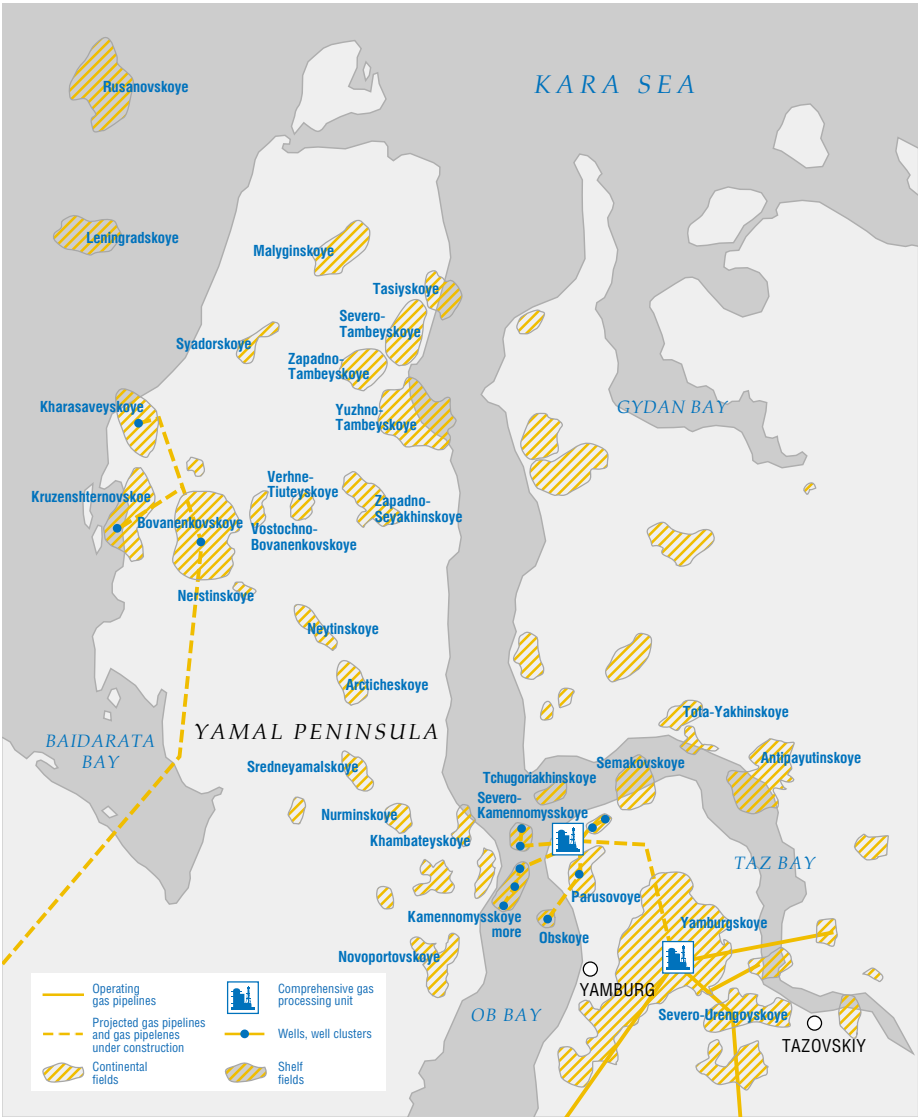

Bovanenkovskoye
Ukhta
YAMAL
MEGAPROJECT

The Yamal Peninsula is a strategic oil- and gas-bearing region of Russia. Commercial development of fields onshore and offshore Yamal is crucial for securing Russia's gas production build-up beyond 2010.



Field Pre-Development Scheme for the Ob & Taz Bays and the Yamal Peninsula

Reserves and Resources of Yamal

11 gas and 15 oil, gas and condensate fields with approximately 16 tcm of explored and preliminary estimated gas reserves (ABC1+C2) and nearly 22 tcm of in-place and forecast gas reserves (C3+D3) have been discovered on the Yamal Peninsula and in its adjacent offshore areas. Reserves of condensate (ABC1) are estimated at 230.7 mln t and those of oil – 291.8 mln t.

