Research and development

We support R&D activities aimed at producing high-tech products that contribute to economic and social transformation. We pay special attention to the development of internal scientific potential and commercialisation of R&D to achieve timely economic benefits.

Single operator for scientific and technical activities

To consolidate and systematise the research and development activities of the Fund's Group, the Samgau Centre for Scientific and Technological Initiatives, a non-profit organisation, was established as a single operator for R&D activities.

In 2024, 57 applications for research and development were considered. In 2024, 11 meetings of the Scientific and Technical Council of the Fund were held, following the results of which 24 promising projects were submitted and approved for financing. Four financing agreements were concluded.

We also carry out systematic work to identify and solve production challenges of the companies of the Fund Group. In 2024, innovation and technological diagnostics of enterprises were carried out, based on the results of which 34 technological challenges were worked out and 40 relevant solutions, including foreign technologies, were proposed. The work is focused on practical applicability and adaptation of solutions to real conditions.

As part of the memorandum with the Ministry of Science and Higher Education of the Republic of Kazakhstan, technology sessions were organised with the participation of Kazatomprom JSC, EmbaMunaiGas JSC and Kazakhoil Aktobe LLP. During the events, dozens of topical issues were identified, and the most promising solutions were proposed and selected, including technologies with a high potential for environmental and production efficiency.

As a result of the technological session dedicated to the problem of field development near the underground freshwater lake Kokjide, a Demo Day was organised with the participation of international oil service companies, which resulted in the selection of 15 solutions for the safe operation of fields. In 2025, it is planned to expand the practice of technological sessions with the involvement of other key portfolio companies.

Upgrade of the oil and gas sector

We implement advanced technological solutions to improve the efficiency of geological exploration and hydrocarbon production. In 2024, the active application of STRYDE technology using wireless sensors and machine learning enabled us to achieve a 20% reduction in total cost and a 33% reduction in seismic exploration time, while reducing environmental impacts.

An agreement was concluded with Sinopec to implement blockchain technologies to protect geological data. Co-operation with leading international companies (Shell, Chevron, CNOOC) in the field of deep drilling and digital twin technologies is being developed. Roadmaps of technological challenges aimed at the development of hard-to-recover reserves are being implemented. In 2024, the introduction of new approaches in carbonate and low-permeability reservoirs enabled additional production of over 390,000 tonnes of oil.

To improve the efficiency of technological solutions, unified rules for technical and economic evaluation have been approved, and the System Centre OPI portal has been launched for accelerated implementation of innovations. Solutions for optimising mature fields, including service management, polymer flooding and horizontal drilling, are also being implemented, which ensures both short-term production growth and long-term sustainability of the industry.

Innovations in the nuclear industry

We have launched an innovative transcontinental project to develop technology for the production of medical radioisotopes. Together with representatives of the United States, Japan and scientific institutions of Kazakhstan, we have developed and approved a plan of activities and an application for research and development work to study potential sources of raw materials for the production of medical radioisotopes.

As part of the development of production potential and technological modernisation, NAC Kazatomprom JSC implemented a number of applied projects. An innovative technology for well repair and remediation works using hydrofluoric acid was introduced to improve the filtration characteristics of ores. An efficient ammonia recovery system was developed for uranium oxide production, which helps reduce production costs. Robotic complexes were introduced to automate mining processes at the Irkol mine, and an experimental mini-hydropower plant was created to generate electricity from process solutions.

Development of rare and rare-earth metals

As part of the implementation of the Programme of Scientific and Technological Development in the field of rare and rare-earth metals for 2022–2029, we continued to develop our own mineral resource base. We obtained licences for exploration of tantalum, niobium and beryllium deposits in the Abay, Aktobe and Ulytau regions. Geological exploration works, including magnetic exploration, aimed at confirming the reserves of strategic metals were carried out.

In parallel, technologies for associated extraction of rare metals from uranium streams are being developed. A subsidiary of IHT LLP completed pilot tests of an ammonium perrhenate production unit and developed a vanadium extraction technology. A project to produce spherical tantalum and niobium powders for additive manufacturing at UMP JSC is also underway.

The Fund signed a Statement of Intent with the European Commission and the EBRD on co-operation in research and development projects for the development of strategic metal deposits, including the Upper Kayrakty tungsten deposit. Preparatory work has been defined in 2024, including sampling, selection of analytical methods and design of processing technology. The project has the potential to create a world-class mining and metallurgical complex and make a sustainable contribution to regional employment and development.

Development of hydrogen energy

We are strategically developing hydrogen energy as part of the transition to a low-carbon economy. In 2024, we conducted feasibility studies for production of blue hydrogen with CO_2 capture, as well as low-carbon ammonia and methanol at the fields of EmbaMunaiGas JSC.

In the direction of green hydrogen, the development of the Atlas of surface waters of Western Kazakhstan for assessment of water supply potential of electrolysis based on RES was finalised. The document was presented at the COP-29 conference. An analytical calculator of green hydrogen production cost was also developed. The first laboratory samples of iron and titanium alloys were obtained to ensure safe storage and transport of hydrogen. Pre-project work on the pilot project was completed, an application for grant funding was submitted, and negotiations with international partners, including Green Spark, are underway.

Digitalisation and artificial intelligence

In line with the global trend, active work continues in the field of modern innovative and digital technologies, in particular, the introduction of intelligent control elements in the power industry, forming the basis for the development of a new generation network, Smart Grid. As part of the implementation of the Smart Grid, KEGOC is implementing projects to upgrade the SCADA/EMS system and introduce monitoring using synchronised WAMS technologies, which improves the controllability and stability of the UES of the Republic of Kazakhstan. A pilot project on installation of energy storage systems is also being implemented jointly with international partners, and the development of storage management algorithms has been finalised to improve the reliability of the energy system when integrating renewable energy sources.

In 2024, AI integration into the SCADA system started to forecast production and consumption balances, as well as losses in electricity transmission. In addition, a pilot project is being implemented jointly with Assystem SA to create a digital twin of a substation transformer, which will enable real-time monitoring of its condition, identifying potential faults and improving the efficiency of maintenance and lifecycle management solutions.

In the transport and logistics sector, in partnership with Huawei, we initiated a project to implement artificial intelligence in transport flow management. We developed the architecture of an analytical warehouse, created a data lake and tested language models, including native ones, to support analytical and operational processes. Pre-project work has also begun on the creation of an intelligent module Train Schedule.