

FOCUS NORTH

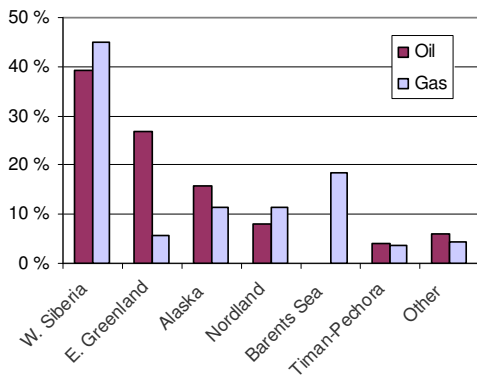
Oil and Gas

Produced by the research company Ocean Futures, Oslo for the Norwegian Atlantic Committee

The Arctic – the world’s next petroleum province?

Since North Sea oil reached its peak in 2001, attention has turned to the Arctic as the most promising area for new development. Such enthusiasm has developed around Arctic oil and gas in recent years that one might call it the New Klondike.

Feeding this enthusiasm is an estimate by the US Geological Survey (USGS) that the Arctic holds 24 percent of the world’s undiscovered hydrocarbons, or 51 billion tons of oil equivalent. Some industry analysts dismiss this as highly speculative, criticizing the USGS for dubious methods and political bias. The USGS believes the resources are distributed as follows:



In the opinion of Norwegian officials, the European Arctic could become Europe’s most important petroleum province. Their optimism is based on the fact that considerable reserves of oil and gas have already been found in the Barents, Pechora and Kara Seas, such as the Snøhvit and Shtokman (*Shtokmanovskoe*) gas fields.

The resource base

Petroleum *reserves* comprise an estimate of the amount of oil and gas that can be pumped out of known, proven fields. *Resources* comprise an

estimate of all stocks, including undiscovered resources—what one expects to find after further exploration, based on geological valuations of resource potential. Estimates can vary significantly between sources. *Oil equivalents* (o.e.) are used to collectively describe oil, gas and condensate.

Today – small reserves in the North

At the beginning of 2005, Norway had proven petroleum reserves of 3.4 billion tons o.e., whereas Russia had 52.5 billion tons o.e. (see Table 1).

Table 1 – Proven reserves as of 1 January 2005

	Oil million tons	Gas billion m ³
Norway	1,325	2,385
Russia	9,901	47,980

The European Arctic currently accounts for a relatively small proportion of the countries’ petroleum reserves. Today, Norway’s proven, recoverable reserves in the Barents Sea are 170 million tons o.e., or 5 percent of total reserves. Northwest Russia contains extractable resources of 3.1 billion tons o.e., or 6 percent of Russia’s total reserves. Table 2 divides these into oil and gas reserves for the land and offshore areas of northwest Russia.

Table 2 – Recoverable reserves in northwest Russia

	Oil million tons	Gas billion m ³
Komi Republic	819	484
Nenets autonomous district	493	161
Continental shelf areas	62	3,200
Total	1,374	3,845

Great potential, little exploration

The European Arctic represents considerable potential for petroleum development in the mid- to long-term, though extensive geological exploration is needed before resource estimates can be stated with a high level of confidence.

Norway, Russia and others have conducted seismic surveys across parts of the Barents Sea



shelf. These have identified several geological structures on the Norwegian and Russian shelves—and in the disputed area—that show promise of yielding recoverable resources (see Figure 1).

Still, the area is relatively unexplored. Russia has explored less than a third of the potential petroleum-bearing structures identified on its Western Arctic shelf. Norway has explored even less, having drilled only some 60 exploration wells to date. So far, Russian exploration activity has resulted in 11 proven petroleum fields: five in the Barents Sea and six in the Pechora Sea. Shtokman and Prirazlomnoe are among the Russian fields with proven hydrocarbons. Snøhvit is the largest find on the Norwegian shelf in the Barents Sea.

Norway

At the beginning 2005, Norway's total remaining recoverable resources were estimated at 7.6 billion tons o.e. Of this, Norway's oil directorate estimates that some 830 million tons o.e. await discovery on the Norwegian Barents Sea shelf.

In addition to the Barents Sea, Norwegian oil companies are extremely interested in the shelf off western Norway (Nordland 6 and 7). According to Statoil, Nordland 6 and 7 are among the most promising areas for exploration on the Norwegian shelf. Statoil estimates they contain recoverable resources of 270 million tons o.e. The areas are currently closed to exploration.

Russia

In an energy strategy document released in 2003, Russian authorities estimated the country's total petroleum resources at 157 billion tons o.e. (44 billion tons oil and 127,000 billion cubic meters gas). Siberia and the Urals contain the largest concentrations, with 60 percent of the oil and 40 percent of the gas.

