

Long-term investment program

The PAO Rosseti Ural's investment program for 2024-2028 was adopted by the Ministry of Energy Decree²².

The Company's 2024-2028 cost and physical parameters

Metrics	2024	2025	2026	2027	2028
Funding, RUB million, incl VAT	15,584	13,057	12,724	12,309	9,927
Capex, RUB million net of VAT	13,140	9,931	10,470	10,288	7,834
New fixed assets, RUB million net of VAT	15,570	9,187	10,039	12,250	7,578
Commissioning of transformer capacity, MVA	609	173	123	202	87
Commissioning of power lines, km	1,509	1,260	1,232	1,081	1,048

The Company's investment program for 2024-2028 stipulates RUB 63,601 million (incl. VAT) funding, RUB 51,663 million (net of VAT) capex, RUB 54,623 million (net of VAT) new fixed assets. The Company's 2024-2028 investment program is prepared with due allowances to regional development plans, equipment health, importance of grid facilities and current domestic environment.

INNOVATIONS

The Board of Directors has adopted the PAO Rosseti Ural's Innovation Development Program²³. The 2023-2027 mid-term implementation plan was revised and approved as a part of the 2022 Innovation Development Program progress report²⁴. The goal of the Company's Innovation Development Program is to shift to the new-generation innovative network with game-changing properties related to reliability, efficiency, availability, controllability and customer-centricity of the Russian grid sector.

The final results are:

- provision of high reliability of electricity supply
- enhancement of efficiency through reduction of losses, expenses and implementation of innovations in electricity transmission, maintenance and repairs of the Company's grids
- increase of investment attractiveness and value of the Company

In 2023 expenses on the activities from the IDP exceeded the targets. Total expenses in 2023 totaled RUB 982.29 million (target – RUB 958.23 million), completion of the IDP totaled 102.51%.

2023 Achievements are as follows:

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

The goal is to create grid facilities with intelligent control and management system by installing state-of-the-art equipment and systems as well as to use IEC 61850 data transfer protocols. Effect from the deployment of the "Digital Substation" technology: increased level of automation and controllability, reduced exploitation costs due to extended repair intervals, usage of low-maintenance equipment, reduced time for restoration of normal network operation, reduced possibility of incidents and damages of equipment, usage of network fault location and remote switch control system.

The "Digital Substation" technology is planned to be deployed on the following pilot substations:

1) 110 kV Esaulka substation (Chelyabenergo branch).

The implementation of the project shall enable to ensure:

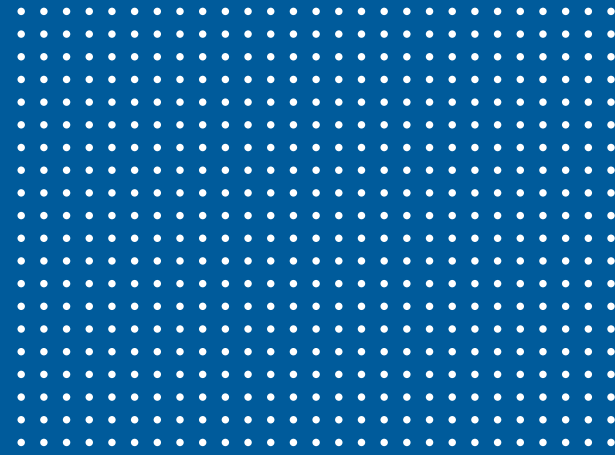
- a possibility to connect new consumers and increase net supply;
- an increase of supply reliability and voltage quality;
- upgrade of obsolete equipment;
- achievement of optimal load;
- an increase in observability and controllability of the facility, testing of IEC 61850-compliant solutions using microprocessor-controlled RPA devices and telematics, supporting "digital substation" technology.

2023 achievements: DSW in progress. 2023 expenses: RUB 21.03 million (target value) and RUB 18.33 million (real value). Deviation from the target value is due to reduced cost of the project as a result of completed tenders.

2) 110/35/6 kV Pyshma substation (Sverdlovenegero branch).

Innovative technologies implemented: i) digital relay protection and automation devices, supporting digital data exchange; ii) PMU devices integrated into DSP; iii) systems for control (analysis) of IEC 61850 digital communications protection, etc., using machine learning and neural networks to discover abnormalities, to ensure functional security of remote control of primary grid equipment; iv) automated systems for control of 10-220 kV equipment status after synchronous registration and monitoring of normal and emergency modes parameters; v) smart meters with possible integration into the unified management system, providing remote control and information on network parameters; vi) fieldbus firewalls with functions of control and infiltration of OPC.

