Focus areas

“From strategic goals to technological projects” is Gazprom Neft’s approach to innovation. The company develops and implements the technologies necessary to address challenges as it works towards its strategic goals.

Priority areas of technological development:

- Improving oil recovery factor at mature fields
- Multiphased fields development
- Production from low-permeability reservoirs
- Efficient and safe offshore development in ice conditions
- Effective catalysts and processes for refineries

For each focus area, the company is implementing projects to develop, test and deploy the necessary technologies.

Technological development is a core pillar of Gazprom Neft’s 2030 Strategy. Technological advancements will enable the company to efficiently deliver its large-scale upstream projects and consolidate leadership in strategic areas.

Main documents

Gazprom Neft’s intellectual property portfolio

<table>
<thead>
<tr>
<th>Year</th>
<th>Patents</th>
<th>Software</th>
<th>Patent applications</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td>2016</td>
<td>89</td>
<td>49</td>
<td>14</td>
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<td>2017</td>
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<tr>
<td>2020</td>
<td>346</td>
<td>171</td>
<td>80</td>
<td>597</td>
</tr>
</tbody>
</table>

Source: company data

Innovative Development Programme

The Board of Directors approved the updated Innovative Development Programme in 2020. The focus area list has been significantly expanded by adding digital transformation projects, including cognitive geology, production project management centres, the Asset of the Future programme, integrated planning and operations and reliability management at refining, logistics and sales enterprises.

These projects include both the implementation of digital tools for data-driven decision making, as well as digital twins and business process optimisation. The projects will improve decision quality and accelerate key business processes at the company, including exploration, major greenfield production project management and operations management.
The company expects that its digital transformation projects will significantly accelerate the exploration cycle, shorten the time to first oil, achieve incremental production and reduce equipment downtime as well as unit operating costs (UOC).

The company has also not lost sight of the original focus areas of the Innovative Development Programme: unconventional reserve development technologies, enhanced oil recovery, improving drilling and multistage fracturing technologies and developing and producing refining catalysts.

Investments under the Gazprom Neft Innovative Development Programme totalled more than ₽24 billion in 2020. The main cost items were cat-cracking, hydrotreatment and hydrocracking catalyst development and production launch, development of a suite of technologies to produce Bazhenov oil, and the implementation of digital-transformation activities.

Upstream Technology Strategy

The Upstream Technology Strategy covers all focus areas of the Upstream Division, including:
- exploration and resource expansion technologies;
- well drilling and completion technologies;
- enhanced oil recovery and well stimulation;
- development of unconventional reserves;
- development of oil rims;
- electronic asset development (EAD);
- development of carbonate and fractured reservoirs;
- long-term infrastructure development programme; and
- civil engineering technologies.

In 2020, the company completed 13 projects from the Technology Strategy portfolio, including implementing new methods to find overlooked intervals, conceptual engineering tools, developing technology to calculate the optimum fracture system for multistage fracturing in the Bazhenov Formation, developing reservoir management tools and optimising well design for the Priobskoye field. A rollout perimeter was defined for each completed project.

Expected incremental production from the technology projects completed in 2020 totals 200,000 tonnes of oil before 2025. Expected monetary value (EMV) of these projects exceeds ₽7 billion.

Downstream R&D strategy

R&D in oil refining follows a long-term R&D strategy. Currently, over 30 projects are being implemented across the following focus areas: increasing oil conversion rate (refining depth), improving operational efficiency, and new product development, including cat-cracking, hydrotreatment and hydrocracking catalysts.
## Innovative infrastructure

**Gazprom Neft has been developing an R&D cluster in St Petersburg since 2014 to make the company a technology leader and promote the innovative development of Russia’s “Northern Capital”**.

R&D centres for the key focus areas – from exploration and drilling to petroleum refining, logistics and digital operations and sales management – have been launched within the cluster.

### Structure of Gazprom Neft’s St Petersburg R&D cluster

<table>
<thead>
<tr>
<th>Digital Technologies in the Oil and Gas Industry</th>
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<tbody>
<tr>
<td>Gazpromneft Science &amp; Technology Centre</td>
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<tr>
<td>GeoNavigator Drilling Control Centre</td>
</tr>
<tr>
<td>Project Management Centre</td>
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</tbody>
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<table>
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<tr>
<th>Higher Efficiency and Stronger Environmental Performance</th>
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</thead>
<tbody>
<tr>
<td>Downstream Efficiency Control Centre</td>
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<tr>
<td>Downstream Production Control Centre</td>
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<tr>
<td>Digital Arctic competency centre</td>
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</table>

