

Russian Arctic Seas Petroleum Potential and Development Prospects*

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Abstract

Arctic offshore exploration has contributed to considerable oil and gas reserves though it requires a small scope of drilling due to the availability of large promising targets. Subsequent development of offshore fields will make up for the expected drop in oil and gas production in Russia and meet the needs of domestic and foreign markets. The assessment of the hydrocarbon potential and analysis of the current state of the development of the Russian Arctic seas, perspectives of Gazprom Neft concerning the Russian Arctic shelf, as well as of the legal conditions of the offshore subsurface use are given.

Discussion

Today, one of Gazprom Neft's top-priority objectives is the development of the offshore Arctic resources (Yakovlev, 2013).

The Arctic shelf account for 87% of Russia's total offshore initial petroleum resources comprising four large petroleum provinces (offshore extensions of the Timan-Pechora and the West Siberian petroleum provinces and the proper offshore Barents-Kara and East Arctic provinces) as well as a number of independent potentially productive petroleum regions ([Figure 1](#)).

Russia's best studied West Arctic Seas are known to have a great volume of predicted petroleum resources (though with a small number of completed exploratory wells), a high proportion of large fields, and an unprecedentedly high efficiency of deep drilling. The latter results from successful seismic study of large prospects located in regions apparently rich in petroleum.

According to the official estimation made by the All-Russian Research Geological Oil Institute (VNIGNI) as of January 1, 2009 (Popov et al., 2012), the structure of the Russian Arctic seas' total initial petroleum resources is as follows: oil 11%, associated gas 1%, free gas 84%, and gas condensate 4%. The share of predicted petroleum resources in the total initial petroleum resources is estimated at 83%. More than a half of those resources are concentrated under the Kara Sea bed (Suprunenko et al., 2012).

In the recent ten years, a number of changes have taken place in the degree of knowledge and development of the Russian offshore Arctic areas. The most noticeable of them are the following:

1. The disputed zone in the Barents Sea (the so called "gray zone") has been divided between Russia and Norway into two areas virtually equal in area.
2. A number of prospecting and exploratory wells have been drilled in the Barents and the Pechora Seas and in the Ob Guba and the Taz Guba bays of the Kara Sea.
3. Geophysical explorations have been performed including geotraverses by Sevmorgeo and numerous areal seismic surveys.
4. In 2012-2013, Rosneft and Gazprom obtained licenses for a significant part of the offshore Arctic areas.

All these events have had a major effect on evaluation of the Arctic resources.

The range of opinions on petroleum potential of the poorly studied Arctic seas is very wide. In addition to the official estimation by Russian authorities, there is a number of alternative resource estimations, in particular performed by a group of experts from Russia's leading research institutes under the auspices of the Trofimuk Institute of Petroleum Geology and Geophysics (INGG) (Kontorovich et al., 2010) and by the U.S. Geological Survey (USGS) (Gautier and Klett, 2010). As a whole, the INGG' estimation is considerably higher than the official one and the USGS's estimation is lower ([Figure 2](#)). It is worth mentioning that the latter lacks rationale: for instance, in the Pechora Sea, where petroleum reserves alone exceed 400 million tonnes, the U.S. experts counted only 200 million tonnes of oil. As to the Eastern Arctic seas, according to the USGS's estimation resources of that area do not cross the limits of analytical error. In its turn, the INGG's estimation is characterized mainly by both much larger gross petroleum resources and the share of the liquid phase. This is most visible in the case of the Barents Sea.

Comparing the three resource estimations mentioned above one can note they differ substantially for the majority of the offshore areas both in the volume of petroleum and the balance between its liquid and gaseous phase. The closest numbers in all three estimations refer to petroleum potential of the Kara Sea especially if the official estimation of resources and reserves in the bays is not taken into account. Apparently, this is because the West Siberian sedimentary basin is studied best of all and its onshore parts have recognized benchmark reservoirs whose properties can be applied to estimate the offshore areas too. Essentially, resource estimations performed by different experts cause many controversial issues and are not detailed enough to suggest promising exploration areas for oil companies which they need most of all.

