

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.

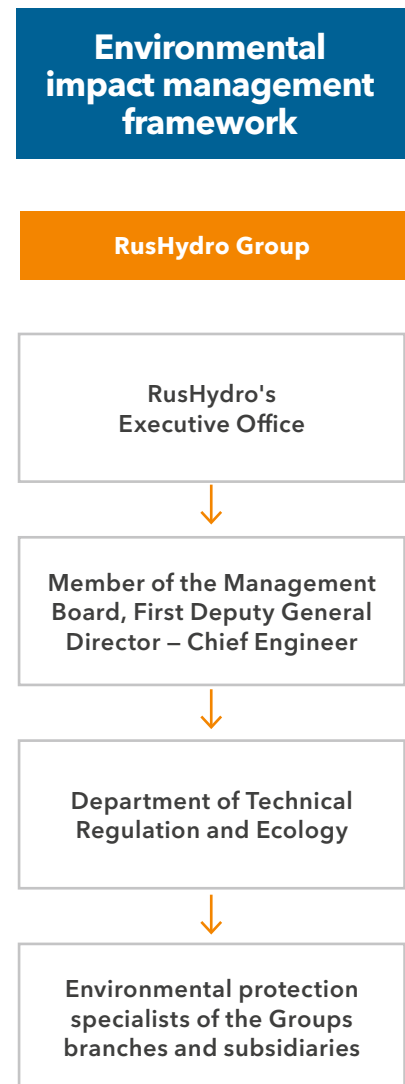
The Environmental Policy takes into account the specific operating environment of RusHydro Group's hydropower and heat assets. The Policy sets out KPI seeking to increase the installed capacity of low-carbon

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.



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.

i

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.

i

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.

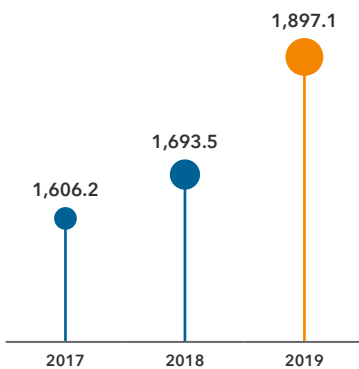
To this end, the Company established a working group tasked with developing a methodological approach

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.

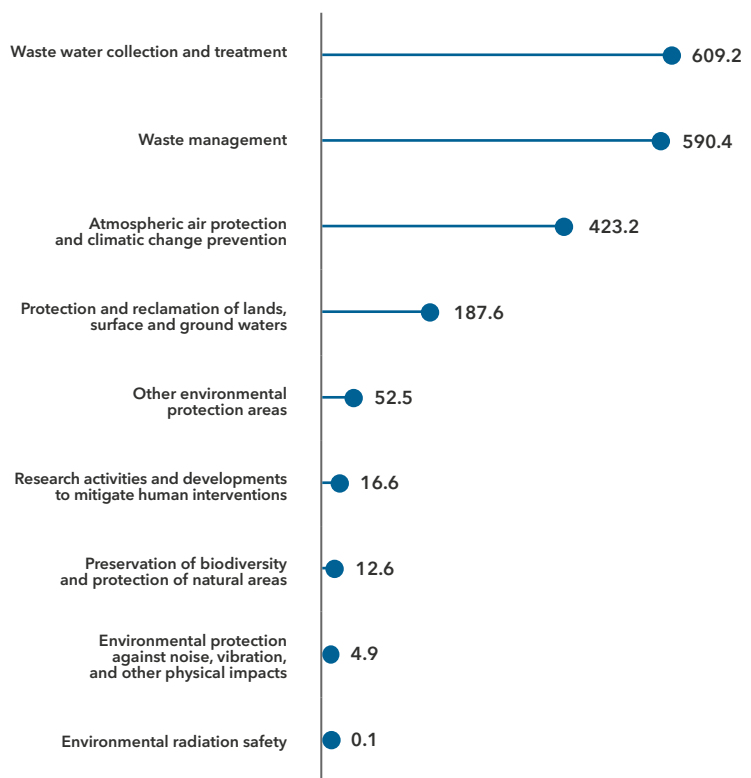
Investments in environmental protection

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.

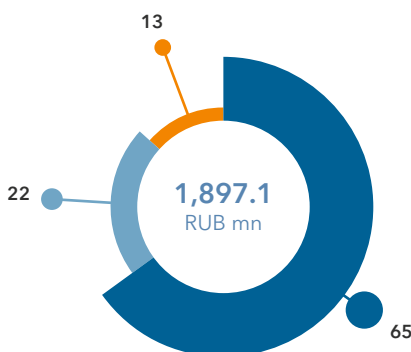
RusHydro Group's environmental protection expenses and investments, RUB mn



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



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



- Current (operating) costs
- Environmental protection services
- Costs for capital repair of environmental protection fixed assets

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 of 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.

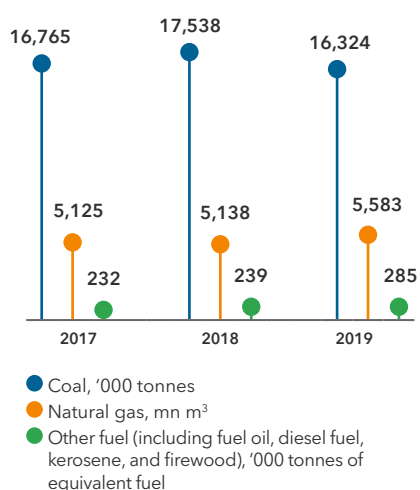
TPPs heavily rely on electricity for own consumption accounting for a hefty 10-16% of RusHydro Group's electricity generation. In 2019, HPPs consumed 1.3% of the electricity their produced.

