ONE OF THE PRIORITIES FOR GAZPROM NEFT’S INNOVATIVE DEVELOPMENT IS TECHNOLOGY THAT ENSURES THE COMPANY ACHIEVES ITS STRATEGIC PRIORITIES: GROWTH IN PRODUCTION TO 100 MILLION TONNES OF OIL EQUIVALENT PER YEAR (BY 2025) AND THE IMPROVED 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’s key projects focus on introducing a set of technologies to enhance well productivity, developing the Bazhenov formation, improving tertiary methods for increasing oil recovery at depleted fields as well as developing and manufacturing catalysts for refining. Production automation projects in the oil production and refining segments are also an important part of the Innovative Development Programme.

INNOVATIONS IN EXPLORATION AND PRODUCTION

High-tech wells accounted for more than 50% of the Company’s total drilling volume in 2016. The effectiveness of the new methods was enhanced by the renovated Drilling Support Centre (DSC), which began working at the Scientific and Technical Centre in 2016. The DSC can support the construction of 600 wells of any complexity per year, including objects with heavy loads, extended horizontal sections and superdeep wells. In addition, the Centre monitors the drilling of all wells that focus on the birthplace of hard-to-recover hydrocarbon reserves, including wells from the Bazhenov formation.

The Centre has combined geological and technological support functions for well construction for the first time in the domestic oil and gas industry.

The Company has had a Technological Strategy for exploration and development since 2014 which specifies the main technological challenges and key areas of innovative development in exploration and production. 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. More than 50 technological projects have been launched as part of the Technological Strategy.
Hydraulic fracturing is a method used to intensify oil production. A mixture of liquid and a special proppant is pumped into the formation under high pressure. As the mixture is supplied, high-conductivity channels (fractures) are formed that connect the wellbore and the formation. These cracks provide an inflow of oil, which otherwise would not have entered the well. In multi-stage fracturing, several fracturing operations are carried out in a single horizontal wellbore, which significantly increases the coverage area of the formation by a single well.

Innovations in production

Improvement of well drilling and injection technologies

- The length of the horizontal wellbore at the Novoportovskoye Port field has reached 2,000 metres, the Company’s highest such indicator to date.
- At the Verkhnesalymskoye field a well was drilled with depth of 3,300 metres in less than eight days. The construction speed of this well was a new technical record for such depth.
- In March 2016, the Company conducted 18-stage hydraulic fracturing at the South Priobskoye field. In July 2017, 30-stage hydraulic fracturing was performed at this field, the first such operation for the Russian oil and gas industry.

Integration of unconventional reserves into development

- A consortium involving the Company and Russian research organisations has developed the world’s first hydraulic fracturing simulator for the Bazhenov formation1, which makes it possible to determine optimal fracturing parameters and assess the productivity of wells in the Bazhenov formation.
- The company has continued building high-tech wells to optimise technology and reduce the cost of wells.

Chemical methods to increase oil recovery

In March 2016, Salym Petroleum Development began injecting a soda-surfactant polymer substance into the formation at the West Salymskoye field. The technology makes it possible to increase oil recovery at a mature field. Given the high proportion of assets in a late stage of development, increasing oil recovery at mature fields is among the Company’s top technological priorities. The pilot project allowed for assessing the technological and economic effectiveness of soda-surfactant polymer flooding. The successful completion of testing will enable the Company to transition to the large-scale industrial introduction of the technology in Western Siberia.

The introduction of ASP technology at the Salym group of fields is a unique experiment for Russia that turns a new page in the history of oil production. This method makes it possible to extract up to 30% of oil from the subsoil. I am certain that this technology will allow for the more sustainable development of dozens of deposits in Western Siberia. Moreover, it will help to make a significant contribution to the social and economic development of the region, generating additional payments to the budget, creating new jobs and boosting local business development.