Today, in Gazpromneft Science & Technology Centre the work is under way, using sedimentation and basin modeling techniques, to define resource potential of the offshore Arctic areas. The studies are completed for the Pechora Sea and the Kara Sea; in time results will be obtained for various parts of the East Arctic seas. This information will be used to elaborate long-term development plans and define the most promising exploration areas on the Arctic shelf.

Petroleum accumulations on the Russian Arctic shelf are not explored well enough yet. 2D seismic surveys are performed in all of the Arctic seas but their density varies greatly from 0.02 km/sq.km in the East Siberian Sea to 0.8 km/sq.km in the Pechora Sea making the average of

0.13 km/sq.km. In the Arctic waters, a total of about 600 local structures are identified and prepared for exploratory drilling. Altogether, there are 86 wells drilled in the region as of today out of which 29 are located in the Kara Sea bays.

In the Barents Sea, the Pechora Sea, and the Kara Sea 27 commercial discoveries are made out of which twelve are located in the Kara Sea bays or confined to offshore extensions of onshore structures. In terms of reserves and number, gas and gas condensate fields prevail. Discoveries made on the Pechora shelf of the Barents Sea include oil, oil-gas-condensate, and gas-condensate fields; the Barents Sea has mainly gas and gas-condensate fields; in the Kara Sea two unique gas-condensate fields have been discovered; in the Kara Sea bays there is a number of gas, gas-condensate, and oil-gas condensate fields.

Licensing of offshore blocks in Russia is currently somewhat restricted. In particular, in accordance with the amendment to the Federal Law *On the Continental Shelf of the Russian Federation* adopted July 18, 2008 "offshore blocks are granted for exploration and production without any tenders or auctions". At the same time, amendments have been made to the Russian Federation Law *On the Subsoil* providing that licenses for Russia's strategic offshore blocks can only be held by corporations with not less than five years of experience in development of offshore blocks in the Russian waters and the Russian government's stake in the authorized capital more than fifty per cent.

Among the oil companies with a substantial stake of the Russian government in their authorized capitals, the highest interest to offshore Arctic projects is expressed by Gazprom and Rosneft. These two companies hold licenses for 54 blocks on the Russian Arctic shelf.

Gazprom Neft develops two assets in the Pechora Sea. As of today, the company is the operator on Prirazlomnoye Field (license belongs to Gazprom), which produced its first oil in 2013. Besides, Gazprom Neft has a license to explore and develop Dolginskoye oil field wherein 2014 is planned to drill an exploratory well (Yakovlev, 2013).

Our company also has experience in exploring offshore blocks in other countries: Equatorial Guinea and Cuba. In particular, in 2012 a deep water well was drilled in the Cuban exclusive economic zone in cooperation with Petronas (Malaysia).

It should also be noted that development of offshore Arctic areas is a difficult and costly process. For companies without sufficient offshore experience it would be reasonable to invite, on a parity basis, more skilled partners (including foreign companies) to perform explorations and build production facilities and infrastructure.

Moreover, it should be clearly understood that developing and producing petroleum accumulations in the Arctic, far from the shore, would require technologies that just do not exist in the world today. These technologies cannot be compared with those currently applied at the Snøhvit Field in Norway that is sometimes seen as a prototype for the development of the Shtokman gas condensate field in the Barents Sea. In this context, cooperation with foreign partners should come in line with domestic R&D efforts.

Conclusions

1. The Russian Arctic shelf has a high petroleum potential which is, however, is not studied well enough at the moment.

2. Due to the active issuance of licenses for Russian Arctic offshore blocks in 2012-2013, the volume of explorations in the region is expected to grow up drastically.
3. To assess petroleum potential of the Russian Arctic seas, the Gazprom Neft Science & Technology Centre performs regional geologic studies based on sedimentation and basin modeling.
4. To develop and produce offshore petroleum accumulations in the Arctic, both proven and advanced technologies and solutions are required.

