

There were 3 research and development works during 2021, according to the mid-term plan on the implementation of the Innovative Development Program:

1) Research project “Development of an automated system for handling of keys to electric equipment and control of access to facilities, integrated with PAMS, with application of electronic keys and signature” (in progress, project time: 16.08.2021–30.11.2022).

Key 2021 achievements:

- design and engineering documentation to the automated system for handling of keys (services, devices, software, software components, components, required for system operations) prepared;
- drafts of administrative and regulatory documents regarding accommodation of equipment in DPC prepared;
- a draft of the Standard (Requirements to the technology-facilitated arrangement of recording, storage and delivery of keys) prepared;
- a draft of the Standard (Functional and Technical Requirements to equipment used for grid facility monitoring systems) prepared;
- technological documentation dealing with system application prepared.

2) Research project “Mobile system for recording results of computer-vision inspections of power lines and equipment with identification of defects and integration into the PAMS defects register” (completed).

Key 2021 achievements:

- project solution on creation of software and interface prepared;
- software and methodologies for testing procedures and algorithms of the system and interface prepared;
- algorithms and procedures of functioning, required for creation of system software, incl. integration components, developed;
- interface for system’s and infosphere’s interaction developed;
- interface for users’ and system’s interaction developed.

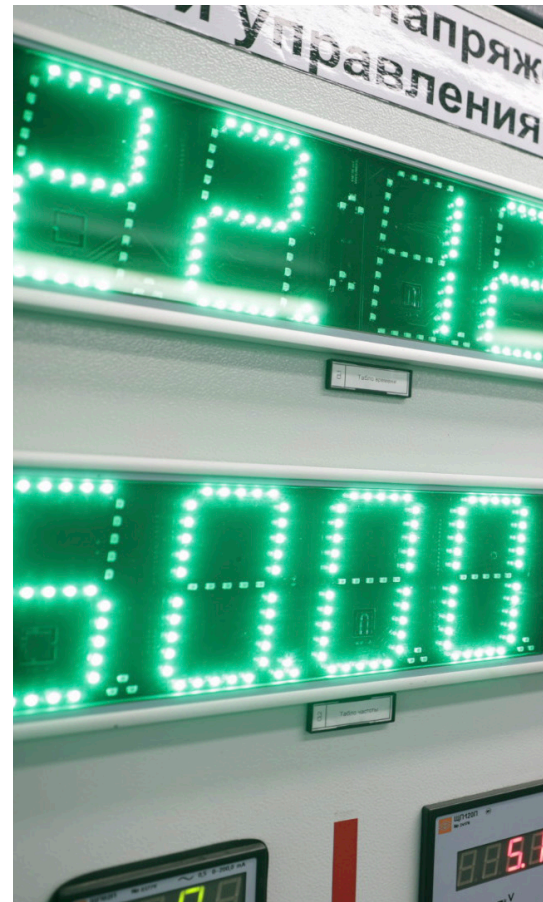
3) Research project “Study of compliance of MPLS, WDM by ECI Telecom (Apollo, Neptune), installed in Permenergo and Chelyabenergo branches, with PAO Rosseti’s STO 34.01-9.2-004-2019 and IEC 61850” (completed).

Key 2021 achievements:

- communications test schemes installed, signal routing with simulated incidents studied (Apollo and Neptune equipment);
- recommendations on the arrangement of telecom channels for RPA signals passage via PSN;
- passage of signals via digital networks, based on various technologies, compared.

Innovations expenses 2019–2021, RUB million

Parameter	2019	2020	2021	2021/2020, %
Expenses on innovations	492.71	520.71	665.83	127.87%
R&D expenses	31.75	22.69	31.51	138.87%



PROGRESS OF THE DIGITAL TRANSFORMATION PROGRAM

Actual funding of the activities under the 2020–2030 Digital Transformation Program totaled RUB 2,113.6 million, incl. RUB 1,789.6 million spent on smart metering, RUB 315.7 million on corporate information control systems and RUB 8.254 million spent on integrated system of information security.

Funding of the Digital Transformation Program’s activities, RUB million

	2019	2020	2021	2021/2020, %
	1,006.1	1,583.1	2,113.6	133.5%