Kama cascade in a high-water season, which translated into additional output of power.

mechanisms for frequency-regulated drives);

- replacement of hydropower units with ones with a higher efficiency rate, modernization of automatic control and excitation systems;
- modernization and rehabilitation of hydraulic structures, including service, emergency and repair gates, phased rehabilitation of water intakes and industrial water disposal areas;
- replacement of power transformers with energy saving ones, replacement of air circuit breakers with gas-insulated ones (as compressors are phased out).

Energy efficiency of heat

The Group's key ESEEP initiatives in 2019 included:

- rehabilitation of power generation facilities (turbo

- generators, boiler units, secondary equipment) for better cost effectiveness, including steam path improvement, heating surface replacement, sealing off air gas ducts, etc.;
- rehabilitation of boiler houses, including boiler replacement;
- rehabilitation of heat pipelines using heat proof materials;
- replacing existing inefficient capacities through construction and rehabilitation of diesel power plants;
- modernization of lighting systems based on high-performance illuminants and light control systems;
- modernization and scheduled maintenance with a view to extending the operational life of the equipment.

To reduce grid losses and optimize energy consumption, the Company kept on installing

commercial-grade electricity and heat meters while also modernizing and introducing the automated electric power accounting system.

In 2019, the key initiatives aimed at better energy efficiency and implemented at other subsidiaries not engaged in regulated activities included:

- modernization of lighting systems based on high-performance illuminants and light control systems;
- replacement of heating elements at new electric boiler houses with induction based ones;
- heat insulation of pipes in the building heating system;
- building facade repairs;
- air sealing of door and window openings;
- replacement of obsolete radiators.

Key technical arrangements for improving energy efficiency in 2019 focused on optimizing operating modes for the equipment and systems by redistributing loads and matching the plant mix to its operating mode.

Energy efficiency of electrical grids

The Group's key ESEEP initiatives in 2019 included:

- process improvements:
 - disconnection, under light load conditions, of transformers at substations that have two or more transformers;

- disconnection of transformers at substations with seasonal load;
- phase load balancing in 0.38 kV transmission grids;
- optimization of break points at 10 kV lines with two-way feed;
- bringing voltage in grid parts to the nominal level;
- rebalancing the main grid load by switching;
- reductions in the duration of grid maintenance and repairs (works at power lines);
- optimization of energy consumption modes:
 - separation of heating circuits for drives and tanks of 35-110 kV circuit breakers;
 - installation of LED lighting to replace existing installations;
 - optimization of the heating mode for substation equipment and building;
- rehabilitation and modernization of power units:
 - replacement of wires with heavier-gauge ones at overloaded power transmission lines;
 - replacement of underloaded and overloaded transformers;
 - replacement of branch lines from 0.38 kV power lines with self-supporting insulated wires;
- improvement of energy metering means and systems.

Also, to reduce grid losses and optimize energy consumption, the Company kept on installing commercial-grade electricity and heat meters while also modernizing and introducing the automated electric power accounting system.

Energy efficiency of heating grids

The Group's key ESEEP initiatives in 2019 included:

- comprehensive equipment modernization at heat substations;
- replacement of boiler units;
- replacement of heat exchange equipment and outlet headers;
- installation of frequency control equipment for the pumping equipment of boiler stations;
- rehabilitation of disturbed heat insulation at trunk pipelines of heat grids;
- reductions in heat energy losses through leaks by timely eliminating any leakages in equipment and pipelines as a result of regular heat grid inspections.

Energy efficiency

2019 saw electricity and heat consumption across the Group totaling 5,428 mn kWh and 1,100,220 Gcal respectively.

