PRINCIPAL APPROACHES TO DEVELOPING OAO GAZPROM LONG-TERM PROGRAM FOR HYDROCARBON FIELDS DEVELOPMENT OFFSHORE THE RUSSIAN FEDERATION

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Background

The basic assumptions for the Program development are as follows:

- national economy demand for additional gas sources;
- high hydrocarbon resource potential in offshore areas;
- technical accessibility of resources;
- capacity of the adjoining onshore gas trunklines;
- economic efficiency of investments in offshore fields development.

The national economy demand for gas production is formed by domestic demand and demand for gas export which are substantiated in the draft General Scheme for Gas Industry Development to 2030.

The domestic demand is determined by demands of various industries and population.

As for gas export, gas is to be exported within and beyond the former Soviet Union.

These demands are to be satisfied by gas production in the Russian Federation and gas supplies from Central Asia accounting for about 7% of the total gas demand.

In the long run, domestic gas production is determined by production from the existing fields and putting into operation of not only new fields but also new regions which include offshore areas in Arctic and Far Eastern seas of the Russian Federation.

The dynamics of bringing new fields onstream is characterized by naturally determined decline of producing fields and increased gas demand in the domestic economy.

The volume of gas production in the Nadym-Pur-Taz region (currently producing about 90% of OAO Gazprom's gas) is forecast to decrease more than twofold by 2030. The decline is to be offset by bringing new regions into operation.

The key onshore region destined to produce additional gas is the Yamal Peninsula accounting for 39% of gas from the new fields to be brought into operation by 2030.

At the same time, 46% of gas from new fields is produced in offshore areas, 37% in the Arctic seas and 9% in the Sea of Okhotsk.

Generally, as a result of the planned intense development of offshore gas production, by 2030 some 32% of the total amount of gas will be produced by OAO Gazprom from the Russian Federation continental shelf.

The resource potential of offshore areas is primarily determined by evaluation of the total hydrocarbons initially in place (Figure 1) and by the status of their development.