2023 achievements: DSW ended, procurements ended, installation and commissioning ended. 2023 expenses: RUB 332.73 million (target value), RUB 330.51 million (real value).



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

2023 achievements:

1) Deployment of projects on the creation of distributed network automation and location of damaged sections, enhancement of observability and automation of network management in Permenergo, Chelyabenergo and Sverdlovenegero.

The projects' goal is to enhance observability and controllability of the networks. 2023 Permenergo's expenses totaled RUB 61.17 million (target value) and RUB 20.20 million (actual value); 2023 Sverdlovenegero's expenses totaled RUB 83.91 million (target value) and RUB 30.0 million (real value). The odds between actual and target values are due to exclusion of the activities from the IDP following the cancellation of the digital smart grids program²⁵, with implementation of remaining activities to upgrade the distribution network sections within the real amounts; specificities of logistics related to equipment and goods delivery.

2) Deployment of projects on the roll-out and development of smart metering (0.4-110 kV) in Permenergo, Chelyabenergo and Sverdlovenegero.

The goal of the project is to create a customer-centered automated metering system with smart metering functions (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).

Innovative technologies implemented:

- Smart metering system is based on the usage of smart meters united into one system of automated control and recording. To get the system working, a new-generation meter is mounted on a power line tower. The meter transfers consumption metrics to the dispatcher and customer's display. Two-way GSM/GPRS communications enable to monitor the system in real time, control electricity supply and rapidly detect losses and attempted electricity thefts. Alongside with the installation of the automated metering system, cable entrance points are reconstructed: old-generation wires are replaced with self-supporting insulated wires, which provides higher quality of energy supply and reduces unauthorized connections to zero. Implementation of state-of-the-art automated systems of control and recording of electricity consumption makes it possible to arrange remote metering on any facilities and perform remote switching off/on;
- Customer services and CRM (management of electricity supply and demand).

Effects from implementation: i) reliable metering at points of delivery at responsibility boundaries of multi-family and single-family houses; ii) reliable metering at points of delivery for consumers connected to networks with peak losses and consumption; iii) 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; iv) minimization of expenses on metering automation (per a metering point).

2023 achievements: i) exclusion of in-house losses (in multi-family houses) from electricity purchased to compensate losses; ii) reduction of losses on selected network sections (by enhanced accuracy of metering and reduced unmetered consumption); iii) growth of net supply (same as previous, plus monthly billing using metered values as of the end of each calculation period); iv) reduction of operating expenses related to meter maintenance (manual data collection, manual data input, instrumental inspections).

2023 Permenergo's expenses totaled RUB 136.29 million (target values) and RUB 201.64 million (real values); 2023 Chelyabenergo's expenses totaled RUB 76.91 million (target values) and RUB 142.31 million (real values); 2023 Sverdlovenegero's expenses totaled RUB 131.45 million (target values) and RUB 132.48 million (real values).

3) Upgrade of 110/6 kV KAZ substation.

Goal of the project: enhancement of reliability and security, confirmation of capacities for cost reductions in reconstruction and greenfield construction, estimated parameters of remote monitoring and control, quality, integrity and authenticity of information on the status of Li-Ion energy storage system.

2023 achievement: pilot and field testing of Li-Ion energy storage system ended, main technical characteristics of installed equipment confirmed. 2023 expenses totaled RUB 0 (target values) and RUB 4.82 million (real values).

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

2023 achievements:

1) Build-up of the Production Assets Management System (PAMS).

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

Innovative technologies implemented:

i) implementation of ERP systems; ii) creation of a network model, compliant with a single data standard; iii) information collection and display systems (SCADA); iv) geoinformation systems (GIS) linked to geolocation and geopositioning systems; iv) electronic catalogues and databases of standard technical solutions.

Effects from implementation: i) build-up of the system for planning and recording of production programs execution (repair program, maintenance program, upgrade and reconstruction program and other programs included into the exploitation decree), compliant with uniform requirements set by external regulatory documents and Company's bylaws; ii) integration of the system covering financial and management accounting, control of logistics, transport and human resources; iii) integration of the system with external systems to arrange data exchange, required for planning of production programs, integration with Rosseti's GIS systems, business analysis systems of the Company; iv) 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.

2023 expenses totaled RUB 18.22 million (target values) and RUB 1.92 million (real values). The odds between actual and target values are due to the execution of prevailing part of activities in 2023 and reduction of development plans by SAP.