Gazprom Group holds the development licenses for the Bovanenkovskoye, Kharasaveyskoye, Novoportovskoye, Kruzenshternskoye, Severo-Tambeyskoye, Zapadno-Tambeyskoye, Tasiyskoye and Malyginskoye fields.

In terms of gas reserves (ABC1+C2) the Bovanenkovskoye field is the most significant one on the Yamal Peninsula (4.9 tcm). The initial gas reserves of the Kharasaveyskoye, Kruzenshternskoye and Yuzhno-Tambeyskoye fields amount to about 3.3 tcm.

Comprehensive Yamal Development Program

A draft Program for the Comprehensive Development of Fields on the Yamal Peninsula and in the Adjacent Offshore Areas was developed by Gazprom in collaboration with the Yamal-Nenets Autonomous Okrug (YaNAO) Administration in compliance with the assignment of the Russian Federation President and Government in 2002.

In the course of the Program consideration by ministries and agencies there occurred considerable changes in the conditions of the national energy sector development and operation, including the gas industry. This provoked the necessity to introduce amendments into the draft Program.

In 2007 Gazprom jointly with the YaNAO Administration amended the draft Program using the results of long-lasting studies with regard to the creation of a scientific framework for engineering, technological, environmental and technical solutions aimed at developing fields and constructing gas pipelines on the Yamal Peninsula.

The draft Program provides a detailed review of the Yamal feedstock base status and its development prospects, as well as technical and technological aspects of field development and hydrocarbon transportation and production, social infrastructure development, industrial and environmental safety reinforcement. The Program also contains the analysis of cost-effectiveness and the substantiation of state support measures during the Program implementation.

Yamal's onshore fields are subject to integrated development by means of creating three production zones – Bovanenkovo, Tambey and Southern:

- The Bovanenkovo production zone includes three basic fields: Bovanenkovskoye, Kharasaveyskoye and Kruzenshternskoye (the licenses are held by Gazprom Group). The total production is projected to reach up to 220 bcm of gas and up to 4 mln t of condensate per annum.
- The Tambey production zone involves six fields: Severo-Tambeyskoye, Zapadno-Tam-

Gas Production Forecast for the Yamal Peninsula and Adjacent Offshore Areas

(The development of promising areas offshore Yamal in the Kara Sea is projected to start after 2025)

Year	2011*	2015	2020	2025	2030
Gas production (bcm)	7.9	75–115	135–175	200–250	310–360

* Production startup on Yamal

beyskoye, Tasiyskoye, Malyginskoye (the licenses are held by Gazprom Group), Yuzhno-Tambeyskoye and Syadorskoye. The total production is projected to reach up to 65 bcm of gas and up to 2.8 mln t of condensate per annum.

- The Southern production zone involves nine fields: Novoportovskoye (the license is held by Gazprom Group), Nurminskoye, Malo-Yamalskoye, Rostovtsevskoye, Arkticheskoye, Sredne-Yamalskoye, Khambateyskoye, Neytinskoye, Kamennomysskoye (located onshore). The total production is projected to reach up to 30 bcm of gas and up to 7 mln t of oil per annum.

The Company is exploring the possibility of constructing an LNG plant on Yamal.

Thus, the maximum annual gas production on Yamal is comparable to the volume of Gazprom's current gas supplies to the domestic market and exceeds twofold the volume of gas exported to the countries beyond FSU.

New Gas Transportation System

In order to secure the conveyance of gas from Yamal, a unique, unparalleled in Russia, new-generation gas transportation system is planned to be created before 2030. Gas from Yamal will be transported via the 1,100 km long Yamal – Ukhta section (5-6 lines) and further along the following di-

Yamal Peninsula – a Region of Strategic Interest for Gazprom

Pre-Development of the Bovanenkovskoye field is progressing in full swing

rection: Ukhta – Gryazovets, Gryazovets – Torzhok, Gryazovets – Yaroslavl and Ukhta – Pochinki. The overall distance of Yamal gas transportation by the new pipelines will be in excess of 2,500 km.

To be a key element of the UGSS of Russia in the future, the new gas transmission system will convey over 300 bcmpa of gas from the Yamal Peninsula fields and include 27 modern compressor stations with the aggregate capacity of 8,600-11,600 MW. At the same time, the total length of linepipe will average 12,000-15,000 km. The creation of the gas transmission system from the Yamal Peninsula will contribute to a full-scale reconstruction of the existing Unified Gas Supply System of Russia.