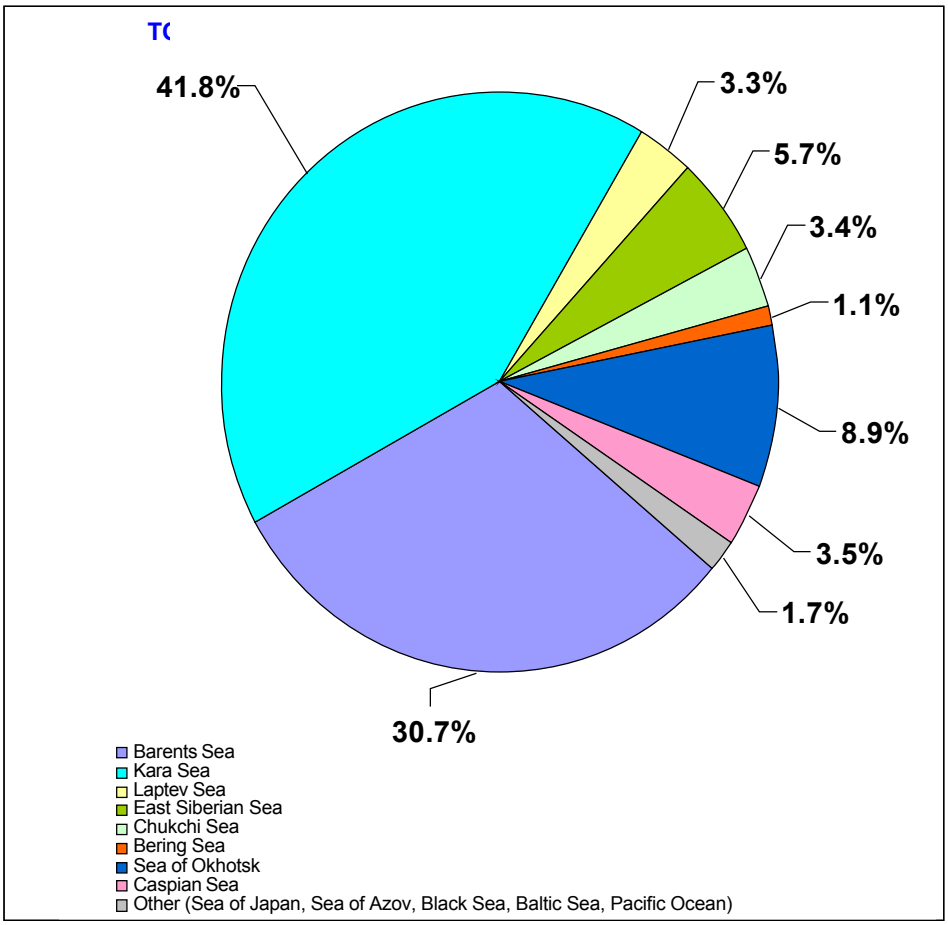

Figure 1. Offshore resource potential of the Russian Federation

At present, OAO Gazprom is focused on the most promising offshore areas in the Sea of Okhotsk, Barents and Kara Seas, accounting for 80% of the total hydrocarbons initially in place on the Russian Federation continental shelf.

The key areas of OAO Gazprom activities on the Russian Federation Arctic shelf are shown in Figure 2.

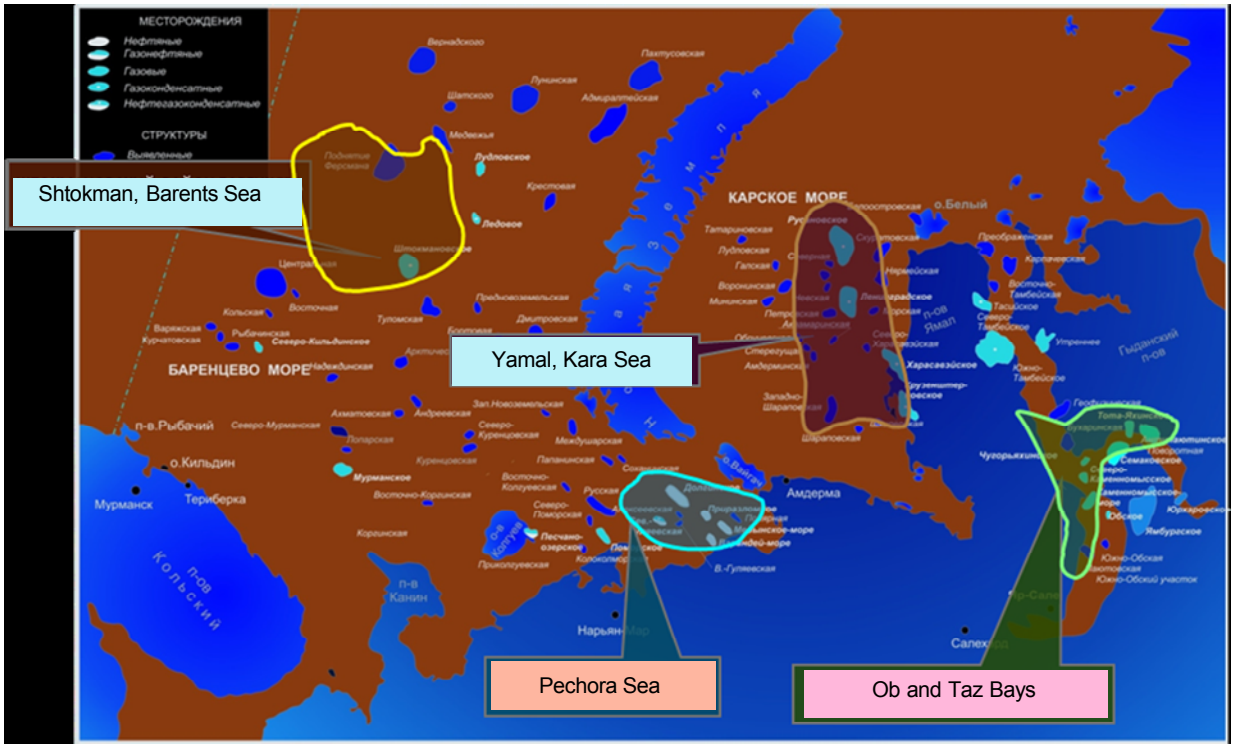

Figure 2. Areas of OAO Gazprom's activities on the Russian Federation Arctic shelf

