International Arctic Petroleum Cooperation

Barents Sea scenarios

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Chapter 2

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Three scenarios

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Introduction to the scenarios

What are some of the possible futures for Barents Sea oil and gas? This chapter draws upon the key trends and issues covered by the book's thematic chapters and presents three scenarios on the prospects for Norwegian–Russian cooperation in the Barents Sea. Ultimately human interaction will play a large part in how the Barents Sea is developed, and we have therefore given the scenarios metaphorical titles related to interaction between people.

In the first scenario – called "After You, Sir" – petroleum development in the Barents Sea region is a respectful and cooperative enterprise between Norway and Russia. However, both countries are also hesitant to make first moves on investments, because growing production of unconventional resources has suppressed oil and gas prices. Thus we think of Norway and Russia as two British gentlemen in front of a door, each politely ushering the other to enter first, but neither of them actually going through the door:

> "After you, Sir."
> "No, no, after you, Sir."

In contrast, the second scenario – "Parallel Play, Not Only for Children" – is centered on the combination of high oil and gas prices and noncooperative relations between Norway and Russia in times of growing energy demand and oil/gas prices. The result is "parallel play", a term borrowed from the pedagogical literature to describe the stage at which toddlers take an interest in playing with other children, but are incapable of interacting directly with them because of their limited social and language skills.

The third scenario – "Let's Dance, but Where Is the Music?" – envisages a future where Russia and Norway cooperate on the development of a few big petroleum projects, but broader development is hindered by a strict and effective global climate regime that reduces profits from the sale of oil and gas and makes smaller Arctic fields commercially unviable.

Figure 2.1 plots the three scenarios on the 12 main uncertainties we have identified. The shape of each scenario on the radar diagram can be thought of as its unique fingerprint.

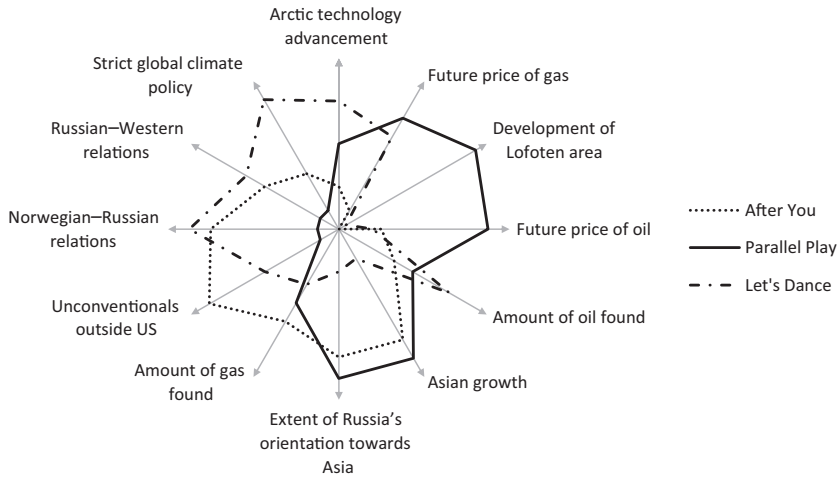

Figure 2.1 Scenario star with all three scenarios

Approach

In developing the scenarios we have applied the time-honored approach made famous by Royal Dutch Shell (Cornelius, Van de Putte, & Romani, 2005; Jefferson, 2012; Varum & Melo, 2010). Rather than probability – which cannot be quantitatively estimated with any degree of accuracy for complex future developments – the criteria for the scenarios are instead plausibility and internal coherence. That means that the scenarios are not attempts at forecasting or projection but rather at identifying alternative possible developments, emphasizing the unpredictable interaction between multiple factors. The aim is not to predict the future but to prepare mentally for a full range of possible futures. Neither is it decisive whether the reader agrees with the scenarios or not, as long as he or she is stimulated to make his or her own reflections on the future.

