

INNOVATIONS

The Company's 2016-2020 Innovation Development Program to be potentially extended till 2025 was adopted by the Board of Directors³⁴. Mid-term implementation plan for 2018-2020 was updated and adopted as a part of the 2017 progress report on implementation of the Company's Innovation Development Program³⁵. The goal of the Company's Innovation Development Program for the mid-term and long-term (till 2025) periods is to shift to the new-generation innovative network with game-changing properties related to reliability, efficiency, availability, controllability and customer-centricity.

2018 Achievements:

I. Transition to 35-110(220) kV digital substations

Project "Implementation of IEC 61850 digital data exchange solutions in relay protection and automation systems on pilot substations of OAO IDGC of Urals".

The goal of the project is to create smart grids through modern equipment and systems as well as to use IEC 61850 data transfer protocols.

Pilot facility: 110 kV "Kemping" substation

Effect: a) enhanced automation and control; b) reduced exploitation costs due to extended repair intervals; c) usage of low-maintenance equipment; d) reduced time for restoration of normal network operation; e) reduced possibility of incidents and damages of equipment; f) usage of network fault location and remote switch control system.

The Year 2018 achievements: approval of design documentation, selection of digital 10 kV switchgear, initiation of construction and assembly operations (incl. purchase of equipment). The project envisages data exchange through digital buses, capability of remote control of switches, grounding blades and draw-out elements in 10 kV cells. A 10 kV equipment uses IEC 61850 digital data transfer.

II. Transition to digital smart grids with distributed intelligent automation and control system

Project "Roll-out of metering systems on retail electricity market (0.4 kV, 6 kV, 10 kV). Upgrade/build-up of MIS. Automation of data collection from MIS" (Permenergo, Chelyabenergo and Sverdlovenegero branches).

The goal of the project is to create a customer-centered automated metering system with smart metering functions (possibility of remote reading of metering parameters, incl. billing and load limitation/disconnection; remote collection of consumption data; multi-tariff function; monitoring of meter status; data exchange).

Effect: a) provision of reliable metering at points of delivery at responsibility boundaries of multi-family and single-family houses; b) provision of reliable metering at points of delivery for consumers connected to networks with peak losses and consumption; c) location of electricity loss centers through upgraded metering systems on 6(10)/0.4 kV substations making it possible to prepare balances of main substations with problematic feeders; d) minimization of expenses on metering automation (per metering point).

The Year 2018 achievements: a) exclusion of in-house losses from electricity purchased to compensate losses; b) reduction of losses on selected network sections (by enhanced accuracy of metering and reduced unmetered consumption); c) growth of net supply (same as previous, plus monthly billing using metered values as of the end of each calculation period); d) reduction of operating expenses related to meter maintenance (manual data collection, manual data input, instrumental inspections).

Project "Creation of new services for consumers: Charging infrastructure" (Permenergo, Chelyabenergo and Sverdlovenegero branches).

The goal of the project is to launch charging stations to grant customer-centered services for EV owners.

Effects: a) provision of charging infrastructure; b) integration of charging infrastructure into active-adaptive network; c) enhancement of electricity supply; d) use of EVs for own needs; e) support of EV public transportation promotion; f) improvement of environment in cities.

The Year 2018 achievements: 6 charging stations installed (3 stations in Permenergo, 1 station in Sverdlovenegero, 2 stations in Chelyabenergo).

III. Transition to end-to-end performance of business processes and automation of control systems

Project "Build-up of Production Assets Management System (PAMS)".

Goals of the project: a) build-up of the system for regular centralized management of core production assets in line with the Company's strategic goals; b) enhancement of the quality of planning for repair, maintenance, upgrade and reconstruction programs; c) provision of Company's management with a tool to generate data on production assets' health and exploitation costs; d) creation of a mechanism for provision of maximum possible reliability level within set funding.

Effects: a) build-up of the system for planning and execution of production programs (repair program, maintenance program, etc.), compliant with uniform requirements set by regulatory documents and Company's bylaws; b) integration of the system covering financial and management accounting, control of logistics, transport and human resources; c) integration of the system with external systems to arrange data exchange, required for planning of production programs, integration with PAO Rosseti's GIS systems, business analysis systems of the Company; d) establishment of the KPI system related to production asset management on all levels that help evaluate and compare production departments, branches in terms of processes, technical and economic properties for further solutions.

The Year 2018 achievements:

- Development, in accordance with a single system of rules, of a Company's maintenance and repair program, based on risks of equipment failures (with the use of automated systems);
- Development, in accordance with a single system of rules, of a Company's upgrade and reconstruction program, based on risks of equipment failures (with the use of automated systems);
- Additional advantages from automation of the PAMS processes (integration of various information systems, etc.);
- Maintenance of databases on assets and asset parameters in an up-to-date state.

Project “Development of the knowledge management system. Roll-out of the digital system for accumulation, storage and distribution of knowledge”.

The project goal is to improve information support of innovative activities, to provide with required knowledge and information on innovative projects and activities.

Effects: a) build-up and development of tools for accumulation, storage and distribution of knowledge (database, information repository); b) exchange of development and solution implementation outcomes, exchange of best operating practices and achievements of innovative projects.

The Year 2018 achievements: deployment of up-to-date IT systems related to knowledge collection and management, incl:

- The XWiki corporate knowledge base has been created and continuously enriched;
- The Redmine system for project management has been created;
- The digital library of external and internal bylaws has been created;
- Deployment and use of the “Konsultant+” and “Tekhexpert” information systems.

IV. Application of the latest technologies and materials

Project “Roll-out of 110 kV remote commercial meters.

The goal of the project is to create autonomous points of commercial metering in 110 kV networks at the boundaries of operational responsibility area for enhanced accuracy and authenticity of data.

Effect: a) provision of reliable metering at points of delivery for consumers connected to networks reporting peak losses and consumption; b) remote 110 kV commercial meter, based on i-TOR combined digital current and voltage meter and e-TOR device, makes it possible to arrange commercial metering of consumption at any segment of the network (110 kV power line pole or substation); has a high accuracy of metering; has minimal size and weight and can be integrated into the automated meter reading and control system.

Pilot facilities for 110 kV meters:

- pole No.36 of 110 kV “Okunevo – Rezh-1” aerial power line with a branch power line to RGK substation;
- pole No.1 of 110 kV “Nizhnie Sergi - Mikhailovskaya” aerial power line;
- pole No.175 of 110 kV “Pervouralskaya – Nizhnie Sergi” aerial power line;
- pole No.35 of 110 kV “Siren – Tsemzavod-1” aerial power line;
- pole No.35 of 110 kV “Siren – Tsemzavod-2” aerial power line.

Project “Roll-out of 35 kV remote commercial meters”.

Goal, description and effects of the project are similar to the Project “Roll-out of 110 kV remote commercial meters”.

Pilot facilities for 35 kV meters:

- pole No.68 of 35 kV “Verkhnie Sergi - Atig” aerial power line;
- pole No.86 of 35 kV “Degtyarka - Rudnik” aerial power line.

Target and actual expenditures in 2018

Aspects of the innovative development	Expense target value, RUB million (net of VAT)	Expense actual value, RUB million (net of VAT)
Transition to digital substations	12.50	29.79
Transition to digital smart grids with distributed intelligent automation and control system	115.10	185.81
Transition to end-to-end performance of business processes and automation of control systems	87.24	131.18
Application of the latest technologies and materials	13.86	0.00
TOTAL	228.70	346.78

Failure to achieve target values in “Application of the latest technologies and materials” was due to aborted tenders. In 2018, we arranged tenders for the projects 5 times, with no contractors designated due to objective reasons.