Implementation of Top-Priority Projects

The Cenomanian-Aptian deposits of the Bovanenkovskoye field rank as a top-priority development project on Yamal. Projected gas production from the field is estimated at 115 bcmpa to be increased to 140 bcmpa in the long term. To deliver the produced gas to the UGSS, it is necessary to

Shift Personnel Housing at the Bovanenkovskoye field

construct the Bovanenkovo – Ukhta gas trunkline system.

In October 2006 the Gazprom Management Committee decided to initiate the investment stage of the Bovanenkovskoye field development and the gas transportation system construction. The first startup complexes rated at over 15 bcmpa for the Bovanenkovskoye field development and the Bovanenkovo – Ukhta gas trunkline system are to be commissioned in the 3rd quarter of 2011.

Between 2007 and 2008 the construction work progressed on paramount facilities of the Bovanenkovskoye field, including the fire protection, sanitation & epidemiology, environmental safety, life-support, production & transportation infrastructure, industrial bases.

In 2008, 29 facilities – primary construction targets – are planned to be brought onstream (road management and well overhaul bases, operational services, a power plant for internal needs, power lines etc.). Construction of a drilling base, a geoscientist station as well as of engineering support, operational drilling and gas treatment facilities has been initiated.

Moreover, the first three out of nine drilling rigs have been delivered to the Bovanenkovskoye field; the preparation for the launch of operational wells drilling in the current year is ongoing. The first drilling rig, that will start drilling wells in the field, was manufactured by the leading national machine-building enterprise URALMASH – Drilling Equipment and was named Yekaterina. This is the fifth-generation rig, the product of the best and most advanced ideas of the Russian engineers.

In 2008 Gazprom launched the construction of the Bovanenkovo – Ukhta gas trunkline system. The pipeline is being constructed with the use of 1,420 mm high-resistant flow-coated pipes made of K65 (X80) grade steel designed for the operating pressure of 11.8 MPa (120 Ata). The production of these pipes was launched at the Izhora Pipe Plant and the Vyksa Steel Works on the order of Gazprom.

«Yekaterina» Drilling Rig

Additionally, in 2008 nearly 40 km of 1,219 mm concrete coated pipes designed for the operating pressure of 11.8 MPa were laid during the summer navigation season at the most complicated system section – the submerged crossing via the Baidarata Bay.

The Baidarata Bay is specific for its unique environmental conditions: despite an insignificant depth there are frequent spells of stormy weather, complex sea-floor sediments and frost penetration reaching the bottom in the winter. These conditions do not permit working activities in the Bay except for several months a year.

The practice of laying a pipeline with such technical parameters and in such complex environmental conditions is the first of its kind not only in Russia, but also worldwide.

Pipe laying is performed by a state-of-the-art pipe-laying vessel, MRTS Defender, designed for offshore

gas pipeline construction and specifically upgraded for operation in the Baidarata Bay.

Application of New Technologies and Utilization of Advanced Experience

During the development of the Yamal Peninsula fields infrastructure and the creation a new gas transportation system, it is planned to apply the domestically-developed advanced experience and a number of novel technologies and technological solutions, of which the most significant ones are:

- utilization of integrated production infrastructure for gas extraction from the Cenomanian-Aptian deposits;
- application of heat-insulated pipes for wells construction and operation with a view to preventing the permafrost rocks thawing;
- reduction in the number of monitoring wells through combined monitoring over development of various deposits in a well;
- • the first instance of applying high-resistant 1,420mm pipes of K65 (X80) steel and with smooth interior coating designed for 11.8 MPa (120 Ata) of working pressure, as well as new welding technologies and materials;
- application of brand new energy saving equipment with an efficiency coefficient equal to 36-40 per cent.

For over 30 years of operation in the Arctic Gazprom Group has managed to gain valuable experience and to develop, in the harsh environmental conditions, gas production and transportation technologies that will be used for the Yamal field development.

The Russian technologies and experience can be successfully applied for the implementation of various projects in countries with a sub-arctic climate, specifically, in Alaska and North America.