The scenarios were developed through four stages. First, the book's thematic chapters (3–14) were written to provide input on different topics of relevance for the future development of the oil and gas resources in the Barents Sea. In addition to the chapters as they are published here, the authors of each chapter were requested to provide specific written input for the scenarios. Second, we held a series of internal intensive scenario-building discussions among the six authors of the scenarios. The authors include both Norwegians and Russians, and social scientists, natural scientists, and experts on technology, making for rich and dynamic discussions. Third, the scenarios were presented at two dedicated seminars, one in Norway and one in Russia. The participants in these seminars were well-informed non-academic actors who are involved in petroleum cooperation between Norway and Russia. These sessions were also

interactive, with ample room for feedback and discussion. Fourth and finally, the written scenarios were submitted to three knowledgeable people for review.

In developing the scenarios we first identified developments that we believe are likely. These we refer to as "assumptions", not because it is certain that they will take place but because we think they are significantly more probable than many other developments. An example is rising energy demand. Having laid out our assumptions, we attempted to identify key uncertainties – developments that we think are fundamentally uncertain and could easily tip one way or the other. An example is the future price of gas. Subsequently, we pieced together the three scenarios, each consisting of contrasting combinations of the assumptions and uncertainties.

Finally, we added a series of wild cards. These are events that have low probability but would have a great impact. They are difficult to fit into the scenarios and are more like miniature scenarios in their own right. We believe that wild cards are one of the most important components in scenario building, because they help expose the full range of possible future developments. Unexpected things often do happen and play an important role in how the world develops. To prepare for the future one therefore needs to prepare for the unexpected, and wild cards are a good way of remaining attuned to the future's unforeseeable nature.

Assumptions

In this section, we briefly outline the main assumptions identified in the book's thematic chapters and taken into the scenarios. By "assumptions" we mean things that we are reasonably confident about and therefore choose to treat as givens. This does not mean that they are guaranteed, just that we see them as significantly more probable than other factors we have considered.

Global markets vs. international political bodies

According to Chapter 3 (Overland, Simonia, Vasiliev, and Wilson Rowe), the Arctic, and especially the Barents Sea, is unlikely to be the setting for a major geopolitical conflict, and circumpolar political bodies are unlikely to propose binding agreements that would restrict oil and gas development. The Arctic Council is an important institution of political discussions but has no power over the Arctic nation-states and lacks power of enforcement. Also UN organizations cannot stop Norwegian and Russian Arctic offshore petroleum activities. For the development of the Barents Sea, we therefore assume that the global market and global geopolitical context will be more important than circumpolar or other international political bodies.

Demand for energy

According to major world energy market forecasts, including those of the IEA and OPEC reviewed in Chapter 3 (Overland, Simonia, Vasiliev, and Wilson

Rowe), global energy demand is going to continue growing, driven by a combination of population growth and economic growth. Forecasts also assume that oil and gas will remain an important part of the world energy supply, even if their consumption is reduced. The composition of the energy resources portfolio to cover this increasing demand is, however, uncertain. For example, coal may or may not be phased out, and the balance between oil and gas is uncertain.

Asian market growth

We also assume that the importance of Asian markets will continue to grow and that Russia will continue diversifying its exports by expanding infrastructure to sell oil and gas to the Asia–Pacific region. Although we are relatively confident about this development and have therefore included it among our assumptions, we are far from sure how far it will go and its extent is therefore included in the uncertainties listed below.

Global climate policy

Although we do not know whether an effective new climate agreement will be reached to follow up and improve on the Kyoto Protocol, we do assume that climate change will remain on the political agenda. The pressure for transformation towards a low carbon economy comes from many directions. The UN report *Better Growth, Better Climate* (Global Commission on the Economy and Climate [GCEC], 2014) focuses on how major economies through innovation and changing regulations can combine continued economic growth with reduced carbon emissions. The question is how quickly such policies will be developed and what impact they will have on the development and use of oil and gas resources.

