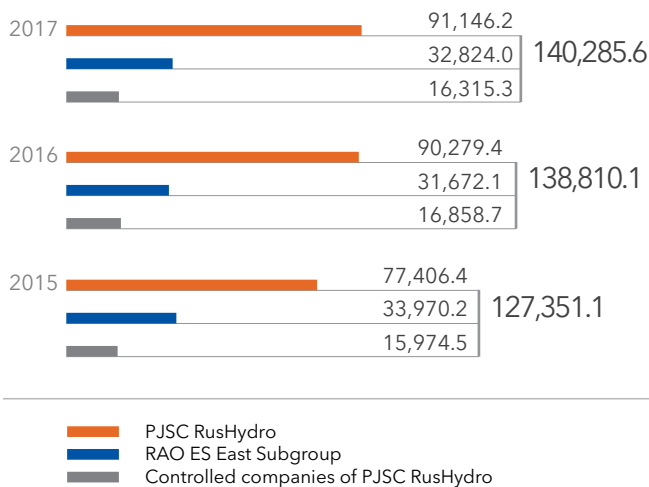


Dynamics of power generation of RusHydro Group¹, mn kWh



Energy sales of companies of RusHydro Group - JSC ESC, PJSC Krasnoyarskenergosbyt, JSC Chuvash Power Sales Company and PJSC RESC - for 2017 amounted to 20,707 million kWh, which was 6 % less than the value for the same period in 2016. The decrease is due to the emergence of a number of large consumers at the Wholesale Electricity Capacity Market, primarily in the service area of PJSC Krasnoyarskenergosbyt, higher outdoor temperatures, and a number of other factors.

RELIABILITY AND SAFETY OF ELECTRIC POWER FACILITIES

Management approach to issues of safety, reliability and safety of hydraulic structures

Providing reliable power supply for the population and operations of equipment hydraulic facilities safe for the environment is one of the company's strategic goals.

The technical policy of the company defines the requirements for the integrated system of safety management of the production processes, which includes the subsystem of industrial safety management.

In 2017, in order to update the system of safety management and the reliability of hydraulic structures and equipment of the company, the decree of PJSC RusHydro of August 8, 2017 No. 515 approved "Regulations on the system of safety and reliability management of hydro-technical structures and equipment of hydroelectric power plants of PJSC RusHydro". [103-2],[103-3]

The company's tasks in the field of industrial safety:

- Continuous improvement of industrial safety of hazardous production facilities to the level corresponding to the best indicators in the world's electricity generating companies thanks to timely technical rehabilitation and enhanced reliability of technological equipment, in order to ensure their safe and accident-free operations;
- Creation and maintenance of efficient and effective system of industrial safety control, ensuring the planning and solution of the most important problems of industrial security.

The result of the achievement in the field of industrial safety is a stable reduction of industrial risks from the operation of hazardous industrial facilities by improving the production control, the quality of repairs, and inspections of industrial safety systems.

¹ The data are given for PJSC Boguchanskaja HPP (owned by PJSC RusHydro and "Rusal"), taking into account the HPP-2 PJSC Kamgek and without including HPP-1 and HPP-3 PJSC Kamgek are managed by a trust.

Results of Activities

Mechanisms for ensuring the reliability of operations and the safety of facility operations:

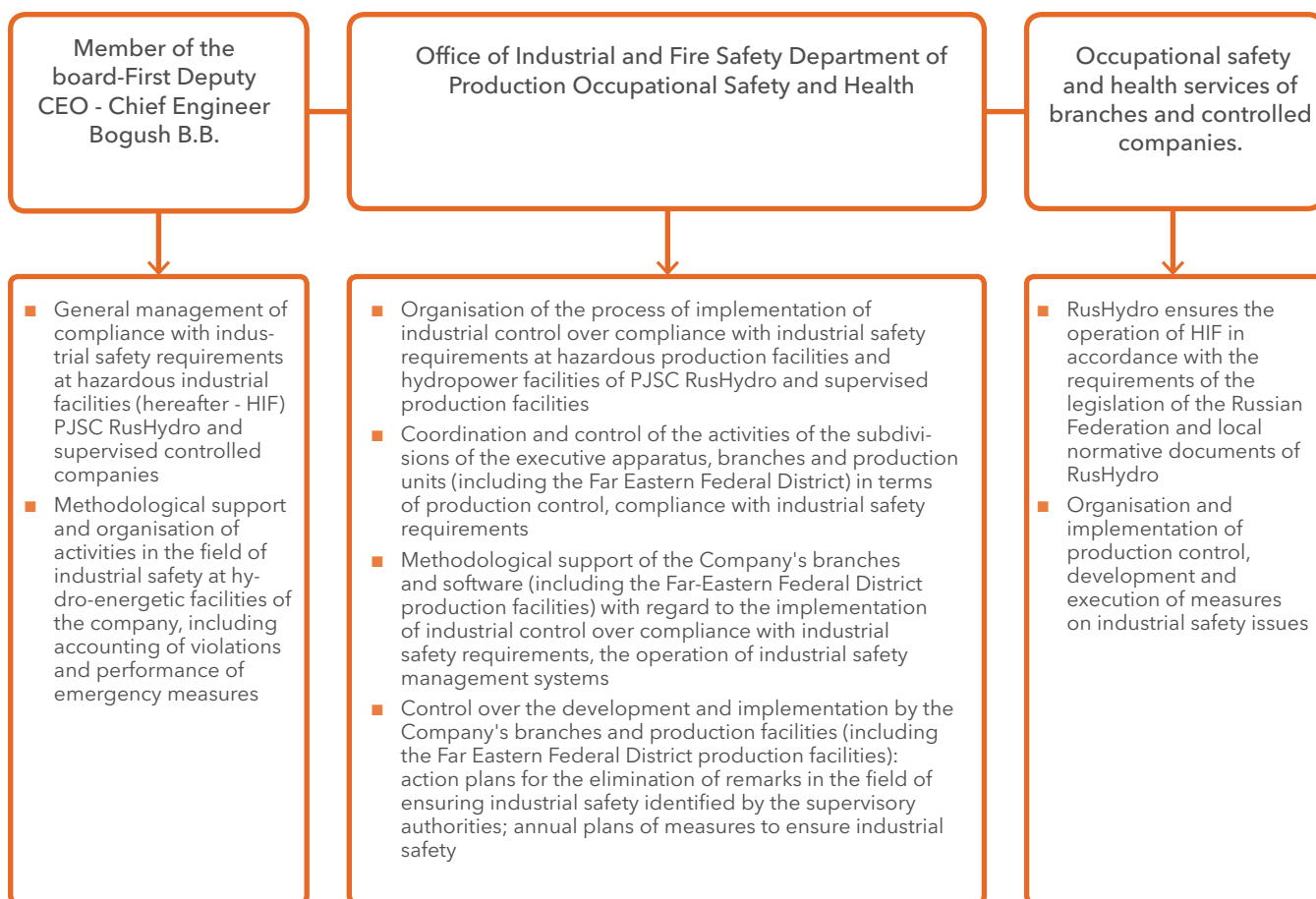
- Quality control at the design and construction stages;
- External regulatory oversight;
- Internal production control;
- Standards and operating regulations (industry and corporation);
- Technical policy and system of technical system management.

Effective control of safety and reliability of functioning assets is achieved by a double control system: an internal system of production control of compliance with industrial safety requirements at hazardous industrial and external facilities by state inspection authorities.

495 HIFs of RusHydro Group are registered in the state register of hazardous industrial facilities: 176 PJSC HIFs RusHydro and 319 HIFs of controlled companies.

HIF sites and HS complexes of branches of PJSC RusHydro are insured under the contract of compulsory insurance of civil liability of the owner of a hazardous facility for causing damage as a result of an accident at a hazardous facility dated December 20, 2016 No. 16DL0687.

Distribution of responsibility on industrial safety issues



The company has a "Standard regulation on the production control of compliance with industrial safety requirements at hazardous production facilities of the branches of PJSC RusHydro", which is going to be updated in 2018.

All generating companies of RusHydro Group have developed and are applying "Regulations on the industrial control of compliance with industrial safety requirements at hazardous industrial facilities".

In 2017, the Siberian Department of the Federal Service for Environmental, Technological and Nuclear Oversight was assigned four events at the Novosibirskaya HPP. All events were carried out. No other violations were recorded in respect of industrial safety requirements during the reporting period.

Key projects to improve the safety of hydraulic structures

Projects completed in 2017

- Reconstruction of the spillway dam of Novosibirskaya HPP

Replacement of the destructive concrete of a water-hole plate, weirs, and steers of a spillway dam.
- Automation (control and measuring equipment (hereinafter - CME) of Novosibirskaya HPP

The piezometers of the spillway dam, the piezometers of the earth dam are automated.
- Reconstruction of the CME with the introduction of IDs (information and diagnostic system) at Gunibskaya HPP

New piezometers are arranged in the arched dam of Gunibskaya HPP. The information- diagnostic system for safety control of HS was developed. The geodetic network of the CME was reconstructed.
- Construction of the canal bypassing the head structures with the help of an additional sump on the Yezminskaya HPP

A bypass (winter) channel was built to circumvent the existing head node of the Yezminskaya HPP in order to facilitate its drainage (head unit) and repair work in low (winter) period. Reconstruction (extension) existing sump of the head complex, for better operation.
- Construction of the bypass canal of the Head Unit of the Gizeldonskaya HPP with the restoration of the reservoir to the original sizes

Reconstruction of a water intake and spillway structure of the head unit was carried out by installing an additional bottom spillway.

