

Going North: realising the Arctic's hydrocarbon potential

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The discovery of oil in 1969 was a rags-to-riches fairytale for Norway. But now the giants of the deep are shrinking. What does the future hold? Will our past experience enable us to solve the challenges of the future?

A new chapter is beginning in our home waters. The mammoth fields of the North Sea are dwindling, and the game is changing. Although we have the highest level of exploration at any time in our history, new oil finds are smaller and scattered. They are also less accessible and more challenging to recover. It is a trend that's changing the way we work – but in our business change is the only constant. We have been adapting our technology and refining our methods ever since we started work on the Norwegian continental shelf (NCS), nearly four decades ago.

The quest for new resources is taking us to areas as yet undeveloped – deeper waters, harsher environments, complex reservoirs. As we move steadily northwards, we are crossing new frontiers for our industry: to storm-tossed and icy seas, and wells with high pressures and temperatures. As the largest operator in Norway by far, our innovation is driving development on the continental shelf as a whole.

New areas

Estimates prepared by the US Geological Survey indicate that the world's total undiscovered resources are equivalent to 1500 years of the current Norwegian production. It is expected that more than 20 per cent of these resources are found north of the Arctic Circle – that is to say, in Arctic and sub-Arctic areas. This equals nearly 300 years of production from the NCS. More than two-thirds of this volume is probably gas and nearly 85 per cent of the resources are expected to be found offshore.

The Norwegian Arctic shelf is unique with its access to infrastructure and no issues of ice due to the Gulf Stream

Oil production on the NCS has already passed its peak. The North Sea has been thoroughly explored and the geology is known. We continue to make finds, but they are smaller. No new exploration acreage has been allocated since 1994. We believe that there are major resources waiting to be found, and we believe that many of them are located in areas where we have not yet been granted access.

The Norwegian authorities opened the Barents Sea for exploration in 1981 and the same year Statoil discovered the huge Snøhvit gas field. Over the course of these thirty years Statoil, the authorities and a number of international players have developed fields and a strong foothold in the far north, partly through drilling of more than 80 exploration wells.

On the NCS the areas off Lofoten and Vesterålen are the most attractive acreage with regard to the possibility of finding large new fields that can warrant independent developments and new infrastructure. Statoil wants the authorities to give careful consideration to how a portfolio of such projects and resource volumes can be realised. These resources could offer a new lease of life for the NCS, extending its life for decades – as well as providing a major boost to local economies.

The border agreement reached between Russia and Norway in the Barents Sea was announced this spring. More than 40 years have passed since Norway and the former Soviet Union started negotiations on this ocean area. The news about the agreement therefore attracted great attention when it was presented. Oil drilling in this area may still be years away. After the agreement has been ratified, guidelines and terms for oil and gas production must be clarified.

The clarification of potential new acreage in this area is of great interest to Statoil. In terms of exploration this is an interesting but very immature area with a high level of uncertainty. A major discovery in the area may be far from shore and potentially face technological challenges related to ice and darkness. It may take up to 20 years before any oil or gas field may come on stream.

Northern areas: Our commitment to responsible development

Few controversies in Norway today are as challenging as the question of exploration off our Arctic coast. We understand the concerns. Our coastline has a uniquely beautiful environment and abundant fish stocks.