Barents petroleum exploration

Exploration drilling will be extended to cover all parts of the southern Norwegian Barents Sea. On the Russian side, the Dolginskoye, Varandey-More, Medin-More, and Pomorskoye fields will be explored (see Figure 9.4 in Chapter 9 – Zolotukhin, Sungurov, and Streletskaya). However, outside the potentially interesting structures that have already been identified for test drilling, very large fields are not very likely to be found, especially on the Norwegian side.

Arctic petroleum production

Oil and gas resources in the Arctic will continue to be explored and developed. Even though many environmentalists and fishermen are critical regarding Arctic petroleum developments, exploration and production have already started and further development of new licenses is probable. Probably, the Dolginskoye oilfield will come into the production phase between 2015 and 2025. It is

therefore likely that there will be significant oil and gas production from the Arctic, although how much will be produced remains uncertain.

The cost of operations, maintenance, and logistics will be higher than in other parts of the world due to the harsh climate and longer distances that infrastructure and human resources need to travel. Subsea processing factories can be hooked up to production centers located relatively far away (say 200 km), making integrated area development possible (see Chapter 10 – Bulakh, Gudmestad, and Zolotukhin).

Arctic marine bio-resources

Although biodiversity and catches may be influenced downwards or upwards by climate change, the Barents Sea will remain an important marine habitat for Arctic marine species, both in terms of the planet's ecology and in terms of commercial fisheries (see Chapter 13 – Kommedal, Bagi, and Hemmingsen).

Arctic weather conditions

Regardless of how the climate changes, Arctic weather conditions will challenge personnel and hardware (see Chapter 11 – Markeset, Sæland, Gudmestad, and Barabady). Greater physical and mental pressure on personnel will necessitate higher wages and more time off. For hardware, there will be higher failure rates as well as higher maintenance costs also when there are no failures (see example Chapter 14 – Sundsbø). The cost of petroleum exploration and production under these conditions will remain high, even if significant technological progress is made and the climate heats up.

Northern Sea Route

The Northern Sea Route will remain secondary as a transport route for oil and gas from the Barents Sea to Asia. It will only be used in summer. Less ice may actually be more difficult to handle than a firm ice cover that it is possible to plow a channel through. There will be a limited number of icebreakers, and they will have the capacity to take a limited number of ships in each convoy because the broken ice slips back into the channel they have created. This is disadvantageous for the development of the Barents Sea because it limits the volume of hydrocarbon resources that can be exported via the Northern Sea Route to Asia and therefore reduces possible synergies that the petroleum industry in the region can have by building and using a common infrastructure with the Northern Sea Route.

Business-to-business cooperation

Norwegian and other Western oil companies will continue to want access to the Russian part of the Barents Sea; and Russian oil companies will want access

to the Norwegian part of the Barents Sea (see Chapter 5 – Bourmistrov, Borge Doornich, and Krivorotov). However, there will be limited room for small supply companies to play a role in the Barents Sea petroleum province, especially local small players and especially on the Russian side – except if there are very many large developments and the authorities make a special effort to facilitate their participation.

Uncertainties

Having presented the points that we are relatively sure about in the previous section, here we summarize the points that we see as most uncertain. When forecasting the future, the aim is to reduce uncertainty as much as possible. This is of course not the aim in a scenario project such as this one. Uncertainties are rather at the core of the project and actively cultivated in order to define the range of possible scenarios. The uncertainties discussed here are also presented visually in Figure 2.1.

Price of gas and oil

As discussed in Chapter 3 – Overland, Simonia, Vasiliev, and Wilson Rowe – some of the uncertainties that will affect the development the Barents Sea are related to energy demand: will the prices of oil and gas rise, stabilize, or fall, and will they be high enough to justify the development of Barents Sea fields? Historically, the prices of oil and gas were tightly correlated, in large part due to the linking of gas contracts to oil prices. However, from 2005 to 2015, the prices of oil and gas increasingly diverged, as increasing amounts of gas were traded in spot markets and shale gas in the US pressed gas prices downwards. Thus, in our work on the uncertainties, we treated the future price of oil and future price of gas as two separate factors. This does not mean that they will not interact with each other, just that they will not necessarily move in tandem.