Northwest Russia contains about 34 billion tons o.e., with 15 percent of the country's oil and 21 percent of the gas. Of this, the Russian shelf in the Barents and Pechora Seas is thought to contain 27.8 billion tons o.e., equating to 5 percent of the country's oil resources and 19 percent of its gas.

The disputed area between Norway and Russia

According to the Russian energy ministry, the disputed area holds 6.4 billion tons o.e. (400 million tons of oil and 5800 billion cubic meters of gas). However, there are no proven reserves for the disputed area as no exploratory drilling has taken place. Norway and Russia have agreed not to explore the area until the dispute is resolved.

Current production and future prospects

Russia is the world's largest producer of gas and the second largest producer of oil. In 2004, Russia produced 1.0 billion tons o.e. (461 million tons oil and 635 billion cubic meters gas). Although oil production fell by half following Russia's independence in 1991, output has been rising since 1999. However, Russian gas production has remained relatively flat since 1991.

Norway is the world's seventh largest petroleum producer and its third largest exporter. In 2004, Norway produced 226 million tons o.e. (140 million tons oil and 78 billion cubic meters gas)—equivalent to one-quarter of Russia's production. This was the highest production from the Norwegian shelf since production began in 1971.

Production today – on land

Today, petroleum production in the European Arctic is underway only on land—in Western Siberia and the Timan-Pechora oil province, located in the Komi Republic and Nenets autonomous district in northwest Russia.

Timan-Pechora currently produces 21 million tons of oil per year. Two-thirds of this is produced in the southern part of the Komi Republic and is transported via pipeline to central Russia and Europe. As these fields are depleted, production will move northwards to Nenets, which is expected to account for two-thirds of the production by 2020.

The Russian energy ministry wants to double production from its land-based fields by 2010.

Next phase – offshore

Production will soon go offshore, beginning with the Snøhvit gas field on the Norwegian shelf in 2007 and the Prirazlomnoe oil field in the Pechora Sea in 2008, followed later by the Shtokman gas field (see Fact Boxes 1–3).

Offshore production will gradually take over as the existing land-based fields in northwest Russia are depleted. According to current plans, production on the Russian Arctic shelf is expected to be about 40 million tons per year by 2020.

Nevertheless, the time perspective for developing the Russian shelf remains uncertain. A variety of factors are at play, including the potentially lower cost of developing fields in other locations, market needs, offshore expertise and transport.

The future development of the Norwegian shelf is also uncertain. In the Comprehensive Management plan for the Barents Sea released in March 2006, the Norwegian government indefinitely

closed some areas to petroleum exploration, including Nordland 6 and 7. New exploration will not be allowed within 50 km of the coast of Troms and Finnmark, the two northernmost counties. The government will reconsider allowing new activity between 35–50 km offshore when it revises the plan in 2010.

Expected increase in Russian activity

Russia must intensify oil and gas exploration in the North if it is to maintain its current level of economic growth. The three major gas fields in Western Siberia that comprise more than 60 percent of Russia's gas production are already in decline. Even under the most optimistic scenario, Russia's energy strategy indicates only modest growth in gas production by 2010—about 1.3 percent.

Given petroleum's dominating importance in the Russian economy, there is every reason to expect great resources will be set in from the Russian side to maintain and increase production. Intensive, systematic exploration is already planned in Komi, Nenets and on the Russian Barents Sea shelf, and expectations for new discoveries are great.

Prospect for Norwegian–Russian collaboration

Russia makes no secret that it lacks offshore expertise. Yuri Trutnev, Russia's minister of natural resources, remarked that Russian companies are unable to open up the Arctic shelf by themselves. "There is only one way out—to join the world's leading mineral wealth users, who possess extensive experience of sea-based works, and establish a consortium together" (*Russia Journal*, 15 June 2005).

Gazprom plans to establish strategic partnerships with foreign companies. Gazprom has already

signed letters of intent on potential partnerships, yet the partnership decision regarding Shtokman has been postponed numerous times, and is now not expected until 2007. Statoil and Norsk Hydro are among the finalists.

This opens the door for both Norwegian offshore technology and expertise. It also opens the possibility for Norwegian environmental standards to play an important role in charting the future of Russian offshore activity.

Fact Box 2 – Prirazlomnoe oil field

The Prirazlomnoe oilfield lies on the Russian shelf in the Pechora Sea, 60 km from land.

Reserves – Extractable resources of 83 million tons of oil.

Developer – Sevmorneftegaz, a Rosneft/Gazprom joint venture.