Alexey Govzich
CEO of Salym Petroleum Development

1 The Bazhenov formation is a group of oil-source rock (strata) that has been identified over a territory of roughly a million square km in Western Siberia.
INNOVATIONS IN OIL REFINING AND SALES

RESULTS OF 2016

1. Development of oil refining catalyst technologies and production
   - A project to build an industrial platform at the Omsk Oil Refinery for a modern high-tech complex for the production of oil refining catalysts, including catalysts for hydrogenation processes and catalysts for catalytic cracking, entered the stage of practical implementation. Gazprom Neft began producing high-efficiency Avangard catalytic cracking catalysts in 2016.
   - Catalysts for a number of technological processes were developed jointly with leading Russian research centres that work with catalytic processes. The catalysts outperform the existing import analogues.

2. Establishment of solid acid alkylation technology
   Construction was completed on a pilot plant for solid acid alkylation at Elektrogorsk Institute of Petroleum Refining. 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.

3. Introduction of a highly effective catalyst for the butane-butylene fraction oligomerization process
   A pilot batch of the catalyst was successfully tested in the conditions of an industrial unit at the Moscow Oil Refinery and produced a qualitative oligomerizate (petrol component) corresponding to GOST standards. The cycle length of the catalyst was increased by 150% times and the yield of the oligomerizate by 3% (compared with analogues). Based on the pilot test results, the decision was made to introduce the new catalyst in the MTBE and oligomerizate production unit at the Moscow Oil Refinery.

4. Reactivation of spent hydrotreating catalysts
   An industrial batch of the diesel fuel deep hydrotreating catalyst, which was reactivated according to the technology developed at the Omsk Oil Refinery, demonstrated a high level of efficiency (at the level of a fresh catalyst) in the hydrotreating of class 5 diesel fuel (less than 10 ppm sulphur). The introduction of reactivation technology makes it possible to reduce costs for the purchase of fresh expensive hydrotreating catalysts for diesel fuel by 55%.

5. Deep hydroprocessing of vacuum gas oil
   As part of the comprehensive project ‘Establishment of technology to produce import-substituting catalysts for the deep hydroprocessing of vacuum gas oil’, the Company developed technology jointly with the Boreskov Catalysis Institute of Hydrocarbon Processing of the Siberian Branch of the Russian Academy of Sciences and the Institute of Petrochemical Synthesis of the Russian Academy of Sciences to produce catalysts for deep hydrotreating and hydrocracking of vacuum gas oil with maximum yield of high-quality light oil products and improved chemmotological and low-temperature properties.

6. Increase in intellectual property
   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 that help the Company to achieve its strategic goals. This includes applications for technologies for oligomerisation, solid acid alkylation, the hydrotreating of diesel fuel and vacuum gas oil, the reactivation of hydrotreating catalysts and the production of catalyst supports.
The Russian Ministry of Energy has assigned national project status to Gazprom Neft’s ‘Aluminium Oxide-Based Crude Deep Conversion Catalysts’ project. By 2020, the Company expects to launch the newest production of hydrogenation catalysts with capacity of 6,000 tonnes per year and catalytic cracking catalysts with annual capacity of 15,000 tonnes at the industrial site of the Omsk Oil Refinery. The combined production capacity will make it possible to fully meet the needs of the Russian oil refining industry for catalysts for catalytic cracking and hydrogenation processes.

Priorities in the oil refining segment include increasing refining debt, releasing new products and enhancing the eco-friendliness of the production process.

Completion of Russia’s first pilot project to establish the ‘Neftekontrol-GPN’ automated information system for the collection, processing and transmission of data to track the movement of oil and petroleum products through the entire production and supply chain – from production to refueling complexes. The project was implemented within the framework of the State Information System of the Russian Fuel and Energy Complex in coordination with the Ministry of Energy and the Ministry of Industry and Trade. The system is designed to obtain reliable data on the quantity, quality and losses of oil and petroleum products during the extraction, production, transportation, processing and storage stages. The solutions developed by Gazprom Neft are expected to be used in the formation of state information resources used to ensure energy security.

Gazprom Neft and the Skolkovo Foundation signed an agreement on the establishment of a Gazprom Neft R&D centre at the Skolkovo Innovation Centre. Investments in the project will exceed RUB 180 million prior to 2019. The Gazprom Neft R&D Centre will develop and introduce software to automate business processes in the oil and gas industry. Its research work will focus on creating innovative energy-saving and strategic computer technologies to improve the efficiency of key areas in oil company operations.