

## PROVIDING QUALITY, RELIABLE AND UNINTERRUPTED POWER SUPPLY TO CONSUMERS

In order to ensure reliable, high-quality and uninterrupted power supply to consumers, the Company annually forms and implements a program of technical re-equipment, reconstruction, repair and maintenance of power facilities, as well as takes measures to ensure reliable and trouble-free operation of electrical networks during floods, extreme high and low temperatures of outdoor air, storm and fire seasons, autumn-winter period.

In 2018 Kubanenergo PJSC, as a whole, has fulfilled the main task of its production activity - maintaining a sufficient level of reliability of the operation of power grid equipment.

The main activities carried out in 2018 were aimed at:

- maintenance of the regulatory state of production assets - power lines, substation equipment, relay protection and automation devices;
- timely detection and elimination of defects according to the results of diagnostics of the state of electrical equipment;
- increase of lightning resistance of electrical equipment;
- development of an automated information system for controlling icing on the overhead lines;
- preparedness for the prevention and elimination of technological violations:
  - / the agreements with contractor and related electric grid organizations, as well as with the Russian Emergencies Ministry and Roshydromet were extended;
  - / there were formed 22 mobile crews (125 persons, 48 vehicles);
  - / the emergency reserve of the Company is staffed by 100%;
  - / there was tested the performance of existing 107 diesel generator sets.

The implementation of these measures allowed reducing the number of technological violations occurring due to emergency shutdowns by 13 %.

To prevent fires and deflagrations at the Company's facilities, an order "On preparation for the fire hazard and high-temperature period of 2018" dated 02.03.2018, No. 217 was issued and executed:

- interaction with territorial bodies of the Ministry of Emergency Situations of Russia was organized as a part of agreements on cooperation in terms of forecasting, development control, and the development and implementation of measures to normalize a fire-hazardous situation, there were concluded 32 agreements;
- 518 notifications, letters on the observance of the rules for the protection of electrical networks and responsibility for the fire condition of the high-voltage lines were handed to agricultural producers and other land users, which territory has high-voltage lines;
- the plowing was performed along the perimeter of 431 substations that did not have solid concrete fencing and located in hazardous fire areas, 68.5 hectares of land were plowed;
- 387 inspections of the fire condition of power grid facilities were carried out for compliance with the requirements of Fire Regulations;
- there was organized a systematic monitoring of the temperature conditions of cables, air temperature and ventilation devices in cable structures, the absence of debris and oil spills, the status of fire-prevention overfills and their designation, the state of fireproof seals in the places where cables pass through walls and partitions, the integrity of the structures of channels and trays. Control is carried out at 578 sites;
- free access of fire trucks was provided to 56 fire hydrants, tanks and other sources of fire fighting water;
- A survey of 32 objects built into residential and public buildings, and TP, RTP, RP attached to them were carried out to bring them to a state that meets the requirements of the current Fire Safety Regulations and Rules.

There were no fires or firings at the Company's facilities and emergency outages of power grid equipment as a result of the impact of fire in the reporting year.

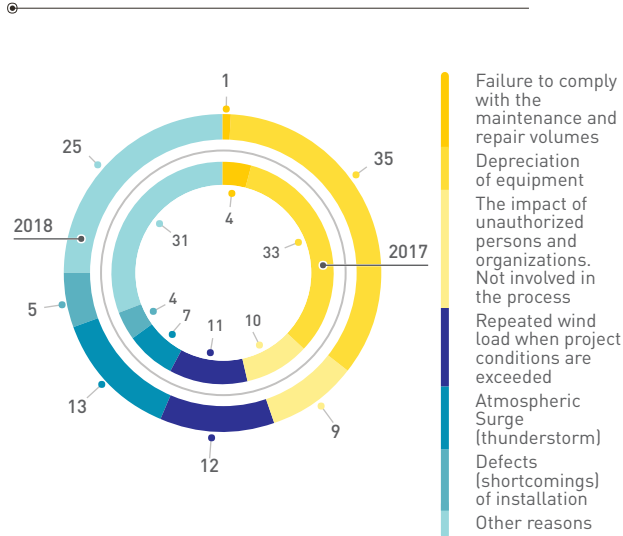
In order to ensure reliable operation of the Company's electric grid facilities during a thunderstorm period, an order was issued and executed on 16.03.2018, No. 255 "Preparation for the thunderstorm period of 2018":

