

R&D AND INNOVATION

INNOVATIONS IN PRODUCTION

One of the priorities for Gazprom Neft's innovative development is technology that ensures the strategic goals of a profitable increase in production and enhances the technological efficiency of oil refining. The Company has introduced a long-term technological planning system that identifies long-term technological challenges and the solutions needed to deal with them.

In 2016, the Company updated its Innovative Development Programme, which now extends to the period until 2025. The Programme is based on measures that aim to introduce a set of technologies to enhance well productivity, develop the Bazhenov formation, improve tertiary methods for increasing oil recovery at depleted fields and manufacture catalysts for refining.

In addition to the aforementioned key projects, production automation projects in the oil production and refining segments are also an important part of the Innovative Development Programme.

The Company has had a Technological Strategy for exploration and development since 2014 which groups technological challenges into priority areas. The key technological challenges include integrating hard-to-recover and unconventional hydrocarbon reserves into development, increasing oil recovery at mature fields, developing carbonate and fractured reservoirs and improving drilling efficiency.



>50
technological
projects

launched as part
of the Gazprom Neft
Technology Strategy in 2016

IMPROVING WELL DRILLING AND COMPLETION TECHNOLOGIES

One of the key priorities for developing drilling technologies is to increase the length of the horizontal section of wells. The length of the horizontal wellbore at the Novoportovskoye Port field has reached 2,000 metres, the Company's highest such indicator.

Another key priority is to increase drilling speed. Salym Petroleum Development, a joint venture between Gazprom Neft and Shell, drilled a well at the Verkhnesalymskoye field with a depth of 3,300 metres in less than eight days. The construction speed of this well was a new technical record for such depth.

A landmark technological event in 2016 was the opening of a renovated drilling support centre at the Gazpromneft-STC site which provides 24-hour monitoring of horizontal well drilling processes. The centre is the first in the Russian oil and gas industry to combine the functions of geological and technological support for well construction work.

A key factor that has enhanced well completion efficiency is the improvement of multi-stage fracturing technology. In March 2016, Gazpromneft-Khantos was the first in the Gazprom Neft Group to conduct 18-stage hydraulic fracturing at the South Priobskoye field in the Khanty-Mansi Autonomous District. Prior to this, the maximum level had been 15 stages of hydraulic fracturing in a single horizontal wellbore. In July 2017, 30-stage hydraulic fracturing was performed at the South Priobskoye field, the first such operation for the Russian oil and gas industry.

INTEGRATION OF UNCONVENTIONAL RESERVES INTO PRODUCTION

The profitable integration of Bazhenov formation reserves into production is a strategic priority for the Company. To this end, technology is being developed in two areas:

- > Enhancing the forecasting accuracy of the oil and gas potential of Bazhenov deposits.
- > Improving the efficiency of well drilling and completion technologies.

On the first issue, a consortium involving the company and Russian research organisations has developed the world's first hydraulic fracturing simulator for the Bazhenov formation.

On the second, the company has built high-tech wells to optimise technology and reduce the cost of wells.

CHEMICAL-BASED ENHANCED OIL RECOVERY METHODS

Increasing the oil recovery of mature fields is a technological priority for the Company considering the high percentage of assets in the late stage of development. To solve this problem, Salym Petroleum Development is developing soda-surfactant polymer flooding technology – a chemical method used to increase recovery, which involves injecting a soda-surfactant polymer substance into the formation. The injection process began in March 2016 as part of a pilot project at the West Salymkoye field. The goal of the project is to assess the technological and economic effectiveness of soda-surfactant polymer flooding technology. The successful completion of testing will enable the Company to switch to the large-scale industrial introduction of the technology in Western Siberia.



18 patents

26 applications

2 international applications

obtained from Rospatent in 2016 for key oil refining technical solutions

INNOVATIONS IN REFINING AND SALES

In 2016, 18 patents were obtained and 26 applications were registered with the Russian Federal Service for Intellectual Property (including two international applications) for key technical solutions in oil refining, including technologies for oligomerisation, solid acid alkylation and the hydrotreating of diesel fuel and vacuum gas oil, the reactivation of hydrotreating catalysts and the production of catalyst supports, which ensure the achievement of the Company's strategic goals.

GROWTH IN INTELLECTUAL PROPERTY ITEMS

Source: Company data



KEY INNOVATIVE DEVELOPMENT PROJECTS IN 2016

DEVELOPMENT OF OIL REFINING CATALYST PRODUCTION

The Ministry of Energy of the Russian Federation has assigned national status to Gazprom Neft's project to develop catalyst production. As part of the project, Gazprom Neft opened Russia's first engineering centre to test catalysts for secondary oil refining processes in 2016. The centre commissioned the country's first pilot catalytic cracking unit, which can be used to test catalysts using different types of raw materials and also determine the conditions and modes for their most effective use at the catalytic cracking production facilities of Russian oil refineries. A regeneration and reactivation unit for spent hydrotreating catalysts will also be built at the facility, which is to be fully launched in 2019.

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DEVELOPMENT OF CATALYST PRODUCTION TECHNOLOGIES

The Company is developing innovative catalyst production technologies in cooperation with leading Russian scientific research centres that work with catalytic processes – the Boreskov Catalysis Institute of the Siberian Branch of the Russian Academy of Sciences (Novosibirsk) and the Institute for Hydrocarbon Processing Problems of the Siberian Branch of the Russian Academy of Sciences (Omsk). The joint work resulted in the development of Russian-made catalysts for a number of technological processes in 2016. The catalysts outperform the existing import analogues, which will improve the quality of products and increase production margins.

ESTABLISHMENT OF SOLID ACID ALKYLATION TECHNOLOGY

The establishment of solid acid alkylation technology is a key R&D project that aims to make production processes more eco-friendly. The project is being implemented jointly with the Topchiyev Institute of Petrochemical Synthesis of the Russian Academy of Sciences. In 2016, construction was completed on a pilot plant for solid acid alkylation at Elektrogorsk Institute of Oil Refining PJSC (Elektrogorsk). Introducing this technology will make it possible to eliminate hazardous and corrosion components from the technological process, integrate low-grade raw materials into refining and also increase the production volume of EURO-5 high-octane petrol.

DEVELOPMENT OF INNOVATIVE PRODUCTS

Research and development work performed jointly with Perm State National Research Polytechnical University in 2016 resulted in the development of the road bitumen compound BND 70/100 (per GOST 33133), which includes oxidised high-viscosity tar and extracts from the solvent treatment of residual oils. Along with scientists from the All-Russian Scientific Research Institute of the Petroleum Industry (VNIINP JSC), the Company completed the development of unleaded aviation fuel with an octane rating of 91 and improved operational features for the needs of small aircraft. Gazpromneft Lubricants and Gazpromneft-Bitumen Materials developed and launched a number of new products that meet GOST requirements and the demands of consumers. A unique interdisciplinary Scientific and Research Centre (SRC) was opened at the site of the Ryazan Bitumen Materials Plant.

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'INDUSTRY 4.0' SOLUTIONS IN INDUSTRIAL AUTOMATION

In 2016, the concept of the production management process was developed taking into account 'Industry 4.0' innovative solutions. The Company started creating 'digital duplicates' of production facilities. Pilot projects were implemented for predictive equipment management (reliability management) along with projects using engineering data in a 3D environment. These projects are among the first in the Russian refining industry to be implemented using the 'Industry 4.0' solutions.