Asian growth

Although oil, and increasingly gas, is traded in global markets, location still makes some difference. As the Barents Sea is located as far away as it is possible to get from the Asia–Pacific region, it makes some difference whether demand for oil and gas imports will be concentrated in the Atlantic basin area or Asia. The effect of Asian growth on the development of the Barents Sea is nonetheless uncertain. Currently, import growth is concentrated in Asia, but if there is a slowdown in China's growth, Asia's importance may diminish (which might be positive for the Barents Sea) at the same time as oil prices would fall (which would be negative for the Barents Sea). On the other hand, if growth continues unabated in China, it could have a converse double effect on the Barents Sea: on the one hand it would help support higher oil and gas prices,

which would promote the development of the Barents Sea; on the other hand it would continue to drive Russian prioritization of its eastern provinces. Thus, the total impact of this double effect on the development of the Barents Sea is an important uncertainty.

Unconventionals outside the US

Another key question is whether the rapid development of unconventional oil and gas will spread beyond the United States, and how expensive unconventionals will be. If they are cheap enough, they will be prioritized over Arctic resources, as they are less risky and available to more countries. Even if unconventionals stall, will there be room for large volumes of Barents Sea gas in the EU market, given the growing EU imports of LNG from Qatar and other countries, possible LNG deliveries from the US, coupled with deliberate EU efforts to cut dependence on Russian energy? This is not only a market question, but also a political one: will the EU show any serious interest in supporting developments in the Barents Sea, and would the support only apply to the Norwegian part of the sea (in an effort to reduce import dependency on Russia) or also extend to the Russian side (in an effort to maximize overall supply)?

Global climate policy

A focus on green growth policies during the decade 2015–2020 could result in a new set of incentives and mechanisms that simultaneously promote growth and reduce carbon emissions. However, there is uncertainty as to whether and how quickly governments can produce a common international agreement on those issues. Will there be a global, binding, and strict agreement to follow up the Kyoto Protocol, and what would its impact be on demand for oil and, especially, gas? Coal is an obvious priority target for such an agreement, oil could be, but its status is less clear, and natural gas even more so. A stricter climate regime might even end up promoting natural gas.

Moreover, how will global climate change affect climatic conditions for petroleum activities in the Barents Sea, especially north of Bjørnøya? Will there be less ice but more dispersed icebergs and storms? In spite of a long-term trend towards global warming, could there be shorter-term (e.g. 20-year) oscillations that make the region colder?

Amount of oil and gas found

As we can see from Chapter 8 – Verba, Ivanov, and Zolotukhin – and Chapter 9 – Zolotukhin, Sungurov, and Streletskaya – the Barents Sea has important hydrocarbon resource potential both in terms of oil and gas. The Fedynsky High prospect is being drilled by Norwegian and Russian companies, but the outcome is not known. If there is a major find, this may spearhead developments in the Barents Sea due to proximity to land and infrastructure in

Kirkenes. It may be important whether it is oil or gas that is found, depending on which is better priced in the market. Gas is also more difficult and expensive to transport long distances.

Development of Lofoten area and infrastructure

As explained in Chapter 6 – Overland and Krivorotov – the Lofoten Islands area in Norway can be an important factor in the development of petroleum fields in the Barents Sea by serving as the gas transportation infrastructure bridge between well-developed southern gas fields in the Norwegian Sea and prospective gas fields in the Barents Sea. If the Lofoten area is opened, the effect on the Barents Sea is still not certain. At first it might distract attention from the Barents Sea, but if major gas resources are found and the Norwegian pipeline grid is extended northwards to the Lofoten Islands, it could provide an important bridge to the Barents Sea that could make many more natural gas projects there feasible in the long term.