<table>
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<tr>
<th>Creating Infrastructure for the Digital Economy</th>
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<tbody>
<tr>
<td>Zifergauz digital transformation centre</td>
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<tr>
<td>Gazprom Neft’s IT cluster</td>
</tr>
<tr>
<td>Corporate IT park</td>
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<table>
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<tr>
<th>Developing an Industrial Innovation System</th>
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</thead>
<tbody>
<tr>
<td>Gazpromneft – Technology Partnerships industrial innovation centre</td>
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<tr>
<td>Artificial Intelligence in Industry science and education centre</td>
</tr>
<tr>
<td>St Petersburg Energy TechnoHub</td>
</tr>
<tr>
<td>Industrial innovations technology centre</td>
</tr>
<tr>
<td>P. L. Chebyshev Mathematical Laboratory</td>
</tr>
</tbody>
</table>
### Gazpromneft Science and Technology Centre

Gazpromneft Science and Technology Centre provides analytical, methodological and R&D support to the Upstream Division's key production and technical functions. The centre provides scientific substantiation for investment and managerial decision making upstream. The scope of the R&D centre includes:

- geological modelling;
- advanced well drilling support;
- expert review of projects;
- comprehensive solutions for field development and infrastructure;
- development and implementation of digital solutions;
- implementation of projects within our Technology Strategy;
- dissemination of knowledge and best practices in technological development.

The Gazpromneft Science and Technology Centre's new technology division took a new approach to technology project management in 2020. A project acceleration system and prioritising business challenges by technological potential were the key innovations of the year. This new approach allows technology projects and assets to be ranked by the potential economic value that would be created were the technology to be rolled out at company fields.

The total potential of the Technology Strategy portfolio is estimated at more than ₽500 billion. A condensed project implementation timeline and broader rollout perimeter translated to a more than 20% increase in the value of the upstream technology portfolio.

### Gazpromneft – Technology Partnerships

Gazpromneft – Technology Partnerships is a Gazprom Neft subsidiary and an operator of the Russian Ministry of Energy's industry project to develop the requisite technologies and high-tech equipment for the viable development of Bazhenov Formation reserves.

Gazpromneft – Technology Partnerships is Gazprom Neft’s knowledge hub and management centre for the company’s big bets on Unconventional Reserves, Paleozoic, chemical methods of enhanced oil recovery, and the Achimovsky Formation. The business is also responsible for managing the commercialisation of Gazprom Neft’s upstream technology products.

The Integrated Upstream Engineering Centre (a Gazpromneft – Technology Partnerships branch at the Skolkovo Institute of Science and Technology) provides R&D support for projects to develop unconventional hydrocarbon reserves, including the Bazhenov Formation, as well as Domanic and pre-Jurassic deposits.

Gazprom Neft is drawing on its technology partnership with the Khanty-Mansi Autonomous Okrug–Yugra administration and the V.I. Shpilman Research and Analytical Centre for the Rational Use of the Subsoil to develop its Core Research Centre in Khanty-Mansiysk, a modern venue to study core samples with hard-to-recover oil and develop the technologies needed to produce Bazhenov oil. Six of the nine planned laboratories operated at the centre at year-end 2020, with the remainder slated for opening in 2021.

In 2020, Gazpromneft – Technology Partnerships agreed to become an anchor tenant of the High Technology Park in the Khanty-Mansi Autonomous Okrug–Yugra. Teams tasked with identifying and creating technologies to develop the Bazhenov Formation will be based in this technology park.
IT cluster

Gazprom Neft’s own IT cluster is based at the subsidiaries Gazpromneft Digital Solutions (previously Information Technology Service Company (ITSC LLC)) and Gazpromneft Information-Technology Operator (previously Noyabrskneftegazsvyaz LLC). The cluster is tasked with developing data centre infrastructure, telecommunications systems, user services, software and mobile applications for company employees, customers and partners.

The IT cluster facilitates the development of a broad selection of digital products and services with a proven track record in actual business processes. This will be followed by a rollout or upgrade to meet the needs of a specific business or a general business area. The centre uses a product-based model, which unlocks rapid IT product development and launch in cross-functional developer teams and business units.

Today, Gazprom Neft’s IT cluster brings together 10,000 high-calibre IT and digital professionals and offers a broad selection of digital services and products with a proven track record in actual business processes.

Impacts of the IT function’s transformation:

- Impacts of the IT function’s transformation;
- accelerated business product development;
- streamlined internal procedures;
- faster product development and shorter development-to-production cycle;
- greater business impact from IT ownership;
- higher quality infrastructural services;
- integration of all infrastructural services under one specialised operator: as at year-end 2020, Gazpromneft IT Operator supports all workplaces;
- better utilisation of infrastructure and service personnel; and
- lower unit costs of infrastructural services.

