

INNOVATIONS

The Board of Directors has adopted the PAO Rosseti Ural's Innovation Development Program for 2024-2029 to be potentially extended until 2035 and mid-term implementation plans for 2024 and 2025-2029²⁸.

The goal of the Company's Innovation Development Program is to enhance reliability, quality and efficiency of supply to consumers by upgrading grids through innovative technologies and transforming them into the intelligent core of the energy sector's technological infrastructure.

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 2025, the IDP activities were implemented below the planned cost levels: total implementation costs amounted to RUB 340.83 million against planned values of RUB 456.54 million, and IDP execution reached 74.66%.

Deviations of actual costs from planned values were attributable to the following reasons:

- the upward deviation under the direction "Transition to highly automated substations of various voltage classes" was due to clarification of the scope of innovative measures actually implemented within the title project for the reconstruction of the 110 kV Esaulka substation (plan/fact: RUB 77.71/115.05 million)
- the deviation from the planned capital expenditure levels (plan/fact: RUB 270.02/159.35 million) under the direction "Transition to end-to-end performance of business processes and automation of control systems" was caused by the postponement to 2026 of the design work for the migration of the ERP solution to a domestic platform and to a domestic DBMS in the amount of approximately RUB 160 million, while additional activities were simultaneously implemented as part of development projects and support for new functionalities of the "GIS Ural" technical information visualization system (plan/fact: RUB 17.50/20.37 million), the automation of the electricity metering service delivery process based on the Omni-US automated information system (plan/fact: RUB 30.81/41.65 million), as well as the excess of the actual implementation scope of the initiative launched in 2024 to create a security system for significant critical information infrastructure facilities (plan/fact: RUB 62.29/97.32 million)
- the deviation under the direction "Application of the latest technologies and materials" (plan/fact: RUB 0.9/0.0 million) was related to

the duration of procurement procedures for the purchase by the Permenergo branch of an automatic balancing device (the purchase timeline was postponed to 1Q 2026; the procurement procedures took place in January 2026)

- the deviation under the direction "Evolvement of the system on development and implementation of innovative products and technologies, R&D activities" (plan/fact: RUB 93.70/48.88 million) was caused by the failure to implement the potential of the promising R&D topic "Development of an automated system for storing perspective views of information on electrotechnical equipment (in IEC 61850, CIM, and BIM formats) within the framework of integration of information systems operating on data of information models in the formation of a unified information model of the electric grid," due to the loss of relevance of the work
- the deviation under the direction "Development of innovative development management systems and shaping of innovative infrastructure" (plan/fact: RUB 8.77/0.75 million) was attributable to the absence of a signed support contract for the knowledge management system (the contract signing timeline was postponed to 2026)
- the excess of actual costs under the implementation of measures in the direction "Development of human capital and partnership in the field of education" (plan/fact: RUB 5.44/16.81 million) was associated with the development of a system of internships and traineeships for students, postgraduates, and the retraining of the Company's employees at educational institutions.

2025 achievements are:

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.

- 110 kV Esaulka substation (Chelyabenergo branch):

Implementation of this project will enable the connection of new consumers and increase the volume of net supply; improve the reliability of power supply and voltage quality for consumers; replace obsolete and worn out equipment; achieve optimal loading of the district; enhance observability and controllability of the facility; and test solutions using microprocessor based RPA and telemechanics devices supporting the digital substation technology in accordance with IEC 61850. 2025 achievements: equipment involved in the implementation of innovative



technologies has been procured and installation works have been completed.

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

Within this direction, no projects or activities were planned or implemented during 2025.

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

· Development of “GIS Ural”:

Project objectives: increase management efficiency by creating a comprehensive georeferenced cross functional environment for interaction among structural subdivisions of the Chief Engineer’s functional block; and establish a single center for integrated visualization of information on the electric grid infrastructure, covering 100% of electric grid facilities.

In 2025, a package of activities was implemented to expand the system’s functional capabilities, including: introduction of a new mode for searching geographic objects via the Yandex service; development of an enhanced printing tool with selection of image format and scale; configuration of geometric error validation with output into the “Verification Data” layer; addition of search result filtering by organizational structure with the option to export results to tables; expansion of spatial search functionality for multiple selection of objects from various map layers; implementation of display and filtering of boundaries of individual production departments and electric grid districts; development of a function for automatic determination of the climatic zone classification of overhead line objects, with subsequent transfer of such data to the master system; implementation of dynamic display of overhead line length parameters and their segments during editing; configuration of differentiated visualization of insulated and uninsulated conductors using appropriate graphical symbols.