As discussed in Chapter 3 – Overland, Simonia, Vasiliev, and Wilson Rowe – during the entire post-Soviet period, Gazprom has had a monopoly on exports, but there has been some discussion of unbundling the company and moving the control over exports to an independent government body. Novatek has already been permitted to export LNG from the Yamal Peninsula, but this is considered an exception from the rule that was only possible for LNG. If Gazprom loses the monopoly, it could open up the way for more dynamism in the Barents Sea, as other companies could handle the opportunities there more creatively. On the other hand, if Gazprom keeps the export monopoly, it may result in other companies being forced to produce more LNG if it is seen as easier to get exemptions from the monopoly for LNG than pipeline exports. Therefore, an important question is: will there be a gas pipeline to the European market in place providing access for Barents Sea gas to this market and facilitating further developments in the area? Related questions are: will this pipeline go through Norwegian waters or through the Republic of Karelia, and will the Norwegian and/or Russian governments reduce taxes in order to kick-start field developments and infrastructure?

Arctic petroleum technology development

As follows from Chapter 10 – Bulakh, Gudmestad, and Zolotukhin – another important uncertainty is how fast remote operation and subsea technologies will develop in the future. These technologies can lower the cost of field operation and be decisive for whether fields are sufficiently profitable to be brought online. For instance, will the Johan Castberg oilfield and nearby fields be developed together, creating enough infrastructure to spearhead other developments?

The technology to be developed should reflect growing environmental, preparedness, and safety concerns related to expanding petroleum operations in

the Arctic (see Chapter 10 – Bulakh, Gudmestad, and Zolotukhin – Chapter 11 – Markeset, Sæland, Gudmestad, and Barabady – and Chapter 12 – Njå and Gudmestad). For instance, the effect of hydrocarbon pollution on Arctic species and ecosystems and especially the effect of long-term exposure have not been researched thoroughly. Future research may show that it is worse or better than thought. It is also not clear whether environmental legislation will be developed adequately for the Arctic environment, and whether effective legislation will be adopted and upheld by Arctic states and operators. If environmental and safety demands are strict, they will push up the cost of petroleum projects. If they are not coordinated by Norway and Russia, they can create obstacles to cooperation and joint development (see Chapter 4 – Bambulyak, Golubeva, Sydnes, Sydnes, Larsen, and Streletskaya).

When there is another major oil spill somewhere in the world it could contribute to holding back the development of the Barents Sea, especially if it is an Arctic offshore oil spill that looks bad on television. Spills that have occurred in the past, such as the Exxon Valdez and Deepwater Horizon accidents, have received broad media coverage but have, nonetheless, only briefly slowed down petroleum sector developments. The main route of influence for such an incident on the development of the Barents Sea would most likely be through a tightening of environmental regulations that drive up the need for new technology and thus the cost of field development.

Russian–Western relations

It will be difficult to build good Russian–Western relations during the first half of the decade from 2015–2025. Over time, the EU will attempt to steadily reduce energy imports from Russia. Although news fades fast and, for example, the conflict in South Ossetia was forgotten quite easily, the conflict in Ukraine has brought some serious negative components into Russian–Western relations and could turn the relationship into a self-reinforcing negative spiral.

Thus, due to the conflict over Ukraine, Western–Russian relations could potentially be bad for a long period of time, especially if Russia succeeds in reorienting its economic focus towards Asia and the EU reduces its economic dependence on Russia. At the same, there is also a possibility that the conflict over Ukraine will subside and relations improve. So the question is first, will Russian–Western relations improve or worsen, and, second, how will that affect Norwegian–Russian relations?