- the interaction with the territorial authorities of Roshydromet was ensured to obtain forecasts about the time and expected nature of thunderstorm activity, units of the Emergencies Ministry of Russia, local authorities in the prevention and elimination of consequences of accidents at power industry facilities
- engineering inspections of all substations of 35–110 kV, fuel and oil depots, oil facilities and antenna mast structures were carried out, including:
  - / compliance with lightning protection with the requirements of regulatory documents,
  - / state of separate and portal lightning conductors and their grounding in accordance with the project,
  - / the state of grounding electrical equipment of substations,
- condition of substation isolation;
- measurements of conduction currents were performed without disconnection from the network, and thermal imaging control of 110 kV surge arresters, a comparative analysis of the measurement results was carried out with data from previous measurements;
- there was performed a visual check of the condition of surge arresters and surge suppressors;
- verification of the readings of the valve arresters' response recorders is made with the latest entries in the operational log or in the register of the actuation of the actuation;
- there was ensured the readiness of the recorders of emergency events, fixing devices, oscillographs and other devices for determining damage sites on power transmission lines installed at the substation;
- selective engineering surveys of overhead transmission line sites were carried out, including:
  - / the condition of the ground wires, as well as their contact connections,
  - / compliance of grounding of ground wires to the project requirements,
  - / the state of grounding devices supports and delays,
- insulation condition;
- there was checked the adequacy of the emergency reserve of surge suppressors;
- performance and configuration were tested in all capacitive current-to-ground compensation devices;
- there was found that the placement of lightning surge protection meets the design and requirements of the regulatory and technical documentation;
- there were conducted the unscheduled briefings and emergency response training of the operating personnel to identify damage sites on the overhead transmission lines with fixing devices;
- inspections of 6–10 kV overhead lines with insulation made of cross-linked polyethylene (6–10 kV insulated overhead lines) were performed, including for installation of devices for protection against wire bursts when exposed to the lightning surge;
- Works for replacement (restoration) of defective ground wire on 35–110 kV overhead lines;
- registration of all cases of outages and damages of power lines and equipment of substations provided with lightning overvoltages to assess the reliability of overvoltage protection of switchgear and power lines;
- the recording of readings from the arresters and surge suppressors are organized with an entry in the operational log or trigger log after each passage of a thunderstorm, etc.

**Dynamics of specific accidents rate at power grid facilities (number of technological failures (crashes) per 1,000 c.u. of equipment) of the Company in 2016–2018**



**The main causes of technological violations (crashes) at the Company's power grid facilities for 2017–2018**



All activities of the requirements of the Federal Service for Environmental, Technological and Nuclear Supervision with a deadline of 2018 were fulfilled and removed from control.

To ensure reliable operation of the power grid complex under conditions of power supply interruption to consumers and other abnormal situations related to power supply interruption, the Company's headquarters operates on an ongoing basis, representatives of which regularly participate in ensuring power supply security in the Krasnodar Territory and the Republic of Adygea.

## REPAIR AND MAINTENANCE ACTIVITIES

The Company annually forms and executes the maintenance and repair program (MRO), taking into account:

- standard periodicity of capital;
- medium and current repairs of power equipment;
- technical condition of objects; the results of preventive tests;
- the need to comply with the Regulations of the supervisory authorities; elimination of technological violations;
- profitability and overall performance of electrical networks.

THE PROGRAM OF MAINTENANCE AND REPAIR OF THE REPORTING YEAR WAS SUCCESSFULLY IMPLEMENTED IN ALL DIRECTIONS. MEASURES WERE IMPLEMENTED FOR RUB 1,766.7 MILLION, WHICH IS 104% OF THE PLAN (INCLUDING THE WAGE FUND, INSURANCE PREMIUMS, FUEL AND LUBRICANTS AND TRAVEL EXPENSES FOR REPAIR ACTIVITIES).

**Leading indicators of the implementation of the repair program in 2016–2018, the plan for 2019**

DESCRIPTION OF THE ACTIVITIES	2016	2017	2018	2019 (PLANNED)
Clearing of high-voltage lines, ha	826.7	968.5	1,620.19	1,828.98
Replacement of ground wire, km	72.7	130.4	77.08	77.25
Replacement of insulators, pcs.	43,612	52,056	43,062	86,711
Repair of power transformers, pcs.	26	41	21	21
Repair of switches, pcs.	1,110	1,120	899	925
Repair of separators, short-circuit breakers, disconnectors, pcs.	1,087	1,290	1,698	1,749
Repair of transformer substations, pcs.	401	483	604	2,911
Repair of power lines, km	2,764.3	2,888.0	3,124.3	12,467.9

To improve the reliability of the power grid complex by a comprehensive program to enhance the reliability of substation equipment, enhance the safety of 0.4–10 kV distribution networks, and also to prepare the power system for the Russian Investment Forum, the World Cup in Sochi and essential events in 2018:

- reactive power sources recovered – 540 defective capacitors replaced;
- mechanical and electromagnetic interlocks were restored at 30 substations 35–110 kV;
- there were replaced 57 physically worn 35–110 kV bushings, oil circuit breakers and power transformers;
- thermovision inspection was performed:
  - / 508 OTL with the plan for 234 pcs.,
  - / 616 substations 35–110 kV, with the plan 288 pcs.;
- 763 power towers replaced by 10 kV overhead lines;
- there were replaced 2,011 towers with 0.4 kV overhead lines;

- 680.32 km of wire replaced with overhead transmission lines 0.4–10 kV;
- 527.4 km of 0.4–10 kV bare wire replaced by steel insulated wire;
- were replaced 14,640 branches to inputs to households made with bare wire;
  - / 11 overhead lines with uninsulated wires were removed from the territories of preschool institutions, schools, other educational institutions, camps, etc. (if the removal was impossible, the bare wire was replaced with insulated).

For 2019, the MRO expenditure limits were provided in the amount of 3,566.7 million rubles, which is 110% more than the 2018 plan, which let to form a set of measures in the MRO program, sufficient for the reliable electricity supply to Kubanenergo consumers.