These offshore resources are rather poorly explored – proven reserves amount to some 12%. With that, a high resource potential of every mentioned offshore area is proven by discovery of the fields (Figure 3) which are unique in terms of resources. These are, first and foremost, the Shtokman field in the Barents Sea, the Rusanovskoye and Leningradskoye fields in the Kara Sea, the Lunskoye field in the Sea of Okhotsk. In total, 11 fields were discovered in the Barents Sea (including the Pechora Sea), the same number of fields were discovered in the Kara Sea (including the Ob and Taz Bays), 8 fields were discovered in the Sea of Okhotsk.

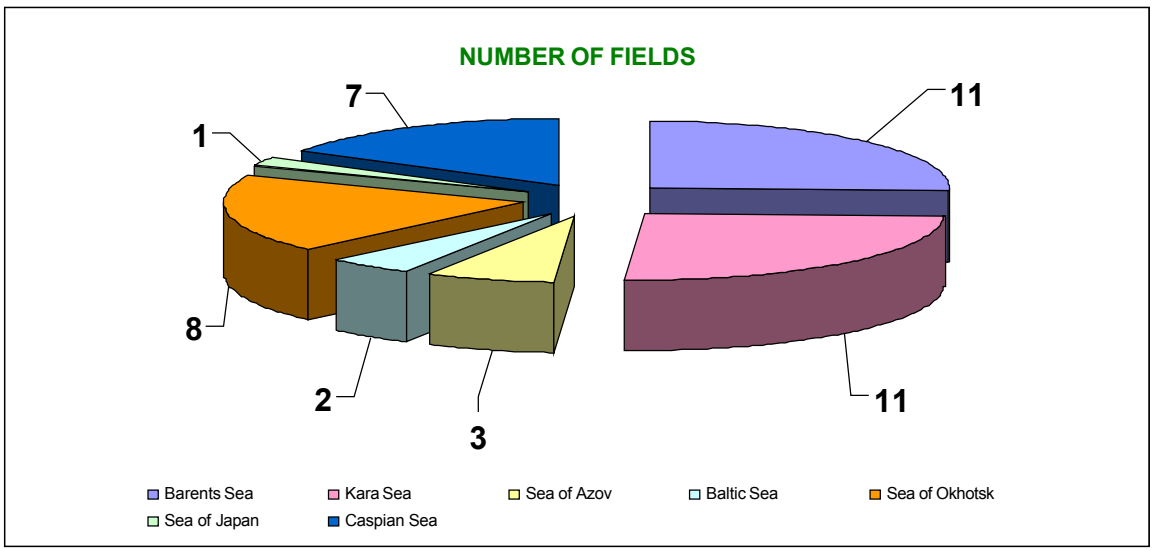

Figure 3. Fields discovered in the Russian Federation seas

Moreover, one should bear in mind that the geological exploration work efficiency is constantly rising due to identification and exploration of the largest fields until the total hydrocarbons initially in place are about 25% explored. Thus, one may rightfully count on discovery of a number of other large fields in these offshore areas.

Technical accessibility of discovered and prospected offshore areas is becoming a matter of high priority in the Arctic and Far Eastern seas. All the considered offshore areas are situated in extreme environmental and climatic conditions and, above all, difficult ice conditions. The influence of ice conditions is determined by the thickness of ice floes and the duration of the ice period. Besides, technical accessibility of offshore resources also depends on the sea depth and the distance from shore.

The world experience in development of fields in ice-covered offshore areas is currently limited to construction of ice-resistant platforms in shallow waters. Its application on the Russian shelf is constrained to development of fields in the Ob and Taz Bays and relatively shallow fields in the Pechora Sea as well as shallow fields offshore Sakhalin. For the fields in the Barents and Kara Seas and in the considerable part of the Sea of Okhotsk such experience is almost inapplicable, therefore radically new technologies are required for these areas.