Understanding Russian–Western relations is particularly important because it will affect Russian attitudes towards the role of Western companies in the development of Russian Arctic offshore fields (see Chapter 5 – Bourmistrov, Borge Doornich, and Krivorotov). To what extent will Russia allow for direct foreign investment in developing its Arctic offshore fields, and how actively will Norwegian companies pursue these opportunities? What changes might there

be in elite attitudes in either country towards the other, due to a change of government or other political developments?

Norwegian–Russian relations

The relationship between Norway and Russia will never be entirely divorced from the broader Russian–Western relationship, but neither is it entirely dependent on it either (see Chapter 6 – Overland and Krivorotov). Countries other than Norway are more likely to be at the forefront of Western quarrels with Russia. In spite of asymmetries, it will be in the shared interest of both Russia and Norway, as the two countries sharing the Barents Sea, to cooperate in meeting common challenges, e.g. exploration and development, environmental protection, resource management, and promoting regional growth and employment. However, the degree of cooperation depends on the approaches of both sides, as well as all the other contextual factors discussed here.

Although we do not expect Russia's relationship with Norway to be one of its worst European relationships, there is a considerable range within which it can move. One of the great successes of Norwegian–Russian cooperation was the partial decentralization of the bilateral relationship to the local and regional level through the Barents Euro-Arctic Region. As Russian–Western relations have soured, there has been a de facto recentralization of Norwegian foreign policy towards Russia. A question for the future is therefore whether the provinces near the Barents Sea will have the possibility to cooperate locally across the border and especially in the traditional areas of cooperation such as education, research, and people-to-people (see Chapter 7 – Bourmistrov, Gudmestad, Salygin, and Zolotukhin). A related question is whether Norway will continue to have ambition to be a leading Arctic state focusing on Arctic oil and gas and relations with Russia in the North, or might an emphasis on climate change under a future Norwegian government alter Norway's strategic priorities?

Extent of Russia's orientation towards Asia

Giving the potential for Chinese–Russian petroleum cooperation described in Chapter 3 – Overland, Simonia, Vasiliev, and Wilson Rowe – if Russian–Western and Norwegian–Russian relations stay negative or worsen, Russia could diversify and give Chinese companies an important role in the Barents Sea. This could affect the prospects for Norwegian–Russian cooperation. The relevant uncertainty in this respect is: will political relations between Russia and the West and the instability and risks that they bring deter Norwegian and Russian companies from investing in each other's countries in the long term?

As noted in Chapter 9 – Zolotukhin, Sungurov, and Streletskaya – Russia is the world's largest country by surface area and has many locations to choose between for hydrocarbon production. Thus Russia may prioritize the Barents Sea or other areas such as the Russian Far East, the Yamal Peninsula, or enhanced oil recovery from its old West Siberian fields.

One strength of Norwegian–Russian cooperation is that previous cooperative initiatives between the two countries are already close to institutionalization, particularly attempts to harmonize education (see Chapter 7 – Bourmistrov, Gudmestad, Salygin, and Zolotukhin) and some business practices (see Chapter 5 – Bourmistrov, Borge Doornich, and Krivorotov). However, the extent to which Russia can shift towards Asia will also depend on how active and efficient the Norwegian and Russian authorities will be in promoting petroleum-related joint industrial investments in the coastal Barents Sea region: cross-border Russian–Norwegian business-to-business and people-to-people contacts (creating cooperative institutions, lifting administrative and cultural barriers, etc.).

Interaction between different uncertainties

The uncertainties identified in the previous section can be thought of as the building blocks for a time machine: how each of them works out and how they interact with each other will determine what the future looks like. Figure 2.2 is a simplified illustration of how we have thought about this interaction. The darker an arrow, the more strongly we assume a factor influences another. Dotted lines indicate that a factor reinforces the effect of another factor.