2) Creation and deployment of the GIS Ural geoinformation system

Goals of the project: i) enhancement of management efficiency by creating an integrated geo-oriented cross-functional area for interaction among structural units with the straight reporting line to the Chief Operating Officer; ii) creation of a unified center for visualization of information on grid infrastructure (100% of grid facilities).

2023 expenses totaled RUB 20.00 million (target values) and RUB 14.46 million (real values), the odds are due to the revision of specifications related to project development.

3) Development of the integrated decision support system (unified platform for IS integration).

Effects from implementation:

- Reduction of labor costs on maintenance of homogeneous data in various information systems, enhancement of data quality by centralization of maintenance.
- Enhancement of efficiency of cross-system coupling among information systems used by the Company and PAO Rosseti by centralization of data exchange processes, provision of guaranteed delivery of information among the systems, enhancement of information security in data exchange, roll-out of centralized monitoring of data exchange among the systems.
- Reduction of expenses on the deployment of new systems or replacement of existing systems into the intersystem interaction due to loose coupling of the information systems and possible reuse of integration services.
- Reduction of expenses on the maintenance and monitoring of data exchange between the Company and PAO Rosseti by rolling out unified communication channels.

2023 expenses totaled RUB 17.84 million (target values) and RUB 19.69 million (real values).

4) Deployment of automated electronic document flow system (SEDO)

2023 achievements: pilot and field testing completed, expenses totaled RUB 4.68 million (target values) and RUB 4.68 million (real values).

5) Services related to development of specifications for OZhUR software

The basic functionality of the software is: i) integration of a CIM-model with related software through PS-20 integration platform (data transfer to/from OZhUR software), incl. CRC information systems; ii) CIM/XML data export/import.

2023 achievements: development of design solution completed, expenses totaled RUB 0 million (target value) and RUB 25.53 million (real values).



4. Application of the latest technologies and materials.

1) Use of new-type PPE for works on facilities under voltage (0-1 kV)

Goals of the project: Provision of technical teams with PPE for works on repair and maintenance of power lines (isolated and non-isolated wire), switchgear and networks with voltage class of 0-1000 V without disconnection from the networks. Innovative technologies implemented: mastering of works under voltage. 2023 achievements: 3 PPE kits (supplier: OOO ArmEnergokomplekt). 2023 expenses totaled RUB 1.82 million (target values) and RUB 0.98 million (real values), the odds are due to reduced cost after conducted tenders.

2) Use of new-type PPE for works on facilities under voltage (0-10 kV)

Goals of the project: Provision of technical teams with PPE for works on repair and maintenance of power lines (isolated and non-isolated wire), switchgear and networks with voltage class over 1000 V (6-10 kV). Innovative technologies implemented: mastering of works under voltage. 2023 achievements: 1 PPE kit (supplier: OOO PP Promtechsursy). 2023 expenses totaled RUB 3.26 million (target values) and RUB 1.40 million (real values), the odds are due to reduced cost after conducted tenders.

5. Evolvement of the system on development and implementation of innovative products and technologies, R&D activities.

There were 4 R&D works in progress in 2023:

1) Research Project “Development of a technology and creation of a unit for renovation of filthy line insulation of an aerial power line with further automated diagnostics of isolation breakdown characteristics”.

Due to contractor’s failure to discharge contractual liabilities, a negotiated settlement agreement was reached, with the contract on R&D works terminated.

2023 achievements:

- Execution: RUB 20.62 million (target value) and RUB 3.132 million, net of VAT (real value)
- Funding: RUB 20.62 million (target value) and RUB 0 million, incl. VAT (real value)

2) Research Project “Expansion of a CIM profile in terms of connection and perspective development of the networks”.

2023 achievements:

- Execution: RUB 3.0 million (target value) and RUB 3.0 million, net of VAT (real value)
- Funding: RUB 14.4 million (target value) and RUB 14.4 million, incl. VAT (real value)

As prospects for the application of research results, the possibilities of arranging unified information exchange between software used in the implementation of connection and prospective development of electric networks, as well as the possibility of using it when working on domestic integration solutions regarding arrangement of information exchange between information systems in terms of connection and prospective development of electric networks, have been identified and confirmed. These factors make it possible to comprehensively influence the achievement of the goal of transparent enterprise data management, which implies an efficient and secure arrangement of data collection, storage and usage processes.

3) Research Project “Development of a model for adaptive regulation of voltage in distribution networks to enhance net supply and reduce losses, taking into account static load characteristics” (performed by FGAOU VO UrFU named after B.N. Eltsyn).