For the Shtokman field and its satellites, Ledovoye and Ludlovskoye fields, situated at the sea depths of 200 to 300 m at the distance of over 500 km from the shore, the issue of field infrastructure development may be solved by a combination of underwater production complexes and floating production platforms preparing products for transportation over considerable distances. The ice conditions in this region enable the use of floating facilities, but that leads to additional complications associated with a high number of icebergs. The solution to this issue is anticipated as a system design providing for possibility of emergency release and departure of production vessels. Another matter of concern is the issue of personnel transportation to the field. At present, there are almost no helicopters capable to fly to the field and back unrefueled. A way out of this situation may be either construction of a dedicated platform with a heli-deck somewhere en route from the shore to the field, or deployment of an air transport base on Novaya Zemlya.

The Shtokman field infrastructure layout is shown in Figure 4.

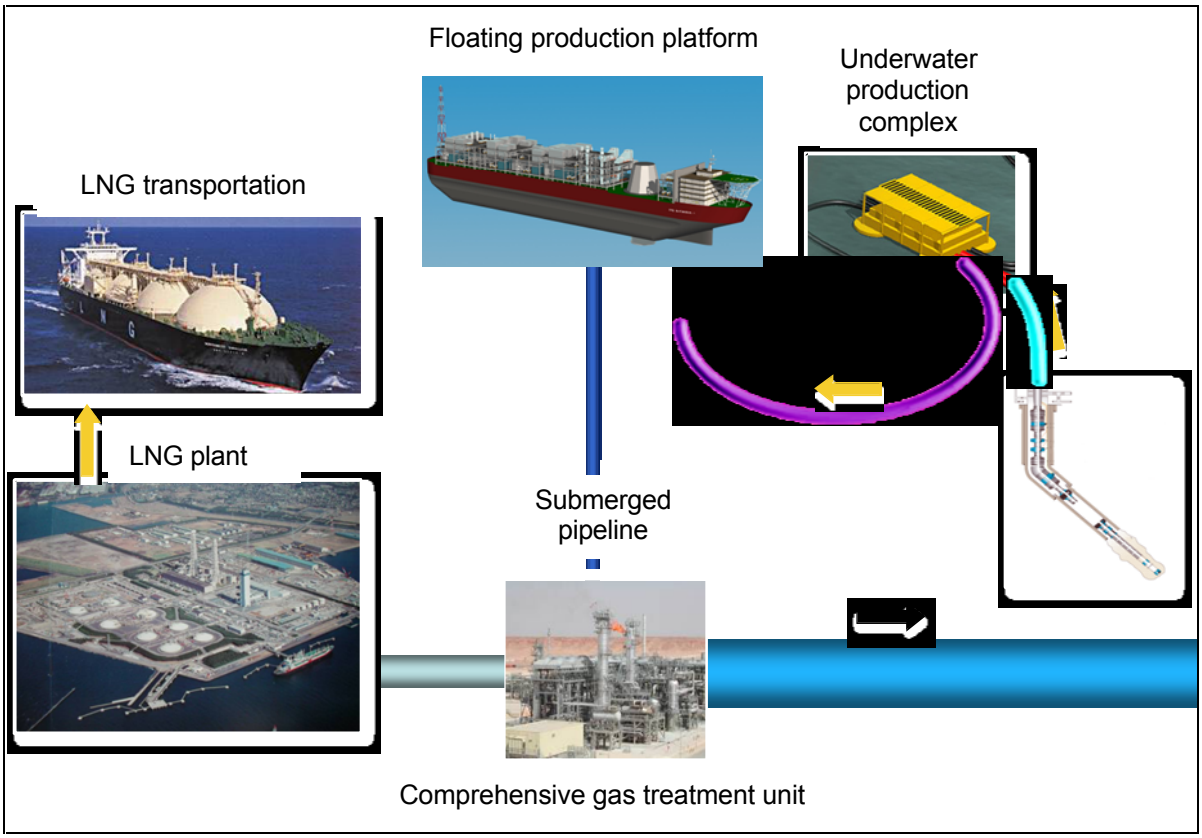

Figure 4. Shtokman field infrastructure layout

The planning of the Rusanovskoye and Leningradskoye fields development in the Kara Sea is rather challenging. The fields are situated at the sea depths of 60 to 100 m with very difficult ice conditions. These conditions almost preclude the use of stationary ice-resistant platforms. This issue may be solved by deployment of underwater field development systems. However, a short ice-free period limits the possibilities for servicing of underwater production complexes. Besides, additional issues with production drilling arise in these conditions. The fields under