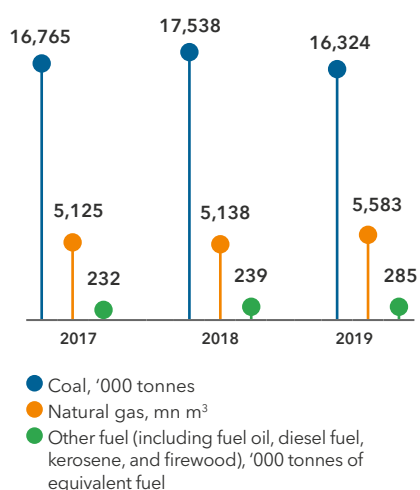
TPPs heavily rely on electricity for own consumption accounting for a hefty 10-16% of RusHydro Group's electricity generation. In 2019, HPPs consumed 1.3% of the electricity they produced.

The main non-renewables used by the companies of JSC RAO ES East Subgroup to produce energy include coal, natural gas, and fuel oil. In addition, they consume some other non-renewables, including diesel fuel and firewood. As for renewables, geothermal steam from the Mutnovskoye

Own electricity consumption in 2019 [302-1]

Source type	In-kind	In money terms, RUB mn
Non-renewables		
Electricity consumption, mn kWh	5,428	1,539.7
Heat consumption, Gcal	1,100	219.8
Coal, '000 tonnes	16,331	38,699.4
Fuel oil, '000 tonnes	159	3,718.3
Motor gasoline, '000 l	6,290	168.6
Natural gas, mn m ³	5,583	28,475.3
Other fuel (including diesel fuel, kerosene, and firewood), '000 tonnes of equivalent fuel	149	8,210.6
Renewables		
Geothermal energy, Gcal	412,249	119.9

Fuel consumption by JSC RAO ES East Subgroup



hydrothermal deposit in the Kamchatka Territory is used.

The fuel mix of JSC RAO ES East Subgroup's TPPs remained virtually unchanged.

In general, 2019 saw a marginal increase (0.6%) in TPPs' consumption as the electricity supply from TPP busbars and heat supply were up 0.1% and 0.4% y-o-y – to 28 bn kWh and 29,771,000 Gcal – respectively.

In 2019, PJSC RusHydro's ESIEEP helped the Company save 26,730,000 kWh on own consumption and additionally generate 62,103,000 kWh, having

spent RUB 7,027 mn on energy saving and energy efficiency initiatives.

RAO ES East Subgroup's companies spent RUB 1,884.0 mn in 2019 under their respective programs for energy saving and improving energy efficiency, with annual economic benefits amounting to RUB 464 mn, or 63,000 tonnes of equivalent fuel.

Plans to improve energy efficiency in 2020

In 2020, RusHydro and its subsidiaries (HPPs) plan to spend RUB 5,893 mn on energy saving and energy efficiency

RAO ES East Subgroup's consumption per unit of equivalent fuel [302-3]

Indicator	2017	2018	2019
Consumption per unit of equivalent fuel for electricity generation, g/kWh	385.2	385.9	388.7
Consumption per unit of equivalent fuel for heat generation, kg/Gcal	159.9	160.1	159.7

Energy savings by RAO ES East Subgroup [302-4]

Type of energy resources saved	2017	2018	2019
Natural gas, '000 m ³	270	4,328	877
Diesel fuel, tonnes of natural fuel	45	46	123
Other fuel, tonnes of equivalent fuel	27,467	29,322	46,535
Thermal power, Gcal	27,868	28,443	19,991
Electricity, '000 kWh	87,151	91,099	74,610

initiatives, which is set to save 33,636,000 kWh during the first year.

In 2020, JSC RAO ES East companies plan to invest RUB 2,783 mn in a number of energy efficiency initiatives which are expected to bring an annual benefit of 205,671,000 kWh of electricity, 73,462.92 Gcal of heat, 2,684,352 cu m of gas, 383.5 tonnes of coal, and 294.4 tonnes of diesel fuel.



Building a lean consumer behavior model

RusHydro Group promotes energy saving awareness arranging for training events at schools.