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]

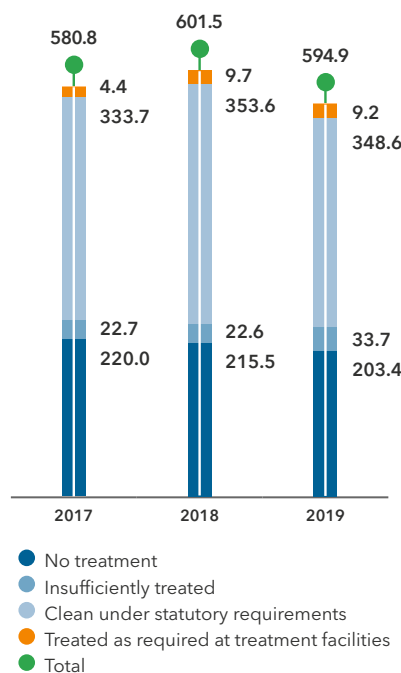
RusHydro Group operates more than 70 hydropower generation facilities making it a major user of national water resources with a footprint all over Russia.

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]

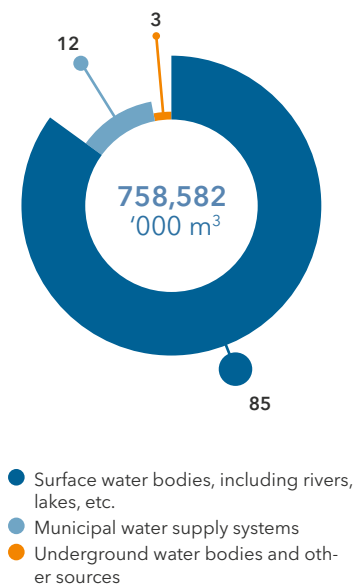
758,582,000 m³ of water was taken in 2019, down 3.6% y-o-y, with 93% of water used for operational purposes. [303-5]

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.

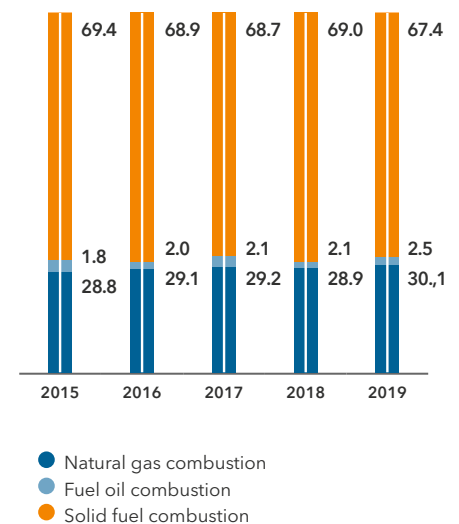
Still, emissions of greenhouse gas are calculated in accordance with Order No. 300 issued by the Ministry of Natural Resources and the Environment of the Russian Federation on June 30, 2015, Guidelines for Calculation of Gross Carbon Dioxide Emissions by TPPs and Boilers (RD 153-34.0-02.318-2001), and 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]

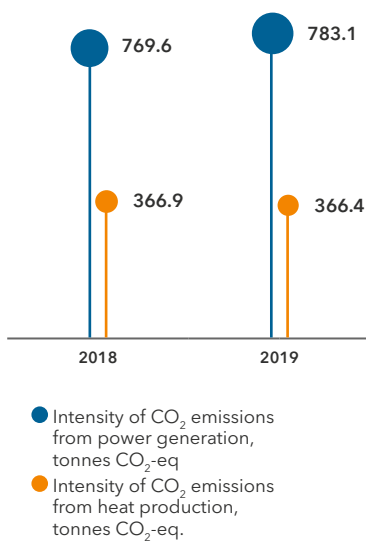
Indicator	2015	2016	2017	2018	2019
CO ₂ emissions	36,182.3	34,096.4	34,457.1	34,942.3	35,137.1
N ₂ O emissions in CO ₂ -eq.	125.3	119.1	117.2	120.2	117.9
CH ₄ emissions in CO ₂ -eq.	14.4	14.4	13.9	14.6	15.3
Total	36,322.0	34,229.9	34,588.2	35,077.1	35,270.3 ¹

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.

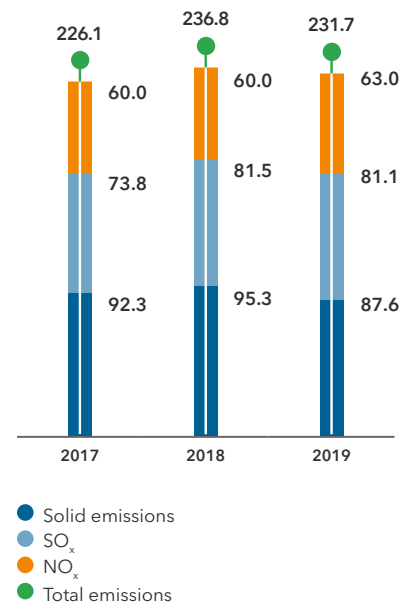
The Expansion of Installed Low-Carbon Capacity target is planned to be achieved with the Comprehensive Modernization Program (Long-Term Development Program for 2012-2020 with a prospect up to 2025) providing for retrofit of RusHydro Group’s generating facilities. In addition, the Group consistently implements 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.

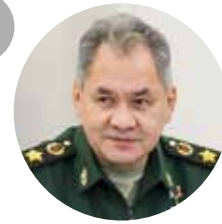
This event served as a launching pad for a partnership between the North Ossetia branch of RusHydro and the Russian Academy of Sciences' Severtsov Institute of Ecology and Evolution (RAN IEE) focusing on a unique project designed to reintroduce leopards in Ossetia. As part of the project, RusHydro Group 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