· Automation of the process for implementing services and accounting for electricity on the basis of the Omni US automated information system:

Project objectives: improve the transparency and controllability of business processes by unifying data and business processes, maintaining a single database of customers and their supply points, and reducing costs; as well as meet the requirements for providing access to the minimum set of functions of intelligent electricity metering systems (capacity)²⁹.

In 2025, a package of works comprising 7 stages was implemented, including: modeling of business processes within the IT architecture, updating the technical design of the unified information platform and functional specifications, development of new functional specifications, direct configuration of the EIP, and preliminary testing of the implemented

configurations. In parallel, the technical design of the Omni US AIS was updated, its functionality and integration mechanisms were configured in line with the updated project documentation, and preparations were made for trial operation of the configurations.

· Creation of a security system for significant objects of critical information infrastructure:

Project objectives: ensure the stable operation of objects of critical information infrastructure when subjected to computer attacks; reduce the risks associated with possible destructive impact on the Company’s information resources; meet the requirements of the Russian legislation governing the assurance of information security for the Company’s critical information infrastructure objects and the law protected information processed there.

Within the funding volumes for 2024–2025, the following import substituted systems are being created: data center firewalls (inter network shielding systems, INS) at the Company’s branches; INS for the branch network management centers; a remote user access system based on Sverdlovenergo and Permenergo branches; a centralized management system for branch INS/IDS equipment; INS and intrusion detection systems for the “Central Electric Grids” production department of Chelyabenergo branch; INS and intrusion detection systems for the “Chelyabinsk City Electric Grids” production department of Chelyabenergo branch.

4. Application of the latest technologies and materials:

· Procurement and installation of automatic load balancing devices (ALBDs) to ensure electric power quality

Project objective: the prompt elimination of non-compliance with electric power quality standards in 0.4 kV distribution networks as part of addressing the increasing number of consumer complaints regarding voltage deviations. Pilot industrial operation within subsidiaries of PAO Rosseti has confirmed the effectiveness of ALBDs in load balancing and loss reduction. The solution has been recommended by the Technical Council of PAO Rosseti for implementation to ensure the prompt rectification of violations of electric power quality standards at consumer endpoints. In 2025, Permenergo branch planned the procurement of automatic load balancing devices.

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

In 2025, five R&D projects were in progress:

1) R&D project: “Development of a Single-Ended Fault Location System (FLS) based on the analysis of time-symmetric components, utilizing domestically manufactured components for installation on combined cable-overhead power lines of 6–10 kV distribution networks. Study of the impact of individual COL parameters, when constructing its digital model, on FLS accuracy” (contractor: ANO VO “Innopolis University”).

Work under Stages 3 and 4 of the R&D project has been completed:

Stage 3: results of the second testing session of the FLS hardware and software complex have been documented; a report on the impact of parameters required for constructing a digital model of the power line on FLS accuracy has been prepared; a database containing the necessary information on the line under study has been developed, along with a software version for automated construction of the line’s digital model; a report analyzing the conditions for effective application of the FLS HSC in distribution networks has been prepared; final versions of the software enabling interaction between the FLS HSC, SCADA system (OIK Dispatcher), and the automated line modeling software have been delivered.

Stage 4: a complete set of technical and software documentation, as well as an installation package, has been prepared.

2) R&D project: “Research and development of a monitoring system for 6–35 kV cable lines based on domestically produced NBPLC modems” (contractor: OOO SPC Prioritet).





Stages 3 and 4 of the R&D project have been completed: a prototype of the cable insulation condition monitoring system and a laboratory test bench for prototype testing have been manufactured; laboratory testing of the prototype has been carried out; algorithms, software, and design documentation for the prototype have been refined based on the test results; upper-level software, as well as predictive analytics methodologies and software, have been developed, and technical specifications have been prepared for integration into the “EGC Incidents” software package; a facility has been selected and approved for pilot industrial operation of the cable insulation condition monitoring system.

3) R&D project: “Assessment of the feasibility of using HPLC+HRF technology for data transmission from smart electricity metering devices in low-voltage power networks, with adaptation to the domestic regulatory framework” (contractor: AO Energomera).

Stage 1 of the R&D project has been completed: an analysis of the applicable regulatory framework has been conducted, and HPLC modem prototypes have been developed.

4) R&D project: “Development of new components for existing insulator strings on 110–220 kV overhead transmission lines to reduce the number of process disturbances caused by surface flashover of insulation” (contractor: ANO VO “Innopolis University”).

Stage 1 of the R&D project has been completed: the current state of the art has been analyzed, and pre-design surveys and technical requirements have been developed.