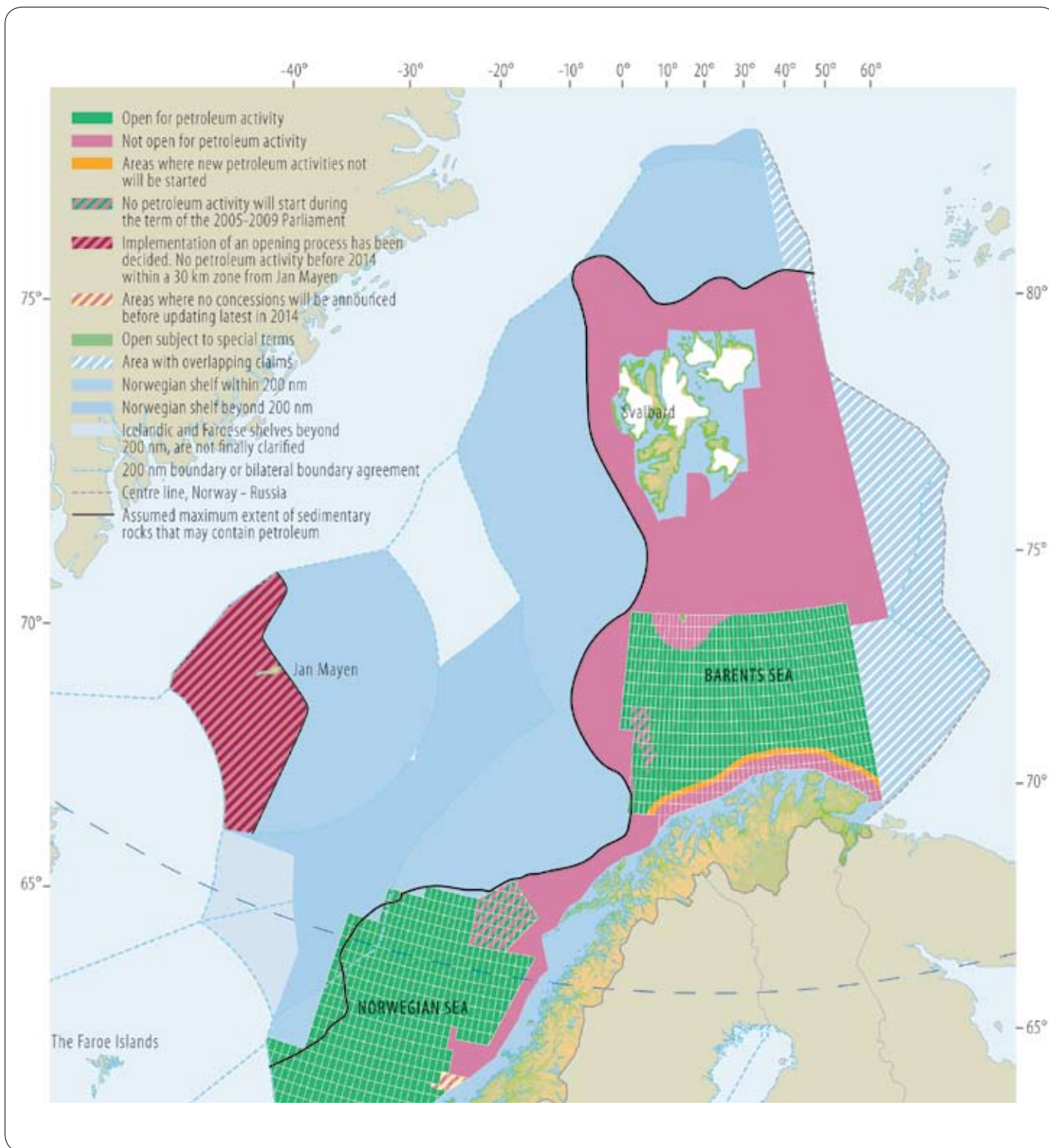
But we already operate in the Arctic – and we already comply with the strictest environmental standards in the world. We have drilled more than 80 explorations wells in the Barents Sea since 1981. We built the world's northernmost LNG plant on the island of Melkøya by Hammerfest.

A government-sponsored study has concluded that our presence in the Arctic would reduce the total risk of oil spills reaching shore, since the measures we would provide would protect the coast from accidents caused by passing ships.

We would provide the world's best emergency preparedness against oil spills – and we would continue to coexist with the environment, local communities and traditional industries as we have done for years. We can be relied upon to act responsibly in the Arctic.