«Defender» Pipe-Laying Vessel in Operation in the Baidarata Bay

Transportation Infrastructure

Transportation infrastructure is quite poorly developed on the Yamal Peninsula. Large-scale development of the region is impossible without a relevant build-up of the aviation and railway communication. By now, a significant volume of cargo is delivered to the Yamal by sea during the summer navigation season through the Kharasavey port.

To ensure year-round passenger transportation to the Yamal Peninsula the new 525 km Obskaya – Bovanenkovo railroad line is under construction. Separate sections of the railroad have already been put into operation. Construction of the linear part, bridges, distribution lines and communication facilities is in progress. Today, over 260 km of rail from the Obskaya station to the Khralov crossing point and 25 km of rail from the Khralov crossing point to the Yuribey crossing have already been laid, with 15 station sidings and 37 bridge crossings completed; a bridge crossing over the Yuribey River floodplain is nearing completion.

The crossing is unparalleled in the world's bridge construction practice both in terms of design and due to the climatic and permafrost conditions of construction and operation. In particular, the crossing is being constructed without the traditional deposition of soil, which enables to preserve the river floodplain ecosystem. 20-40 m deep wells were drilled to secure the reliability of crossing arms under the permafrost conditions.

The Obskaya – Bovanenkovo railroad thoroughfare is to be opened by late 2009. Full delivery of materials and equipment for the Bovanenkovskoye field development is scheduled for 2010.

In addition, the Bovanenkovo airport will be constructed by 2012 according to the Bovanenkovskoye field development project.

Bridge Construction across the Yuribey River

Environmental Care

The Yamal field development provides for the entire set of activities aimed at protecting the environment, preventing and minimizing a potential impact on the ecosystem during construction and operation works. In particular, these activities include:

- sustained environmental monitoring during field pre-development and operation periods;
- planning of technological and special-purpose activities mitigating negative impacts on the surface air;
- utilization of water recycling systems that prevent from polluting surface reservoirs and soils;
- application of special technologies reducing thermal and mechanical impacts on frozen ground;
- elaboration of environmentally-friendly regimes of the area development;
- utilization of technical solutions enabling to decrease land withdrawal areas with their technical and biological reclamation;
- prohibition of construction and installation activities during the bird nesting season in spring;
- water intake through fish protection systems;
- arrangement for an unobstructed migration of reindeer herds through communication lines.

Social Responsibility

One of the underlying principles of the commercial development of Yamal is maintaining a reasonable balance between the industrial development and a solicitous attitude towards the traditional lifestyle of the indigenous minorities.

One of the 37 Bridge Crossings at the Obskaya – Bovanenkovo Railroad

Such an approach helps to retain conventional activities of the natives (reindeer herding, fishing and hunting), trading of conventional industry products under long-term agreements with subsurface users effectuating their activities on the Yamal Peninsula, as well as provide the natives with indemnity to compensate for business activities of subsurface users.

Pursuant to the draft Program for the Comprehensive Development of Fields on the Yamal Peninsula and in the Adjacent Offshore Areas, Gazprom's major goals in the social area are as follows:

- protection of traditional areas of business activities, archaeological and cultural sites of the indigenous population;
- utilization of advanced pre-development and operation technologies for oil and gas fields allowing to minimize environmental risks and damage to the business activities of tundra population leading a roving life;
- reclamation of lands disturbed during oil and gas exploration in the 1980s so as to increase forage acreage for reindeer herding;
- construction of venison and fish processing complexes to supply shift personnel with high quality products and employment of the native population at such complexes;
- ensuring efficient interaction of subsurface users performing their business activities in YaNAO and reindeer herders of the Yamal Peninsula.

In line with the draft Program, compensations allocated by Gazprom and its subsidiaries to the YaNAO municipal entities may reach RUB 7.5 bln. In particular, these funds will be used to construct housing facilities, kindergartens, a school,

Yamal

a boarding school, a hospital, boiler rooms, power stations, heat and power supply grids, a water supply system, venison and fish processing complexes as well as for grasslands reclamation purposes.

There is no Alternative to Yamal!

Sustainable development of the Russian economy and welfare of the country are infeasible without large-scale development of abundant natural resources. Implementation of the rates and parameters for natural gas production build-up set forth in the Russia's Energy Strategy until 2030 is closely linked with the development of a new gas production region – the Yamal Peninsula.