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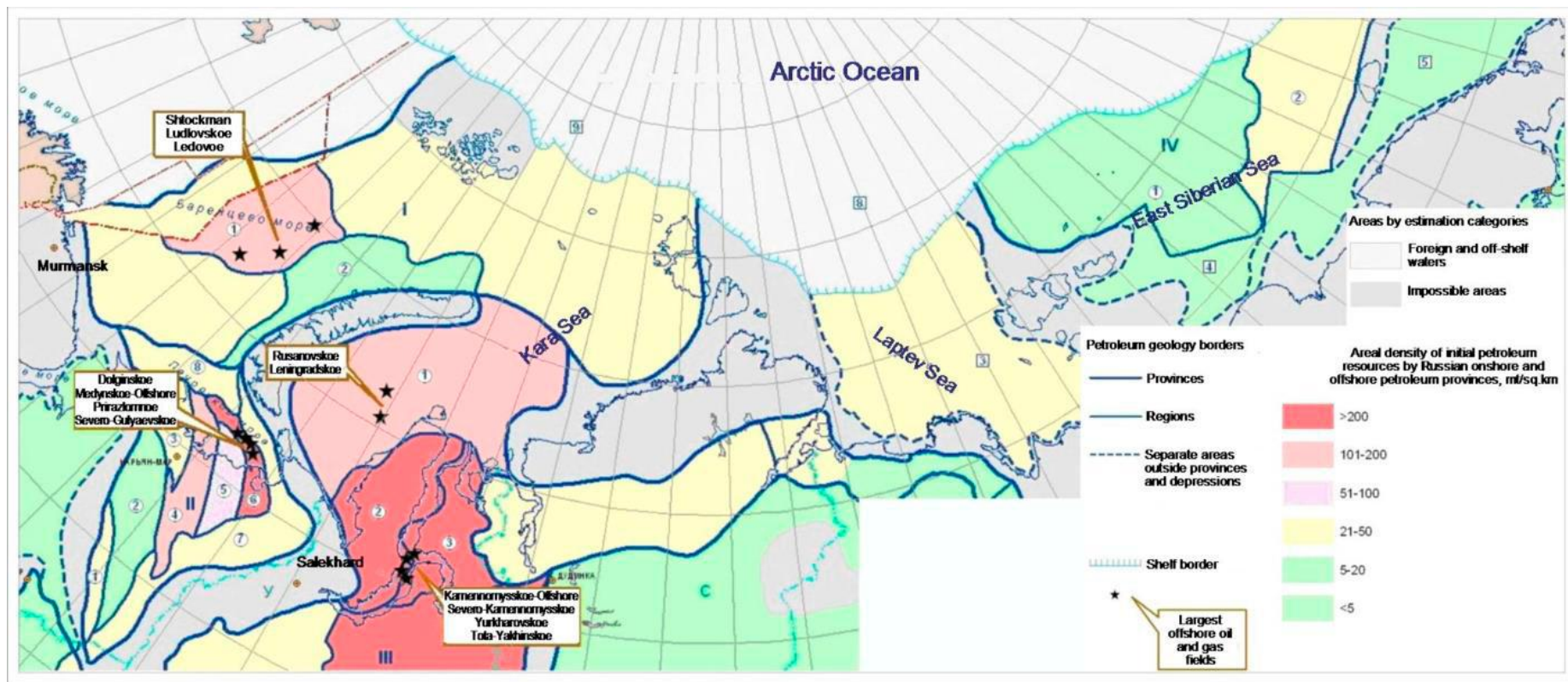


Figure 1. Russian Offshore Arctic Petroleum Provinces/Regions and Their Development Plans.