Reconstructed the plot of a new concrete structure instead of the old metal.

Mechanical cleaning of the reservoir, silted during the operation by 75% of the value from the design capacity, to the design parameters is carried out mechanically.
- Reconstruction of the CME with the introduction of an information and diagnostic system at the Gergebilskaya HPP

New piezometers in the arch dam are arranged. The information- diagnostic system for safety control of HS was developed. The geodetic network of the CME was reconstructed.

Current projects in 2017

- Reconstruction of the pressure node of the Baksanskaya HPP

Dismantling of the old building and structures of the water intake and construction of a new water intake in its place. In 2017 the project documentation for the reconstruction and the examination of the project documentation were carried out. The preparatory work was finished. Works on dismantling the old constructions are in progress. Completion of works is planned for 2018.
- Reconstruction of the headrace piers in the zone of the alternating level of Nizhegorodskaya HPP
- Reconstruction of grooves, slab-shells, thresholds, and spillway covers of the spillway dam of the Zhigulevskaya HPP
- Reconstruction of the control and measuring equipment at the Nizhegorodskaya HPP

Plans for 2018

- Reconstruction of elements of the deep operational water discharge of Gunibskaya HPP
- Reconstruction and automation of controlling and measuring equipment of Chirkeysaya HPP
- Reconstruction of controlling and measuring equipment of Nizhegorodskaya HPP (the device of additional CME was completed in 2017, while in 2018 it is planned to complete the work by performing its automation)
- Arrangement of systems of seismological and seismometric control at the Cheboksarskaya HPP
- Reconstruction of grooves, plates-shells, thresholds and weirs of the spillway dam of the Zhigulevskaya HPP
- Reconstruction of the walls of the headrace in the zone of the alternating level of the Nizhegorodskaya HPP (completion of works).

Accident Rate

Accidents at the facilities of RusHydro Group

Accident rate	2016	2017	2017-2016
Number of accidents in the group including:	5,547	6,218	671
PJSC RusHydro	97	135	38
accidents at controlled companies including RAO ES East Subgroup:	5,450	6,083	633
Number of accidents at HIFs	0	1	1
Number of fires	0	0	0

Compared to the previous year, the increase in accidents in the branches of PJSC RusHydro is primarily caused by a significant number of accidents in the Karachayevo-Cherkesiya branch (21 accidents, in 2016 there were no accidents recorded) due to the failure of newly introduced equipment Zelenchukskaya HPP - PSP due to its constructive defects, poor installation, errors of software, and fault of own personnel in the maintenance of the newly introduced equipment.

In addition, the general increase in accidents in the branches of PJSC RusHydro in 2017 was affected by the increase in accidents at:

- Zhigulevskaya HPP (growth of 8 accidents);
- HPP of Dagestan branch (growth of 7 accidents);
- Volzhskaya HPP (growth of 3 accidents);
- Novosibirskaya HPP (growth of 3 accidents);
- Bureyskaya HPP (growth of 3 accidents).

The increase of accident rate at the facilities of the controlled companies, including RAO ES East Subgroup, for 2017 in comparison with 2016 is caused primarily by the increase in the number of accidents in the following facilities:

- JSC DRSK- accidents with the equipment and power lines 6-35 kV (from 3,638 to 4,111), equipment and transmission lines 110 kV (from 387 to 492) and with the devices of relay protection, emergency, and mode automation (from 51 to 94).
- PJSC Sahalinenergo - accidents with the equipment and power lines 6-35 kV (from 262 to 319), on equipment and transmission lines 110 kV (from 12 to 27) and with devices of relay protection, emergency and mode automatics (with 1 to 17).
- JSC DGK - accidents with boiler equipment (from 40 to 64), auxiliary heat-mechanical equipment (from 45 to 54), with generators and synchronous compensators (from 9 to 14) and with devices of relay protection, emergency, and mode automatics (from 10 to 21).

- PJSC Peredvizhnaya Energetika - accidents with turbine equipment (from 2 to 23).