Being most explored and ready for development, Yamal is located near the existing gas transportation infrastructure, has significant reserves and favorable production opportunities. It is impossible anywhere in Russia to create such an oil and gas production complex within two decades only. This is the reason why the development of Yamal will play a pivotal role in the national gas industry development in the 21st century.

Reindeer Races

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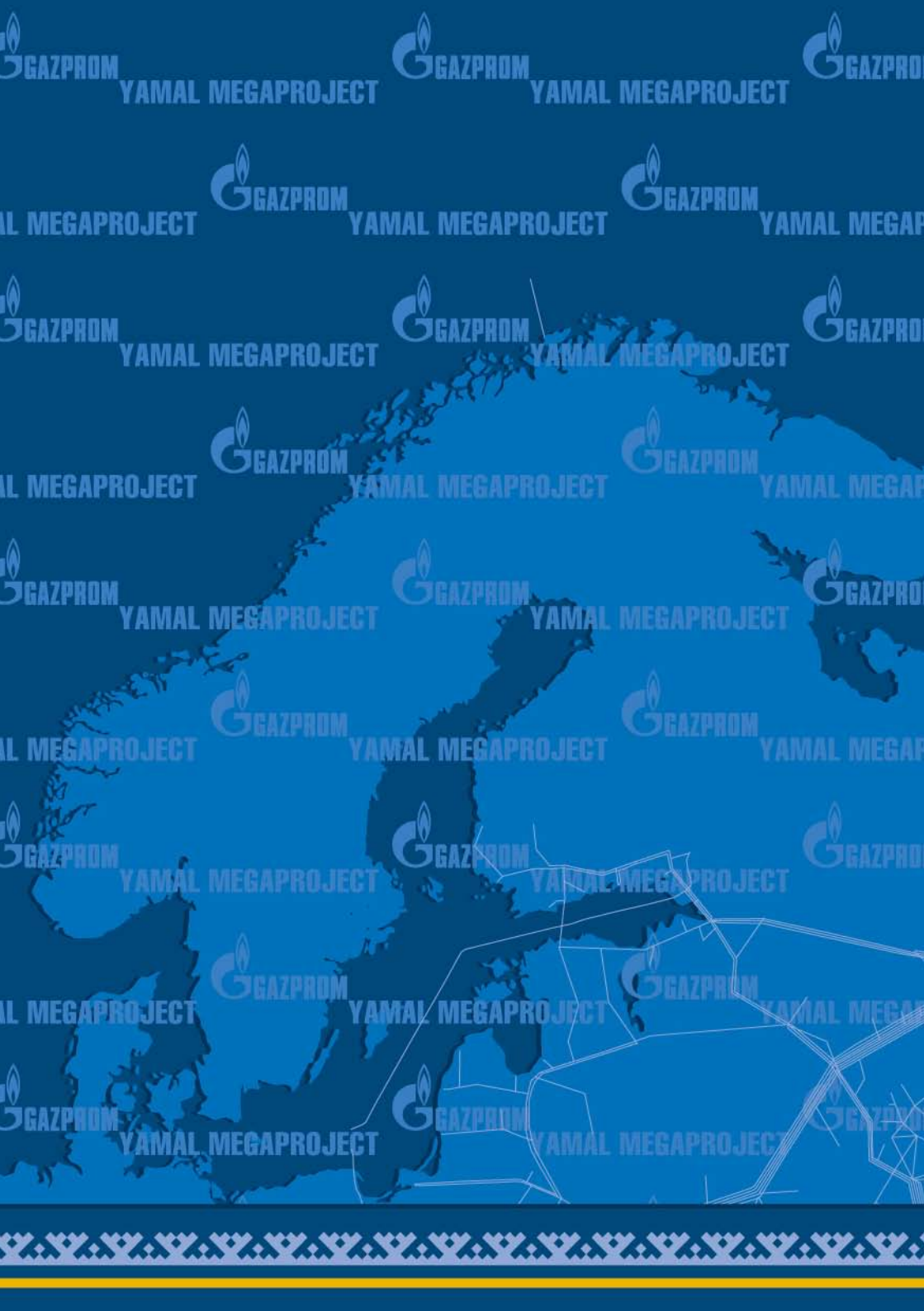
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