Operations – Based around a single, ice-resistant stationary platform—the first of its kind in Russia. The area has shallow water, low temperatures and heavy ice (up to 1.7 meters thick). The area is ice-free 110 days per year. Drilling plans envisage up to 40 directional wells, all drilled from a single rig.

Transport – Icebreaking tankers (approx. 20,000 tons) will transfer oil to Murmansk, a distance of 1,100 km. Supertankers will then export the oil to European and North American markets.

Time plan – Originally planned to begin in 2006/2007. The Russian natural resources ministry announced 2008 is more likely due to problems in completing the platform.

Production – 7.6 million tons of oil per year at full capacity (equivalent to one 20,000 ton tanker per day). Production is expected to last for 22 years.

Fact Box 3 – Shtokman gas field

The Shtokman (*Shtokmanovskoe*) giant gas field lies on the Russian shelf in the Barents Sea, 550 km from the Kola Peninsula.

Reserves – Extractable resources of 3,200 billion m³ of gas and 31 million tons gas condensate.

Developer – Sevmorneftegaz, a Rosneft/Gazprom joint venture.

Operations – A pipeline will take the gas from Shtokman to a gas liquefaction plant on the Kola Peninsula. The LNG plant will have an expected capacity of 14 million tons LNG per year. Ships will transport the LNG to markets (approximately 225 shiploads per year). The USA is expected to be a key market.

Production – First stage extraction is planned at 30 billion m³ per year, of which 25–27 billion m³ will be liquefied and exported. At full capacity, planned production will be 45–90 billion m³ gas and 350,000 tons of gas condensate per year.

Development cost – Norsk Hydro estimates the first stage development costs will be €8–12 billion.

Fact Box 1 – Snøhvit gas field

The Snøhvit project consists of three gas fields on the Norwegian shelf in the Barents Sea, 140 km NW of Hammerfest.

Reserves –160 billion m³ gas and 18 million m³ condensate.

Production – Gas will be extracted by underwater installations. Snøhvit will be the first offshore gas facility without installations on the sea surface. Pipelines will send the gas to a liquefaction plant on Melkøya in Hammerfest.

Transport – Four LNG ships will transport the LNG to the USA, Spain and Portugal. Estimated 70 shiploads per year.

Time plan – First deliveries begin in 2007. Snøhvit will produce 6 billion m³ of gas per year for 25 years.

Development cost –€6 billion, excluding ships.



Transport challenges

In 2003, all of Russia's gas exports and 88 percent of its oil exports went to European customers. A considerable portion came from the Russian North, exported either via pipeline or via the Northern Sea Route and further southwards through the Northern Maritime Corridor to the European continent (Figure 2). The trans-Atlantic route connects them further to North America.

Transport capacity – the weak link

Marine transport of Russian oil through Norwegian coastal waters increased dramatically from 2002. Following a significant rise in production in Western Siberia, Russian oil companies began to send large volumes of oil by train to the White Sea, where it was transferred to tankers and exported to the European market. That the oil went by sea revealed the pipeline network was oversubscribed.

Transneft, the Russian oil pipeline monopoly, can transport only 545,000 tons per day in its major pipelines—about 60 percent of current exports. Most of the rest is shipped to marine export terminals by rail and river routes; this type of transport is more expensive than by pipeline.

Limited capacity in Transneft's pipeline network makes it incapable of meeting oil producers' export ambitions. Expanding capacity is essential if the oil industry is to meet its production and export goals.

Russia is taking steps to develop new export infrastructure, however, the government and Russian oil companies disagree on how to do this. A key unresolved issue is the potential role for private investors in these projects, presumably at the expense of Transneft.

Murmansk pipeline project

Russian oil companies want to build a pipeline from Western Siberia to an export terminal in Murmansk to handle increased production in the long term. The project has the Duma's support, but the government has so far withheld its support. Not only would a privately operated pipeline compete with Transneft, it would limit the government's ability to control the oil industry via Transneft.

Despite various pronouncements, it is still uncertain when such a pipeline might be built, who will build it, how much oil it will carry, and which route it will take. Figure 2 shows two alternatives.

Tanker fleet and transshipment harbours

In the meantime, Russian oil companies have built a modern, ice-strengthened tanker fleet for shipping oil from the production fields in Timan-Pechora and Western Siberia to the export terminal in Murmansk. Crude oil, bunker oil and refined products are shipped out on small tankers to Murmansk, where they are transferred to large tankers for export.

Yet transfer facilities in Murmansk are themselves nearly overloaded. One solution is to expand operations to the deep, ice-free fjords in northern Norway. Proposals to conduct transfer operations in Kirkenes and Kvalsund are currently under evaluation by the Norwegian authorities.