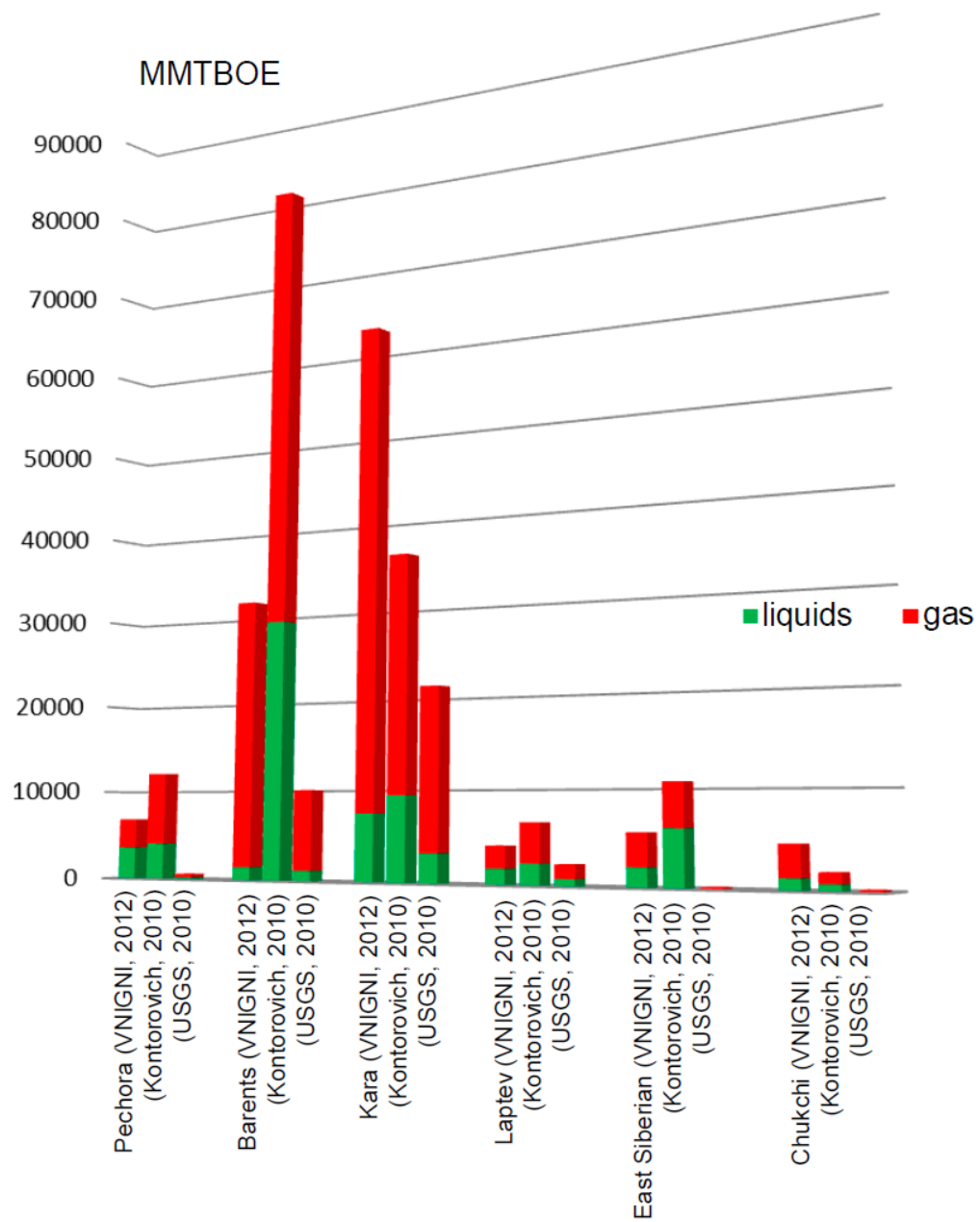


Figure 2. Different Estimations of Petroleum Resources in the Arctic.