Scenarios

In line with Shell's methodology, we have striven to avoid scenarios that are simply optimistic or pessimistic. Instead, each of them is meant to be balanced

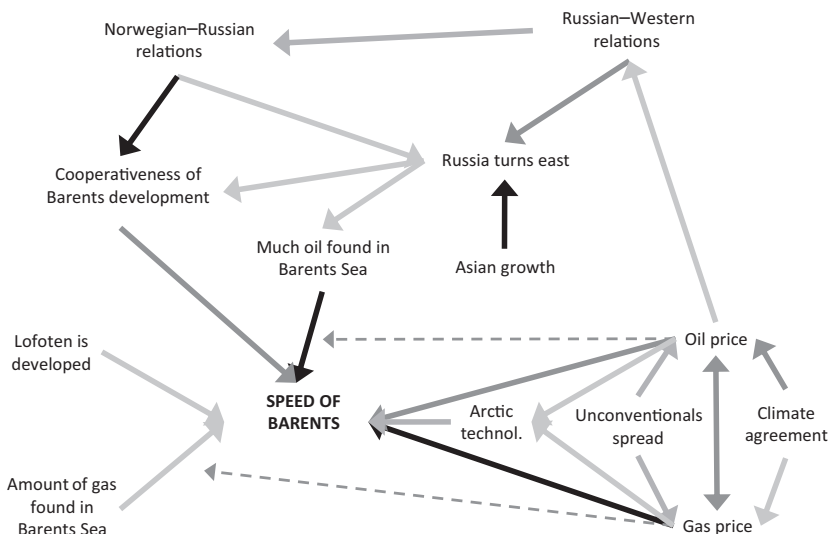

Figure 2.2 Time machine – how the future may be shaped by the interaction of factors

and multifaceted. We tried to avoid getting caught up in discussions of current events or simply extending current trends. That is always difficult. An informed observer can often make good predictions for the coming six or 12 months, and while we have worked on our scenarios we have experienced that some of our visions have already become true. Although that gives one the feeling that one is on the right track, it is not necessarily a good thing, as the scenarios should strive to relate to a future beyond what we know now. It is also worth noting that the diversity of the people involved in making the scenarios, while enriching and providing a sound basis for them, has also had a limiting effect as it was necessary to compromise between sometimes highly divergent worldviews. Tables 2.1 and 2.2 provide an overview of how the different assumptions and uncertainties are related to each other in the three scenarios.

Scenario 1: "After You, Sir"
– Good relations, but surging unconventionals reduce oil and gas prices

In the scenario "After You, Sir", Russian–Western relations had not fully recovered from the Ukrainian crisis, but the crisis did not have a similar degree of influence on the cooperation between the two states in the Arctic. Because of this, the relationship between Norway and Russia was respectful, and their interaction in the Barents Sea was cooperative. But the price of oil and, especially, natural gas, was low and combined with the high costs of infrastructure

Figure 2.3 Fingerprint of the scenario "After You, Sir"

that meant that many fields were not commercially viable. Thus, in spite of the cooperative atmosphere, the two countries were like two British gentlemen in front of a door, each politely ushering the other to enter first, but neither of them actually going through the door.

A new climate regime was agreed upon in Paris in 2015, but it lacked teeth and failed to limit greenhouse gas emissions seriously. Unconventionals, especially shale gas, spread across the world as the Chinese, Argentineans, and others successfully copied the US approach, flooding the market with gas. The interest of companies in developing Arctic petroleum technology was consequently low. Even in Russia, unconventional natural gas became more interesting than the expensive Arctic offshore developments – especially as the Chinese came to fully master shale gas technology and not only used it to expand their own production but in parallel flooded the world market with cheap drilling rigs, often leased along with cheap, disciplined Chinese engineers.

In the Russian part of the Barents Sea, the Russian authorities and companies were slow to act, while Rosneft and Gazprom continued monopolizing all opportunities. On the Norwegian side, the authorities and Statoil disagreed on infrastructure choices and environmental principles, and the Lofoten Islands area remained closed for exploration. Both the Norwegian and Russian authorities were reluctant to give tax breaks. The 1.8 trillion-bcm trans-boundary gas field identified in the Fedynsky High in 2016 was developed jointly by Gazprom and Statoil and is due to come on stream in 2029. The gas would be piped through Russia to the EU and partly replace volumes from West Siberia that were being diverted to Russia's Altai pipeline to western China.