For example, in line with the national policy for energy saving and improving energy efficiency, RusHydro's PJSC RESK assists Ryazan Region in implementing the Development of Utilities Infrastructure, Energy Saving and Improving Energy Efficiency for 2015-2020 state program approved by Resolution No. 314 of the Government of Ryazan Region of October 29, 2014.

Water use and discharge [103-2] [303-1]

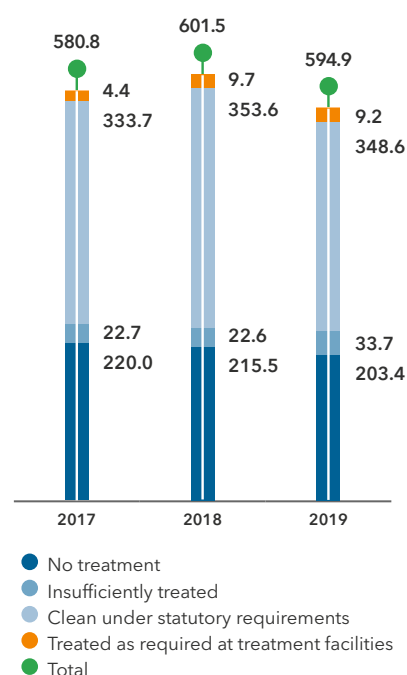
RusHydro Group operates more than 70 hydropower generation facilities making it a major user of national water resources with a footprint all over Russia.

RusHydro strictly adheres to the applicable Russian laws and timely obtains all necessary permits and licenses for water use and protection of water bodies from the authorised government agencies. The Company's water withdrawal activities have no significant impact on water sources. [303-2]

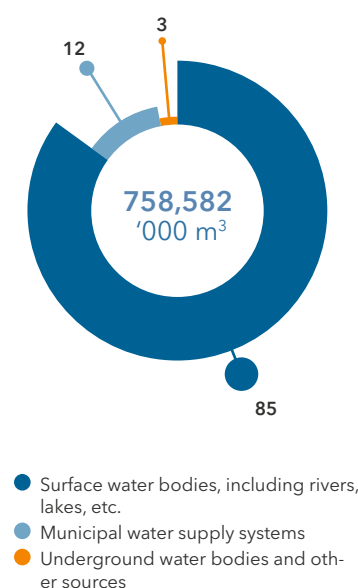
758,582,000 m³ of water was taken in 2019, down 3.6% y-o-y, with 93% of water used for operational purposes. [303-5]

In 2019, circulating water supply systems and recycling water supply systems consumed 4.5 bn m³ and 21.2 mn m³ of water respectively.

Waste water discharge into water bodies by treatment method, '000 m³ per annum [303-4]



Water withdrawal in 2019, % [303-3]



RusHydro Group has a dedicated webpage with updates on water level in reservoirs of its HPPs:
<http://www.rushydro.ru/>

The Group discharges water in strict compliance with the applicable Russian laws. The rights to use water bodies for such purposes are confirmed by

relevant permits and licenses issued by authorized government agencies. The same permits and licenses set out the applicable discharge limits.

In 2019, waste water discharges totaled 600.2 m³, down 3.3% y-o-y, including 594.9 mn m³ discharged into water bodies and 5.3 mn m³ underground.

The general volume of RusHydro Group waste waters (93%) includes waste water produced after cooling

the equipment which, due to the specific nature of the technological process, do not provide for the treatment, as it is not contaminated when passed through the plant cooling loop. Over 55% of the volume is recognized as "clean under statutory requirements" due to re-use of the same water body

for uptake and discharge of waste waters; 34% of the volume is recognized as "contaminated without treatment", due to uptake of salt water for cooling and its discharge in a fresh water body. Insufficiently treated waste waters account for only 6% of the total waste water volume. [OS]

Air pollutant emissions

Greenhouse gas emissions [103-2]

No greenhouse gas is directly emitted when operating hydropower generation facilities and those based on renewables. The Group records CO₂ emissions for JSC RAO ES East Subgroup using carbon feedstock.