Transport volumes in the North

The marine transport capacity was originally about 5.4 million tons per year—about one ship from Murmansk per week. This is expected to triple or quadruple in a short time.

According to a recent UN report, oil production on the Russian shelf will be so large that oil transport in the Barents Sea will increase by a factor of six by 2020—that is, by 32 million tons per year. Other analyses give higher estimates, from 36.5 million to 130 million tons per year in the course of 5 to 10 years. This equates to 365 to 1040 shiploads of oil each year.

In addition will come some 70 shiploads of liquefied natural gas (LNG) generated by the Norwegian Snøhvit field, plus those generated by Russian fields that come into production. Shtokman could generate 225 shiploads of LNG annually.

Realistic?

The higher shipping estimates are dependent upon deliveries from Western Siberia. These estimates are only realistic if a pipeline is built from Western Siberia to an export terminal at the Barents Sea. Development plans for Western Siberia thus have direct relevance for marine oil transport in the Barents Sea.

Although considerable uncertainty is attached to estimates of freight volume and sailing frequency, they indicate the likelihood of significant, long-term development activity in the Barents Sea.

Summarized from "Oil and Gas in the North" (11/2005), available (in Norwegian) at ocean-futures.com



Figure 1 – Oil and gas development in the Barents Sea

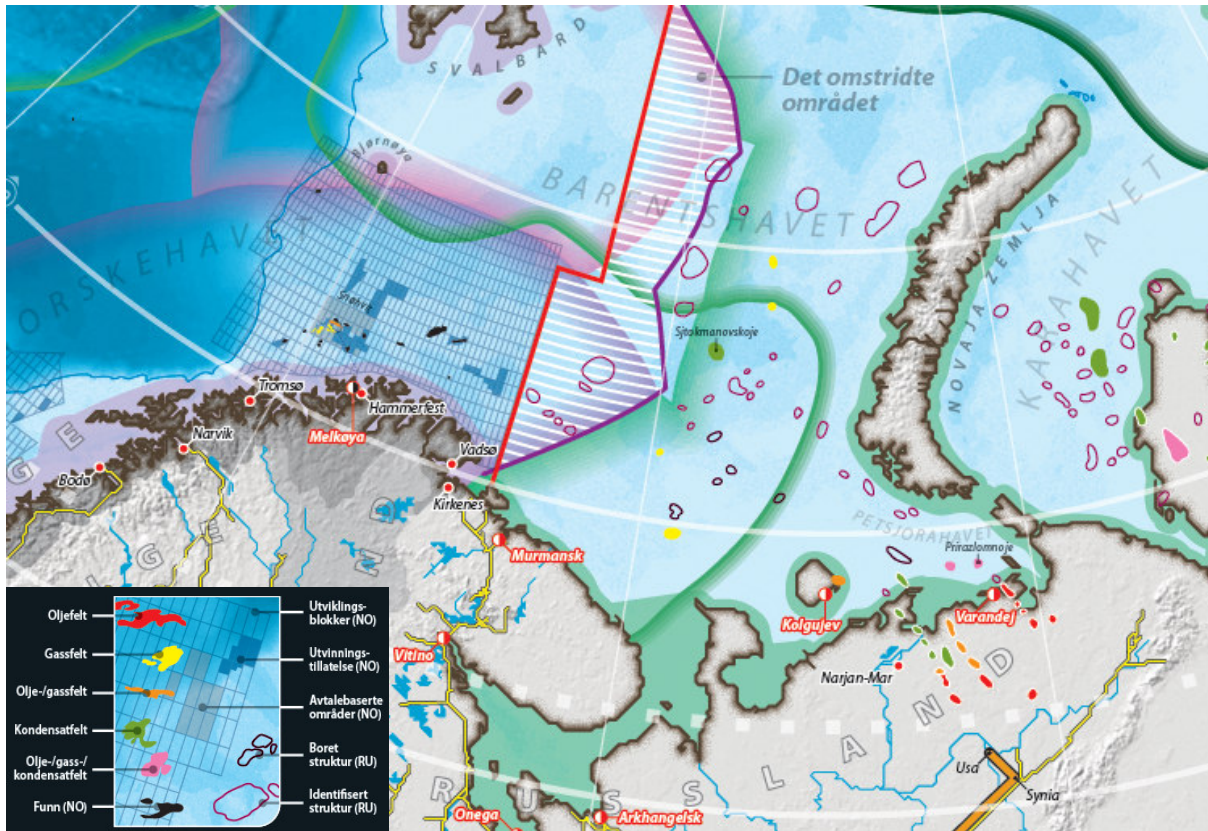


Figure 2 – Shipping routes and proposed oil pipelines



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