consideration have complicated multilayer structures that require drilling dozens of wells for their development. Only one well per season may be drilled in the offshore area due to the ice-free period duration. As a result, the development of fields may require a numerous fleet of mobile drilling rigs designed for arctic conditions. At present, there are just a few drilling rigs of this type. Upon confirmation of the underlying prospective complex productivity, the drilling process will become ever more difficult.

A solution to this issue may be associated with creation of underwater vessels for servicing of underwater complexes and drilling of production wells (Figure 5).

The solution to this complicated issue requires fundamentally new approaches unprecedented in the world practice. National shipbuilders may provide quite a lot of help: they have extensive know-how in building of different types of submarines. In assessing these approaches, one should bear in mind the necessity of long-term R&D prior to construction of underwater facilities and equipment as well as the need for significant investments.

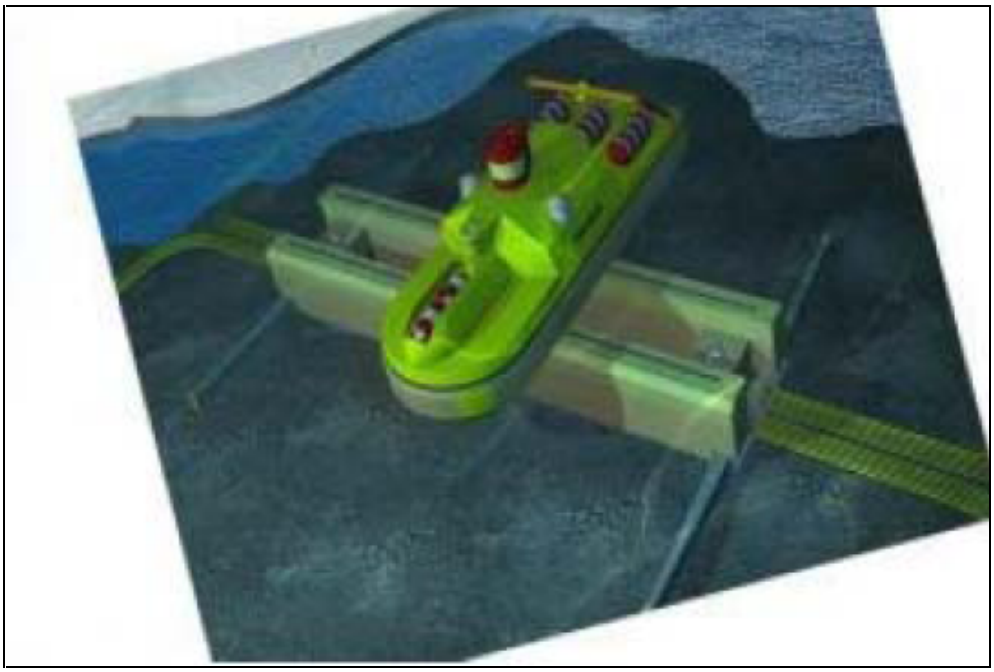

Figure 5. Underwater drilling vessel concept

As a result, field development plans may be compiled for this region only at the final stage of the Program.

Meanwhile, in the Kara Sea region there are offshore extensions of the Kruzenshternskoye and Kharasaveyskoye fields, which may well be developed from the shore or from man-made islands. Besides, in shallow sea depths, where ice-resistant platforms may operate, there is a number of highly promising structures, such as Nyarmeyskaya and Skuratovskaya. In case their productivity is confirmed, they may become the first objects to be developed at earlier stages.