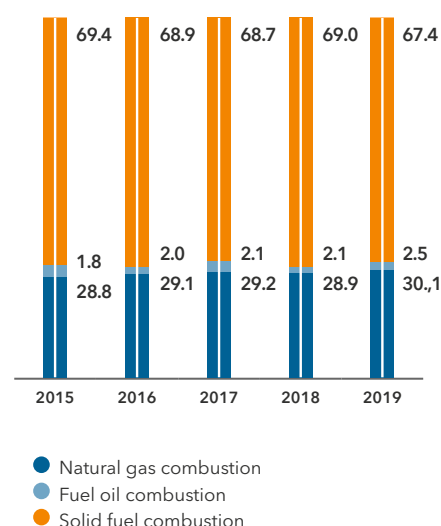
Still, emissions of greenhouse gas are calculated in accordance with Order No. 300 issued by the Ministry of Natural Resources and the Environment of the Russian Federation on June 30, 2015, Guidelines for Calculation of Gross Carbon Dioxide Emissions by TPPs and Boilers (RD 153-34.0-02.318-2001), and data from the Carbon Fund.

Greenhouse gas emissions are calculated per facility based on the fuel consumption of each facility.

In 2019, emissions of greenhouse gas went up 0.55%. The higher emissions in 2019 are attributable to CHPP Vostochnaya commissioned in 2018, while a 4.19% increase in CH₄ emissions was driven by a greater percentage of coal with a higher carbon content in JSC DGK's annual volume of solid fuel combustion.

2019 saw a 1.7% decline in the aggregate greenhouse gas emissions generated by solid fuel combustion and a significant decrease in N₂O emissions by 1.9%.

Breakdown of JSC RAO ES East Subgroup's direct greenhouse gas emissions by source type (scope 1), %



Direct greenhouse gas emissions by JSC RAO ES East Subgroup (scope 1), '000 tonnes [305-1]

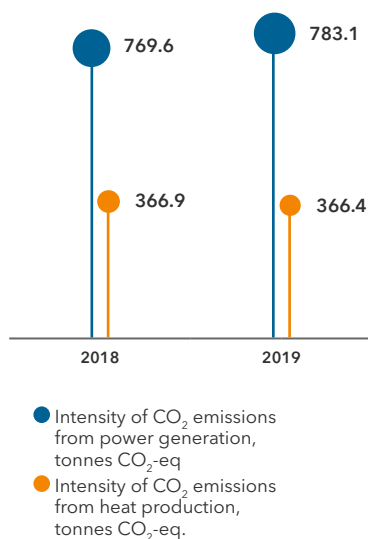
Indicator	2015	2016	2017	2018	2019
CO ₂ emissions	36,182.3	34,096.4	34,457.1	34,942.3	35,137.1
N ₂ O emissions in CO ₂ -eq.	125.3	119.1	117.2	120.2	117.9
CH ₄ emissions in CO ₂ -eq.	14.4	14.4	13.9	14.6	15.3
Total	36,322.0	34,229.9	34,588.2	35,077.1	35,270.3 ¹

¹ Around 2% of the total volume of emissions in Russia. [OS]

One of the key challenges accounted for by RusHydro Group in its updated Environmental Policy is the global climate change and need to adapt to global warming effects threatening human life and health, flora and fauna, and causing changes in long-standing hydrological and meteorological patterns.

Low-carbon development is therefore a primary objective for RusHydro Group. Its Environmental Policy sets a number of 2025 targets, including reduction of greenhouse gas emissions and emission intensity and expansion of low-carbon installed capacity.

Intensity of greenhouse gas emissions by JSC RAO ES East Subgroup, tonnes¹ [305-4]



Commissioning of 10 RusHydro's EV charging stations helped achieve a nearly 70,000 kg reduction in CO₂ emissions in 2019 and early 2020, or 103 500 kg in annual terms.