In total, on the basis of investigation acts of causes of accidents in RusHydro Group in 2017, 8,905 emergency measures were developed, most of which (8,045) were applied and employed. Of all identified emergency measures 860 have not been completed yet.

Accidents at hazardous industrial facilities

On October 7, 2017 at the Yakutskaya GRES (PJSC Yakutskenergo) an accident occurred at HIF. In accordance with the report on the accident, damage amounted to 363 million rubles. The cause of the accident was the holding of preparatory start-up operations at GTE-45-3 no. 1 of the Yakutskaya GRES with incomplete repair work and uncovered outfits, which led to erroneous actions of operational personnel during switching operations in the circuits. PJSC Yakutskenergo provided a report on the actions taken to prevent similar accidents in the future, including adjustments to the technical elements of the plant and changes in instructions, as well as checking and ensuring the work of all safety automatic devices at gas turbine plants.

PJSC Yakutskenergo conducted a detailed assessment of the actual state of the equipment of Yakutskaya GRES and is carrying out the appropriate repair and restoration work. In 2017, 16.1 mn rubles was spent on restoration works, the costs for 2018 are planned to reach 71.5 mn rubles. The total cost of repair and restoration work are estimated at 87.6 mn rubles (instead 363 mn rubles previously announced according to the accident investigation report).

Elimination and prevention of emergency situations

Work on the prevention and liquidation of emergency situations is conducted in RusHydro in full compliance with the normative requirements of the legislation of the Russian Federation for Hydro-Technical facilities and hazardous production facilities. [103-2], [103-3]

All facilities of RusHydro Group have:

- Action plans for the prevention and liquidation of emergency situations of natural and technogenic nature, as well as action plans for the prevention and liquidation of oil and petroleum spills, agreed with the territorial authorities of the Ministry of Emergency situations of Russia;
- Declarations of safety of HS, updating (processing) of which is carried out not less than every five years with mandatory examination of HS by specially created commissions with the involvement of design and research organisations;
- Facility safety passports (specifications);
- Special equipment for the prompt elimination of possible damages and emergencies (at facilities where there are own (contractual) fire-fighting partners);
- Rescue equipment and tools.

At all facilities of RusHydro Group, operating HS of extremely high and high risk, hazardous production facilities of I and II hazard classes, dangerous production facilities of III hazard class, civil defense units or professional out-house rescue teams are duly created and kept on alert.

In accordance with the decree of the Ministry of Energy of Russia of June 9, 2011 No. 222, RusHydro Group created a functional subsystem of the unified state system of prevention and liquidation of emergency situations.

The coordinating body of the subsystem responsible for promptly assessing occasions of emergency and taking the decision to implement the activities aimed at the prevention of emergencies is the Commission for the Prevention and Liquidation of Emergencies and the Fire Safety of the company (CPLÉ and PFS). The annual work plans of the commission include providing for the safe flood water passage in the spring-summer period, preparing the facilities for the autumn-winter peak of maximum loads, as well as to ensuring sustainable functioning in fire and thunderstorm periods. The CPLÉ and the PFS directs and coordinates the work of the permanent and day-to-day bodies for the management of the functional subsystem.

Round-the-clock surveillance of the facilities, notification of detected violations in the equipment operation and execution of priority actions which contribute to the prevention of emergency situations, are performed by the bodies of daily management functional subsystem of the company: during operational duty shifts at the center for monitoring the state of protection and operation of facilities, as well as during duty shifts of operational supervision of generating branches and controlled companies.

At 31 facilities of the Group there are local warning systems.

For the prevention and liquidation of emergency situations, reserves of material resources in the branches operating hydrotechnical facilities and a target reserve of financial resources in PJSC RusHydro were created in PJSC RusHydro amounting to 1% of the average monthly revenue from the sale of electricity and capacity. In all controlled companies in order to prevent and eliminate emergencies, financial reserves and reserves of material resources were created having the needed funds at their disposal.

In 2017, training in accordance with the decree of the Company of May 11, 2017 No. 287 On the conduct of distance learning in the field of civil defense and protection of employees at emergencies in 2017, using an automated system of training and control of learning acquired knowledge, 5,810 employees of RusHydro Group were trained. The total number of people in RusHydro Group covered by the training was 22,399.

In 2017, RusHydro Group held:

- complex trainings - 23;
- trainings at facilities - 379;
- team trainings - 108;
- tactical special trainings - 58.

In the Group's consolidated budget for 2018, funds were planned under the item "Emergency Response Reserve" worth 88,845.1 thousand rubles for accrual and 104,837.3 thousand rubles for financing.