2023 achievements:

- Execution: RUB 9.0 million (target value) and RUB 9.0 million, no VAT (real value)
- Funding: RUB 4.0 million (target value) and RUB 4.0 million, no VAT (real value)

Stage 1, 2 achievements:

- Modern means, methods and approaches to mode control determined; collection of data to be used for development of smart mode control system completed; status of grid complex (Sverdlovenegro branch) analyzed; approach to optimization of mode of operation for networks factoring in prospective means of voltage regulation developed; possibility of integral voltage regulation analyzed; selection of pilot sections (HV/MV/LV breakdown) to identify SLC validated.
- Typical SLC of standalone consumers and distinctive groups of energy facilities presented; models of pilot sections of 6(10)-110 kV voltage prepared; instrumental survey program prepared; SLC measurement results of 6(10) kV and 110(35) kV voltage class obtained; static load characteristics, based on results of typing of consumer groups and conduct of field experiments on voltage regulation determined.

4) Research Project “Creation of a one-way system for locating a point of impact through analysis of time-symmetric functions using domestic components to be mounted on a 6–10 kV cable/aerial power line. Examination of impact of cable/aerial power line parameters when shaping its digital model on fault location” (performed by ANO VO Innopolis University).

2023 achievements:

- Execution: RUB 6.73 million (target values) and RUB 6.73 million, no VAT (real values)
- Funding: RUB 0 million (target values) and RUB 0 million, no VAT (real values)

Stage 1 achievements:

- Analysis of information resources showed lack of solutions, compliant with the specifications. Conducted patent researches showed patent purity of the solution in progress.
- Works on selection of power lines to be equipped with fault location hardware and software package performed.
- Selected power lines examined, technical documentation, single-line power supply schemes, schematic diagrams and equipment layout plans collected and analyzed.
- During the research domestic components and software were scrutinized and selected. Design solutions developed, trial model of hardware and software package assembled, tested and prepared. System for data collection and transfer, compliant with the specifications, developed, software developed and adapted. The trial model evaluated for compliance with information security requirements. Company-owned power line and substation to be equipped with fault location hardware and software package with possible further field tests selected.

6. Development of innovative development management systems and shaping of innovative infrastructure

2023 achievements:

1) Application of the knowledge management system in a process model of technological and innovative development management.

The Company’s knowledge data base is designed for searching, accumulating, storing, distributing and using knowledge by employees and for the functioning of professional communities.

2023 achievements: the system was launched using the Company’s capacities, integrated with Rosseti Group’s systems, Ministry of Energy’s Russian Energy Agency and corporate information system. Functionality tested, primary content provided. Pilot operation and acceptance testing conducted. Preparedness for commercial operations is defined, regulatory and administrative documents developed, personnel training seminars conducted.

2023 expenses totaled RUB 8.43 million (target value) and RUB 3.08 million (real values).

2) Supervisory control of the Company’s management system in terms of its compliance with ISO 9001, ISO 14001, ISO 50001, ISO 45001 and certification of the IMS in terms of its compliance with GOST R 56273.1-2014/CEN/TS 16555-1:2013.

Goal of the project: provision of integration of the management system elements into the holistic system meeting requirements of international standards, improvement of innovative development management systems and enhancement of efficiency of the Company’s business processes.

2023 achievements: supervisory audit in PAO Rosseti Ural, incl. Sverdlovenergo, Permenergo and Chelyabenergo, production departments and distribution zones. Compliance of the Company’s integrated management system with ISO 9001, ISO 14001, ISO 50001, ISO 45001 confirmed, compliance of the Company’s IMS with GOST R 56273.1-2014/CEN/TS 16555-1:2013 certified. 2023 expenses totaled RUB 0.30 million (target values) and RUB 0.30 million (real values).

Target and actual expenses in 2023, RUB million, no VAT

Type of expense	Expense target value	Expense real value
Transition to digital substations	332.73	330.51
Transition to digital smart grids with distributed intelligent automation and control system	489.73	531.45
Transition to end-to-end performance of business processes and automation of control systems	60.74	66.28
Application of the latest technologies and materials	5.08	2.37
Evolution of the system on development and implementation of innovative products and technologies, R&D activities	56.18	21.86
Development of innovative development management systems and shaping of innovative infrastructure	8.73	3.38
Total	953.19	955.86

Innovations and R&D expenses, RUB million

Metrics	2021	2022	2023	2023/2022, %
Expenses on innovations	669.54	520.57	933.99	179.42%
R&D expenses	31.51	20.08	21.86	108.86%