Zifergauz

In 2020, the company opened Zifergauz, the centre for digital transformation, in St Petersburg. The new centre is a shared space for cross-functional teams working on industrial digital transformation projects and the strategic digital transformation office teams at company divisions. It is focused on seeking out solutions to improve traditional business processes and putting cutting-edge technologies to work to boost process performance. The centre focuses on digital solutions for finding and developing fields, remote drilling control, industrial automation, logistics robotics and managing Gazprom Neft’s Arctic fleet. It also features technology laboratories dedicated to AI, video analytics, robot and drone control, 3D printing, VR/AR, testing new services and developing industrial gadgets and telemetry sensors. Tsifergauz is also home to the headquarters of the Artificial Intelligence in Industry science and education centre, established by Gazprom Neft and leading St Petersburg higher education institutions (HEIs). The centre is the headquarters of the world-class Artificial Intelligence in Industry educational centre (St Petersburg).
Gazpromneft-Industrial Innovations

In 2020, the company decided to establish the Gaziommneft-Industrial Innovations technology centre, tasked to identify, evaluate, develop, implement and scale technologies improving the performance of petroleum refining and petrochemical production processes, as well as future technologies.

Technology-wise, the centre’s priorities include the following:
- petroleum refining and petrochemical processes;
- catalysts;
- specialty polymers;
- organic synthesis products; and
- biotechnology, new materials.

The functionality of the new structure covers the entire technological innovation management chain – from identifying business needs to deploying technologies in production processes. The centre will use in-house capabilities and a laboratory-testing complex in St Petersburg to develop and pilot technologies, engaging external partners for technology project implementation.

GeoNavigator Drilling Control Centre

Share of hard-to-recover reserves in Gazprom Neft’s portfolio is gradually increasing. These reserves can only be developed with advanced horizontal and multilateral wells, which GeoNavigator drills using remote control technologies. Every day, the centre supports the construction of about 900 advanced wells in Russia and abroad.

Project Management Centre

The Project Management Centre is a single digital and organisational space for preparing and implementing major oil and gas production projects pursued by Gazprom Neft in the Arctic, Siberia and Iraq.

The centre hones in on optimising project implementation plans using digital models. New technologies and management methods cut major project implementation time by 40%.

Downstream Efficiency Control Centre

This centre controls all stages of petroleum refining, logistics and product sales at Gazprom Neft, from the receipt of crude oil at refineries to final product sales to customers. Predictive analytics, internet of things and AI take business processes to completely new level of efficiency and safety.

The centre uses the digital Neftekontrol (oil control) system to continuously monitor petroleum product quantity and quality across the entire value chain, from refineries to refuelling complexes at airports and filling stations.
**Downstream Production Control Centre**

This is a project to create a digital control system for the Moscow Refinery and Omsk Refinery, to drive a transition from controlling individual refinery units to overseeing production chains. The next step is to create digital systems for automatic hourly planning, real-time process parameter tracking and predictive control of production deviations.

**Digital Arctic**

This centre manages Gazprom Neft’s tankers delivering crude from northern fields, including Prirazlomnaya, the only platform on the Russian Arctic shelf.

The Digital Arctic centre has created Kapitan, a unique digital system that optimises icebreaker and tanker movements, monitors crude shipments and inventories, tracks production parameters and changes in ice conditions to identify the optimum logistics solutions.

**Corporate IT park**

This park brings together leading providers of IT solutions for the oil and gas industry and other manufacturing industries. Gazprom Neft provides developers with its own equipment and computing capacity and invests in software products that show promise. The technology park model helped to launch and quickly develop over 50 projects.

**Artificial Intelligence in Industry**

The Artificial Intelligence in Industry centre was established by Gazprom Neft and the St Petersburg City Administration with participation of leading technical HEIs: St Petersburg State University, St Petersburg Polytechnic University, ITMO University, Saint Petersburg Electrotechnical University and Saint Petersburg State University of Aerospace Instrumentation.

The centre is a venue for collaborative work between industrial customers and leading HEIs researching AI, as well as its applied and theoretical problems in manufacturing industry. It will close the gap between science and business and boost the number of technology solutions taken through to implementation.

This format of collaboration gives a solid base for solving highly complex problems, forming new research teams working on methods and approaches, opening up communication between parties and developing existing teams in HEIs. The unique research expertise that the AI centre can tap into will help industrial customers to solve complex problems. The Artificial Intelligence in Industry association was founded in 2020 to support the centre in achieving its full operations potential.