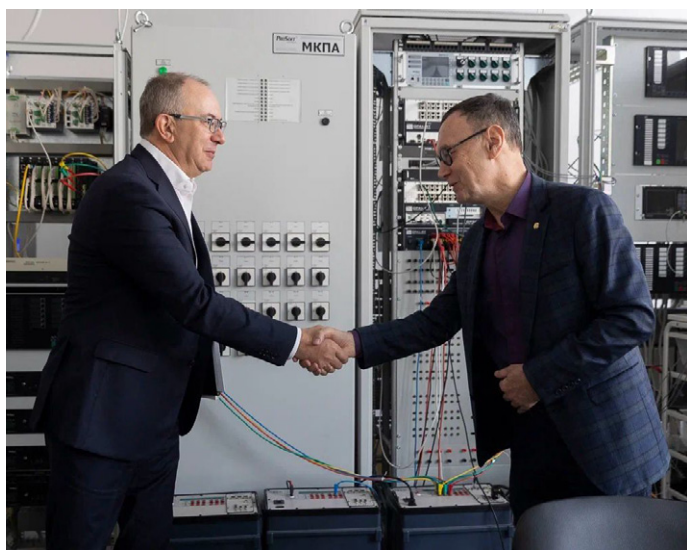
5) R&D project: “Development of an adaptive system for identification of the type and location of disturbances in low-observability electric networks based on machine learning algorithms and synchronized phasor measurements” (contractor: FGAOU VO “Ural Federal University named after the first President of Russia B.N. Yeltsin”).

Stage 1 of the R&D project has been completed: the structure and algorithmic framework of the adaptive system for identification of the

type and location of disturbances in low-observability electric networks, based on machine learning algorithms and synchronized phasor measurements, have been defined; a review and analysis of studies related to the placement of synchronized phasor measurement units for disturbance identification in electric networks have been carried out; a methodology for determining the optimal number and placement of synchronized phasor measurement units, ensuring the capability for adaptive identification of disturbance type and location, has been developed and implemented; a set of data sampling requirements for solving the task of adaptive identification of disturbance type and location using machine learning algorithms has been established; existing methods for determining disturbance locations in low-observability electric networks have been reviewed and systematized; an optimal data preprocessing architecture has been defined; testing of the optimal architecture of the adaptive system for identification of disturbance type and location in low-observability electric networks, based on machine learning algorithms and synchronized phasor measurements, has been performed using synthetic and real-world data.

The following R&D areas are planned for implementation:

- R&D project: “Research and development of a monitoring system for 6–35 kV cable lines based on domestically produced NBPLC modems”;
- R&D project: “Assessment of the feasibility of using HPLC+HRF technology for data transmission from smart electricity metering devices in low-voltage power networks, with adaptation to the domestic regulatory framework”;
- R&D project: “Development of new components for existing insulator strings on 110–220 kV overhead transmission lines to reduce the number of process disturbances caused by surface flashover of insulation”;
- R&D project: “Development of an adaptive system for identification of the type and location of disturbances in low-observability electric networks based on machine learning algorithms and synchronized phasor measurements”.



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

· Application of the knowledge management system within the process model of technological and innovative development management of PAO Rosseti Ural.

Project objective: establishment of a knowledge database of PAO Rosseti Ural integrated with the corporate knowledge database of the Rosseti Group, the knowledge database of the Center for Innovation Competencies of the Rosseti Group (FGBU REA of Russian Ministry of Energy), and the existing corporate information systems of PAO Rosseti Ural, within the scope of the following business processes of the Company: development of the electric grid complex (in terms of innovative development); maintenance, repair, and operation of electric grid complex facilities; diagnostics; technological connection; commercial metering and provision of electricity transmission services.

2025 achievements: preparation and approval of the technical specification for maintenance and support of the knowledge database as part of pre-contractual measures.

Indicator	2023 actual	2024 actual	2025 actual	2025/2024, %
Expenses on innovations, RUB million	930.91	1,141.69	275.15	24.1
R&D expenses, RUB million	21.86	58.72	48.88	83.24
Funding of Digital Transformation Program's activities, RUB million	447.07	742.05	941.6	1.27
Share of managers, specialists, and employees possessing knowledge in the field of digitalization and digital transformation and/or who have undergone training in the field of digital transformation and/or digitalization over the last three years and continue to be employed by the Company as of the end of the calculation period, as a percentage of the total number of managers, specialists, and employees as of the end of the calculation period, %	7/1/0.2	26/9/1	47/67/14	21/58/13