Reduction of greenhouse gas emissions is expected to be achieved through:

- replacement of retiring TPP capacities in the Far East with more advanced and environmentally friendly thermal power plants, now under construction. For example, the modernization program provides for construction, upgrade and retrofit of four power plants, including construction of gas-fired Khabarovskaya TPP-4 and conversion of Vladivostokskaya TPP-2 to gas;
- commissioning of new smaller HPPs;
- TPP efficiency improvement programs;
- expansion of RES (solar and wind generation) projects;
- commissioning of EV charging stations.

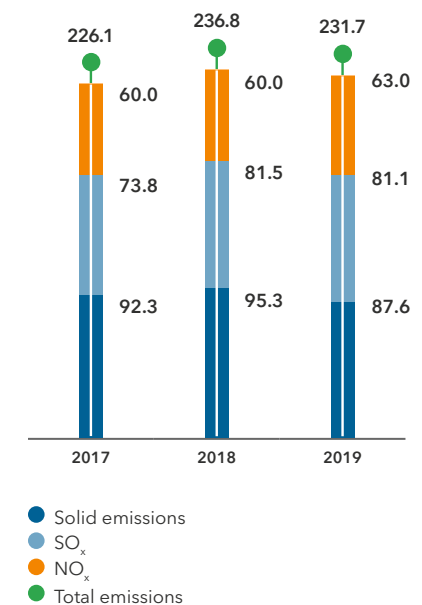
The Expansion of Installed Low-Carbon Capacity target is planned to be achieved with the Comprehensive Modernization Program (Long-Term Development Program for 2012-2020 with a prospect up to 2025) providing for retrofit of RusHydro Group's generating facilities. In addition, the Group consistently implements and intends to continue its renewable energy projects, including the construction of smaller HPPs currently underway in Northern Caucasus.

Pollutant emissions

Air pollution is monitored at all production facilities of RusHydro Group.

In 2019, significant air emissions totaled 231,707 tonnes, down 2.2% y-o-y.

Significant air emissions across RusHydro Group, '000 tonnes [305-7]



¹ Net of Cascade of Viluysky HPPs and solar power plants producing no greenhouse gas emissions. The CO₂-equivalent emission intensity is calculated as a ratio of total emissions (tonnes CO₂-eq.) to electric power (mn kWh) and heat ('000 Gcal) produced.

Waste [103-2]

In 2019, the aggregate waste generated by RusHydro Group's power facilities totaled 23.8 mn tonnes, down 19.6% y-o-y.

Most wastes are those belonging to hazard classes IV and V (low risks or practically no risks), such as soil stripped during coal mining, bottom coal ashes,

and waste from construction and repairs.

In the reporting period, the aggregate waste reduction was attributable to a significant decline in class V waste at JSC DGK (reducing solid fuel combustion due to lower electricity generation) and JSC LUR (reducing soil stripping operations).

Accumulated waste is collected by specialized contractors duly licensed to collect, transport and treat such waste. [306-4]

In addition, RusHydro approved Regulations on its liaising with subsidiaries in bottom ash disposal.

Total waste, tonnes [306-2]

Hazard classes	2017	2018	2019
RusHydro Subgroup			
Hazardous waste class I and II	31	18	21
Hazardous waste class III, IV and V	29,191	23,178	20,688
Total	29,222	23,196	20,709
RAO ES East Subgroup			
Hazardous waste class I and II	39	45	50
Hazardous waste class III, IV and V	26,570,307	29,596,949	23,807,706
Total	26,570,346	29,596,995	23,807,756
RusHydro Group			
Hazardous waste class I and II	70	63	71
Hazardous waste class III, IV and V	26,599,498	29,620,127	23,828,393
Total	26,599,568	29,620,190	23,828,465

Biodiversity conservation [103-2] [EC]

RAO ES East's grid infrastructure extends to specially protected natural areas, sharing them with rare plant and animal species. [304-1] However, none of the Company's power generation facilities is located within such areas.