The AI centre’s tasks also include helping HEIs to adapt their AI programmes to business needs and developing employee competencies of industrial customers.
St Petersburg Energy TechnoHub

The project’s mission is to attract the engineering and R&D branches of major industrial and energy players to the city and support local technology companies.

St Petersburg Energy TechnoHub is a project established by the Government of St Petersburg and Gazprom Neft and launched at the end of 2019.

A total of 130 tenants from 20 Russian regions as well as Belgium and Austria had taken up residence at the St Petersburg Energy TechnoHub as at year-end 2020. Up to 603 technology companies are expected to sign up to the project by 2030. This will help St Petersburg-based companies and research centres to secure a large share of research and engineering orders in the power industry, whose total annual value in Russia is currently estimated at R100 billion. The New Industry Investment Fund is a project partner (see below).

In St Petersburg, five HEIs set up Energy Clubs, which bring fresh graduates, as well as current undergraduate and postgraduate students, together into developer teams and start-ups in conventional and renewable energy.

P. L. Chebyshev Mathematical Laboratory

A joint project between St Petersburg State University and Gazprom Neft to promote research in pure mathematics. The lab creates mathematical algorithms for digital models of oilfields and cognitive software.

The company and the lab jointly run Mathematical Progression, an All-Russian project to support gifted young people that has awarded over 500 undergraduate and postgraduate student scholarships and grants so far.

Bitumens Research and Development Centre (St Petersburg)

This centre develops technologies to produce bitumen materials, significantly extending road surface life. The centre boasts a unique laboratory, which enables the full cycle of research not just on bitumen and its derivatives, but also on asphalt mixes. With its high level of expertise, the Bitumens Research and Development Centre acts as an independent laboratory in some regions under the Safe and High-Quality Roads national project.

Catalyst Technology Development Centre (Omsk)

In 2020, Gazprom Neft completed the construction of the Catalyst Technology Development Centre – the industry’s most advanced centre of its kind in Russia – as part of Gazprom Neft’s new catalyst production facility in Omsk. The centre does comparative testing of catalysts for industrial applications and boasts pilot units for catalyst synthesis and testing that are unparalleled in the world. Fully functional, smaller-scale models of commercial units reproduce the whole catalyst process, from production to use.
Partnerships

New Industry Investment Fund

Along with Gazprombank, RVC and VEB Ventures, the company is a founder of the New Industry Investment Fund (New Industry Ventures). The fund invests in companies developing new materials, technologies, products and services for the oil and gas industry. The fund’s priorities include developing technologies for the exploration, production, refining, processing, transportation, distribution and use of hydrocarbons; energy transmission and storage; and implementing innovative solutions in the construction of industrial infrastructure and managing major projects. Its investment focus also includes resource and energy saving technologies and digital products, including Industry 4.0 technologies. For example, early in 2021, the fund supported a project to develop an innovative construction visualisation and monitoring system, as well as a local company in the Khanty-Mansi Autonomous Okrug-Yugra developing an AI and big data-driven industrial safety and operational control video analytics system.

Also in 2020, the company founded a number of joint ventures to develop, pilot, scale and commercialise new technologies. For instance, the company closed a deal with Zarubezhneft to establish a joint venture in the Khanty-Mansi Autonomous Okrug-Yugra to develop and pilot hard-to-recover oil production technologies. Its asset portfolio includes the Salymsky-3 and Salymsky-5 licence blocks.

New Oil Production Technologies

New Oil Production Technologies, a joint venture between Gazprom Neft, LUKOIL and Tatneft, will develop the hard-to-recover reserves of the Savitsky and Zhuravlevsky license blocks in the Orenburg Oblast. The JV’s focus areas will include developing economically viable technologies for commercial use at the above blocks.

Digital Industrial Platform

The products created within the framework of the joint venture solve the problem of integrating big data of technological objects with key value chain management systems. An additional focus of the joint venture is the creation of solutions in the field of MES (manufacturing execution system), production process management systems, digital doubles, production activity planning systems based on a single object model of the chain.

The technological basis for the joint venture was the industrial platform of the Internet of Things plZIIoTnd digital serefining rvices foof the Zyfra, as well as Gazprom Neft’s own digital systems.

RA

Gazprom Neft and X-Holding established NEDRA (New Digital Resources for Assets), a joint venture based on the existing company Nexign. The JV implements projects in the interests of Gazprom Neft, develops marketable digital products for the industry that use state-of-the-art AI systems and advanced data processing algorithms to support managerial decision making, and integrates its products into an open E&P platform. Some of its promising projects include an investment decision support system for oil and gas fields, computer vision solutions to enhance industrial safety and a tool to integrate production asset processes.