Technology and opportunities

Step-by-step technological development characterises the NCS, Statoil and Norwegian supplier companies. We have a 40-year history of industrial development which has seen ►



The above map shows the status of the petroleum activity areas on the Norwegian continental shelf as of 1st August 2009



◀ us move from the south towards the north. We have moved from shallow to deep waters and from surface installations to subsea and remote-controlled solutions. The direction and speed have been determined by market demand, access to resources, new challenges and fields that are large enough to finance the need for new demanding technology.

Major challenges in the Arctic are ice and rough weather conditions, as well as long periods of continuous darkness, cold, very little infrastructure, vast distances at sea, and rich and important ecosystems. The Norwegian Arctic shelf is unique with its access to infrastructure and no issues of ice due to the Gulf Stream.

Statoil is well-positioned in Arctic petroleum activities. First and foremost, Statoil has experience from nearly 30 years of activity in the Norwegian part of the Barents Sea. In the Russian sector Statoil participates in the onshore Kharyaga field as well as the development of the gigantic Shtokman gas field, located 600 km from shore in the Barents Sea. Other international Arctic assets in which Statoil is active are in Newfoundland and Alaska, and we are considering participating in the Greenland authorities' plans to conduct exploration drilling off their east coast.

Statoil is one of the oil industry's pioneers when it comes to production in cold Arctic regions. So far, we have developed the world's only Arctic LNG facility to process production from the Snøhvit gas field. Snøhvit is located at 70 degrees north, at the same latitude as the frozen seas north of Alaska. Winds, freezing temperatures and turbulent seas make extreme demands on those intending to function and survive here, whether it is the region's flora and fauna, traditional industry or oil and gas operations. In fact, the Snøhvit development

represents an important breakthrough for energy recovery in the northern regions.

The surface of the sea reveals nothing. The field is in fact sheltered from the elements at a depth of 300 metres beneath the surface. Every day 20.8 million standard cubic metres of natural gas liquids (NGL) and condensate are transported 143 kilometres through the seabed pipeline to Melkøya by Hammerfest. The Gulf Stream keeps the sea free of ice all year round. Winter storms, however, can whip up huge waves that make surface installations difficult to operate. On the seabed however all is peaceful. The seabed installations have also been constructed in a way that allows the fishing fleet to continue to operate here. Trawlers may be drawn over the seabed templates with no risk of entanglement.

Statoil is the world's largest operator of subsea wells at depths greater than 100 metres. Subsea or downhole separation of water with associated direct injection back into the field will also be essential in handling production both above and below the ice. Strong technological development in multi-phase transport of mixtures of oil, gas and water is expected to further increase transportation distances. And on top of all this comes electrification and remote operation from shore. The way forward in the Arctic will be dictated by market demand and available technology.

The market for Arctic resources

European countries will have to make decisions that will have a large impact on the future energy mix. Significant new power capacity must be built in the near future to replace existing old capacity and to fulfil new environmental requirements. Gas is the obvious energy choice for the power sector. It is competitive in terms of price and supply security and it has lower greenhouse gas emissions and a long-term potential.

Statoil is the second largest supplier of gas to Europe. Through the flexible and integrated gas pipeline infrastructure and LNG, Statoil can reach large parts of the European markets. The system is also very cost-effective. We exploit economies of scale and keep unit costs low. This means that we are able to develop smaller fields that could not have developed their own transport solution as stand-alone developments. These system properties do not exist to the same degree in other locations, which makes the Norwegian infrastructure unique in a global context.

Statoil believes that the gas demand for power generation will increase in Europe and the US towards 2030. With a strong position in gas we work actively to position ourselves in relation to Arctic gas opportunities. We also have the necessary commercial expertise and the right market positions to take part in this growth. □

Photo: Helge Hansen/Statoil



Snøhvit is Europe's first export facility for liquefied natural gas (LNG) and the largest-ever industrial project in northern Norway. Natural gas produced from the Snøhvit, Albatross and Askeladd fields in the Barents Sea are received and processed at the plant (pictured) on Melkøya island outside Hammerfest