As RusHydro Group seeks to minimize its impact on biodiversity and protected natural areas, none

of its activities cause reduction of species, habitat conversion, or introduction of invasive species, pests or pathogens. [304-2]

Protected species' habitats affected by activities of RusHydro Group [304-4].

As part of the United Nations Development Programme, the Global Environmental Facility and

In 2019, the Company provided assistance to



19

specially protected natural areas

the Ministry of Natural Resources and the Environment of the Russian Federation, RusHydro collaborated on a unique project titled "Bureysky Compromise" during the construction of the Nizhne-Bureyskaya HPP. Other project participants included Directorate for Wildlife Protection and Management and Specially Protected Natural Areas (state-financed entity, Amur Region), JSC Nizhne-Bureyskaya HPP, research and environmental

organizations and mass media. The project "Bureysky Compromise" pulled together a number of measures aimed at protecting biodiversity such as the establishment of the Bureysky Nature Park, installation of over 25 self-feeding stations for ungulates with food enriched with minerals and vitamins, placement of over 100 nest boxes for mandarin ducks and replanting of over 400 endemic species.

The rare species affected by the activities of Far Eastern Distribution Company is the Far Eastern stork (*Ciconia boyciana*). The Far Eastern stork is on the Russian Red List and the 1996 IUCN Red List of Threatened Animals, and mentioned in Appendix 1 to the CITES and migratory bird protecting appendices to bilateral agreements between Russia, Japan, the Republic of Korea and the DPRK. In 2019, AO DRSK proposed an initiative to install supports for stork nests.

Water bodies affected by wastewater discharges of RusHydro Group [306-5]

JSC RAO ES East Sub-group's Subsidiaries	Water body ¹	Volume of average discharge, mn m ³	Biodiversity value
PJSC Kamchatskenergo	Avacha Bay	3,800	supreme
	Khalaktyrka River	-	supreme
	Lake Halaktyrskoye	11	supreme
	Lake Sypuchka	-	supreme
JSC UESK	Bystraya River	43.2	high
PJSC Magadanenergo	Magadanka River	43.8	supreme
	Kamenushka River	37.9	high
	Myaunja River	127.5	supreme
PJSC Sakhalinenergo	Gulf of Patience (Sea of Okhotsk)	211,250	supreme
PJSC Yakutskenergo	Lena River	515,610	supreme
	Vilyuy River	48,250	supreme
JSC Chukotenergo	Kazachka River	22	medium
	Lake Okhotnichye	0.25	medium
	Chaun Bay	-	supreme
JSC DGK	Kivdinskoye reservoir	9.6	high
	Kontrovod River	-	supreme
	Unnamed stream discharging into Knevichanka River	-	supreme
	Promezhutochnaya Bay	-	supreme
	Obyasneniye River	-	high
	Lozovy Klyuch Stream	-	high
	Partizanskaya River	-	high

¹ No water body is a protected natural reserve.

JSC RAO ES East Sub-group's Subsidiaries	Water body ¹	Volume of average discharge, mn m ³	Biodiversity value
	Rudka Stream	-	medium
	Olongoro River reservoir	43.2	high
	Semyonovskiy Stream	-	medium
	Bezmyanny Stream	-	medium
	Amnunakta River	-	high
	Amurskaya Anabranh	-	supreme
	Amur River	-	supreme
	Lake Khorpy	-	supreme
	Galbon Anabranh (Old Amur)	-	supreme
	Zapadnaya Bay	-	supreme
	Nante Stream	-	supreme
	Pravaya Beryozovaya River	-	medium
	Chernaya River	-	medium
	Polezhaevka Stream	-	medium
	Gnilaya Pad Stream	-	medium
	Malaya Sita River	-	high
JSC Teploenergoservis	Vilyuy River	72,400	supreme
	Yana River	29,297	supreme
	Aldan River	154,683	supreme
	Indigirka River	14,002	supreme
	Allakh-Yun River	5,550	supreme
	Nera River	3,658	supreme
JSC LUR	Kontrovod River (area used by JSC LUR)	-	high

Biodiversity conservation [EU13]

Biodiversity conservation is one of the key elements in RusHydro Group's Environmental Policy which sets a zero plant and animal extinction target for 2025.