The economic efficiency of investments is evaluated on the basis of the overall impact of environmental, climatic, geological, engineering, technological and economic conditions of offshore fields development. The impact of these conditions is rather diverse and variable.

The environmental and climatic conditions determine the type and dimensions of waterworks, thus notably affecting the cost of field infrastructure development.

The geological properties of fields mainly characterize dimensions of the field and complexity of its geological structure. They directly determine the required number of wells, their depths and productivity. Economically, these properties determine gross receipts, drilling costs and have a corresponding impact on the required number of waterworks and their dimensions.

The economic conditions of fields development are characterized by product costs, transportation costs, the system of taxes and levies as well as operating and capital expenses. Since the economic conditions practically synthesize the overall impact of all the previously mentioned conditions, let's consider them in more detail.

Gas prices. According to the approved directives for the gas industry, in the short term it is planned to switch to the netback gas price principle. In this case gas prices in the domestic

market will be based on the foreign market prices less the cost of gas transportation to the foreign market and export duties, and all gas sales will be tied to the foreign market prices.

Naturally, the world gas market price depends on market conditions. Currently, it tends to be quite unfavorable for the Russian gas. Proactive LNG supplies to the European market from Qatar which possesses the world's third largest gas resources (by proven reserves it is behind Russia and Iran only) and shale gas development in the USA considerably undermine sales opportunities for the expensive Russian gas. Construction of the Nabucco gas pipeline may be another negative factor. However, a positive impact may be given to the Russian gas in the European market before long due to reduction of the indigenous gas production in Europe and gas demand growth. In general, the situation is rather uncertain and this greatly affects gas price forecasts. According to the Russian Ministry of Economic Development, gas prices are forecast to reach USD 475 to 726 per 1,000 m^3 by 2030.

The world oil market is also susceptible to various factors, both political and economic. An explosive situation in several oil producing regions may be mentioned among political factors above all. Once this extremely complicated situation is settled, the world market may be flooded with additional oil flows. This will surely have an impact on oil prices. Canadian bituminous shales and extra heavy crude from the Venezuelan Orinoco River basin may play the same role in the oil industry as shale gas in the gas industry.

The issues of product transportation are of great importance in offshore fields development.

On the one hand, the distance from the shore considerably determines the cost of transportation systems construction during gas fields development and natural gas sales. In the offshore areas the cost of gas trunklines is almost directly proportional to the distance. Besides, the distance of gas delivery considerably determines the required number of compressor stations, their capacities and commissioning schedules.

On the other hand, for the offshore gas fields the transportation issues often determine the optimal timeframes for bringing into development. Thus, it is practical to use the released transportation capacities on the adjoining land to increase offshore fields development efficiency.

This very approach allows to select the timeframes for development of fields offshore Yamal and those in the Ob and Taz Bays which are linked to the production decline in the Bovanenkovskoye and Yamburgskoye fields accordingly.

One of the crucial issues associated with economic evaluation of offshore oil and gas fields is consideration of taxes and levies. In this respect, there are certain peculiarities in taxation of offshore operations. Thus, the operations performed directly on the Russian Federation continental shelf (for instance, construction of wells) are exempt from VAT since the region is not a territory of the Russian Federation. Article 67 Section 1 of the Russian Federation Constitution states that the territory of the Russian Federation includes territories of its constituents, inland waters territorial waters and airspace above them.

Besides, under increased capital intensity of offshore fields development, the issues of taxation may lever up their operation efficiency.

Conclusions

A number of proposals on the tax burden reduction are being currently considered, including abatement of the severance tax, reduction of the export duties, state financing of the geological exploration, accelerated amortization of the fixed assets and some other measures.

In general, the proposed approaches account for geological, technological and economic aspects of offshore operations development, thus providing a means of creating an unbiased long-term program for oil and gas resources development on the Russian Federation continental shelf.