RusHydro Group's Implementation Program for the Environmental Policy¹ has a dedicated section on biodiversity conservation initiatives, including both charitable support to specially protected natural areas and steps to be taken in order to prevent extinction of certain plant and animal species.

Animal protection [OS]

In 2019, RusHydro Group helped the Republic of Khakassia launch a research project on demoiselle cranes (*Anthropoides virgo*), a rare bird species. The Khakassia Nature Reserves is the Company's key partner in this charitable initiative.

Apart from being home to the nesting grounds of these rare birds, Khakassia is also the place they transit during their migration. Demoiselle cranes are the smallest crane species. There are six main populations of these cranes known to ornithologists,

and their numbers keep decreasing: in Turkey they are on the brink of extinction, while in the Balkans they disappeared completely some 100 years ago.

The research data collected in Khakassia will be used to develop a global demoiselle crane protection strategy, including a regional strategy and an action plan for the Republic of Khakassia. The Institute of Ecology and Evolution (Russian Academy of Sciences) will analyze the observation findings to identify the birds' flyways, stopover sites and pre-migration roost locations.

¹ Approved by the Company's Management Board (Minutes No. 1204 of September 26, 2019).

2019 also saw RusHydro partner up with the Sayano-Shushensky Nature Reserve to restore the snow leopard population in the Krasnoyarsk Territory.

The snow leopard (*Panthera uncia*), also known as the ounce, is an endangered species included on the Russian Red List. The animal is native to the mountain ranges of Central Asia, including the Himalayas, Tibet, Pamir and Tian Shan. Main threats to the species numbers in Russia include loss of prey animals (ungulates) and poaching.

As part of the preservation project, there are plans to breed adult snow leopards in captivity and release their cubs (after adapting them to living in the wild) into their historic natural habitat, while also rehabilitating injured wild animals and running a research laboratory on the premises of the Sayano-Shushensky Nature Reserve. The laboratory will facilitate mapping of the animals' individual home ranges to improve the quality of biological and environmental data collected snow leopards, fine-tune tools used to protect their habitats within the reserve, and enhance preservation efforts in the Western Sayan Mountains.

As part of its efforts to complete the construction of a water reservoir at Nizhne-Bureyskaya HPP, RusHydro commissioned the Malye Simichi forest guard lodge in the Bureysky Nature Park.

RusHydro supports the International Program for Reintroduction of the Leopard in the Caucasus sponsored by the Russian Ministry of Natural Resources and Environment. As part of the Program, Sochi built a Center for Reintroduction of the Leopard in the Caucasus to host remaining pure-bred leopards from zoos from around the world.

In 2015, a CCTV camera at Gizeldonskaya HPP (Northern Ossetia) captured a Persian leopard (*Panthera pardus ciscaucasica*) roaming in the wild for the first time in many years.

This event served as a launching pad for a partnership between the North Ossetia branch of RusHydro and the Russian Academy of Sciences' Severtsov Institute of Ecology and Evolution (RAN IEE) focusing on a unique project designed to reintroduce leopards in Ossetia. As part of the project, RusHydro Group and RAN IEE made considerable efforts to turn natural areas within the Republic of North Ossetia (Alania) into new habitats for released Persian leopards. The exercise involved a wide range of scientific, environmental and awareness raising initiatives, including research on potential opportunities for animal releases, environmental adaptation of the habitats, and awareness raising events aiming to highlight the importance of Caucasian leopards as the patrimony of the Caucasian region and foster a responsible approach to nature.

In July 2018, two non-relative species of the Persian leopard were released in the Alania National Park with support from RusHydro. They had been raised in Sochi's Leopard Breeding Center and trained to live in the wild without human assistance.

In 2019, scientists continued to monitor the released animals using data from satellite collars, on-site research expeditions, photos and videos.

Recovery of aquatic life (OS)

With most of the Company's activities centered on rivers, much attention is paid to the restoration of fish populations.



Russian Geographical Society (RGS) and RusHydro have worked together for many years in a variety of areas. Thanks to RusHydro's support, RGS succeeded in bringing about dozens of projects aimed at studying and preserving Russia's natural, historical, and cultural heritage. We appreciate the company's assistance in conducting scientific research in specially protected natural areas in different regions of the country, specifically in the Kirzinsky State Nature Reserve of Federal Significance and Khvalynsky National Park. I should also note RusHydro's publishing activities that promote the life and activities of great Russian travelers.

Sergey Shoigu,

President of the Russian Geographical Society

RusHydro Group assesses the impact on bioresources of water bodies planned to be used in its activities. As a result, with the approval of the Federal Agency for Fishery, measures necessary for fish preservation and compensation are carried out. In particular, fish safety devices are designed, and juvenile fish is released (for this purpose, fish-breeding facilities are planned to be constructed in some cases).

In 2019, the Kabardino-Balkaria branch of RusHydro released 638,800 fishlings of the Caspian salmon (*Salmo trutta caspius*), a Red List species, into the water bodies of the Kabardino-Balkarian Republic and the Republic of North Ossetia (Alania) as a way to compensate for the damage caused to water resources by HPPs. Fry release initiatives are approved and supported by the

West Caspian Department of the Federal Fishery Agency.

Cheboksarskaya and Zhigulevskaya HPPs provided assistance in the release of 12,000 juvenile starlet (*Acipenser ruthenus*), a highly valuable fish species on the Red List, into the Volga River. The campaign promoting artificial reproduction of bioresources was mounted as part of RusHydro's charitable program and brought together two Russian regions – the Chuvash Republic and the Samara Region. The fish stocking event was overseen by a commission from the Federal Fishery Agency.

More than 600 fishlings of the sterlet were released into the Votkinsk Reservoir under the supervision of experts from the Perm Territory's Department for State Control, Supervision and

Protection of Biological Water Resources (part of the Middle Volga Territorial Administration of the Federal Fishery Agency), Ural and Kama branch of Glavrybvod, and aquaculture laboratory at the Perm branch of the Russian Federal Research Institute Of Fisheries and Oceanography (VNIRO).

Additionally, Boguchanskaya HPP monitored and assessed the impact of its water reservoir on the environment and water life in 2019.

Rehabilitation of disturbed lands

As RusHydro Group engages in the construction and operation of energy facilities, it needs to implement mandatory compensatory measures in order to save affected natural habitats and rehabilitate disturbed lands.

Habitats preserved and rehabilitated by RAO ES East Subgroup [304-3]

Name	JSC DGK	PJSC Sakhalinenergo	JSC Chukotenergo	JSC LUR	Total
January 1, 2019					
Total disturbed area, ha	2,315.5	257.6	174.7	4,110.8	6,858.6
including total post-construction area, ha	59.0	3.2	1.5	24.4	88.1
topsoil stockpiled, '000 m ³	275.6	0.0	0.0	578.8	854.4
Total in 2019					
Total disturbed area, ha	25.0	0.0	0.3	62.8	88.1
Total post-construction area, ha	0.0	0.0	0.0	0.0	0.0
Total rehabilitated area, ha	3.0	0.0	1.0	0.0	4.0
December 31, 2019					
Total disturbed area, ha	2,337.5	257.6	173.9	4,173.6	6,942.7
Total post-construction area, ha	59.0	3.2	0.5	24.4	87.1
Topsoil stockpiled, '000 m ³	275.6	0.0	0.0	578.8	854.4