A number of smaller oilfields were identified on the Norwegian side, whereas exploration stalled on the Russian side. But beyond Johan Castberg and Fedynskoye fields, there were few actual field developments.

As there were not so many projects, the development of the local supply industry in North Norway and Russia was slow. Fields were mostly developed from the Norwegian side, where Kirkenes was used as a main supply hub. The volume of contracts had not been high enough to justify a high level of local content and therefore most of the contracts were awarded to internationally well-positioned Norwegian firms that used only a few local Russian subcontractors, mostly those who had cooperated with Gazprom/Shtokman Development AG previously.

Scenario 2: "Parallel Play, Not Only for Children" – Intensified but noncooperative development of the Barents Sea under conditions of rising energy demand and political polarization

In this scenario – "Parallel Play" – the market context for the development of the Barents Sea was good, especially because of continuous economic growth in Asia and correspondingly growing demand for energy. But the relationship between Norway and Russia was not so good, and the two countries both tried to go it on their own. The result was parallel play, a term borrowed from the

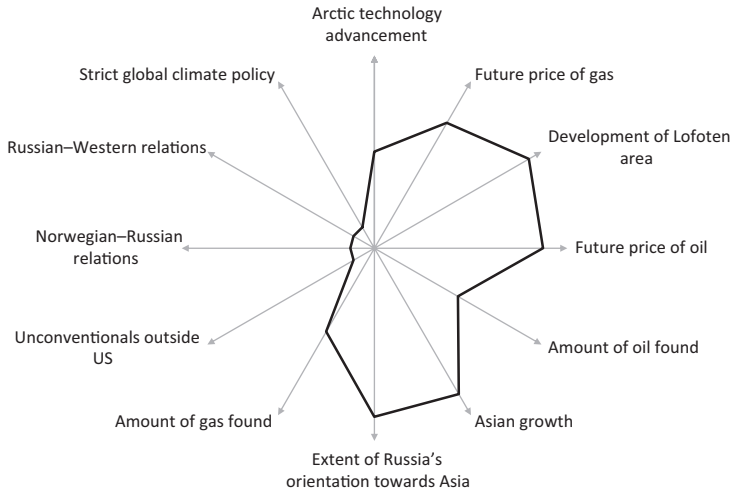

Figure 2.4 Fingerprint of the scenario "Parallel Play"

pedagogical literature, where it refers to the stage at which small children want to play but are unable to interact directly with each other.

In this scenario, no climate agreement had been reached. Unconventionals failed to spread significantly outside the US because other countries failed to adopt the legislation necessary to secure the property rights that were indispensable for the success of unconventionals in the US. Especially the oil price, but also the gas price, was high, providing strong market support for field developments in the Barents Sea. But the Norwegian–Russian relationship had been drawn into the maelstrom of persistently worsening Russian–Western relations, and, beyond the regulation of cod stocks, there was little cooperation in the Barents Sea.

In 2022 there was a military confrontation off the coast of the Svalbard archipelago over a fisheries incident. Although the violence was minor, it was not good for cooperation in the Barents Sea. As a result both sides were working actively but not in coordination, and Russian activity in the Barents Sea had been weakened by the intensive efforts to develop Far East and East Siberia as the country reoriented itself towards Asia.

It also turned out that the procedure for unitization of trans-boundary oil and gas fields under the 2010 Murmansk Treaty was not quite clear after all, and in the prevailing atmosphere the sides were unable to iron out the wrinkles. Combined with the generally negative political atmosphere, this made it difficult to develop any trans-boundary fields. The major oil finds happened to straddle the

boundary delimitation line, meaning that little happened on the oil front. Some smaller fields deeper into the Norwegian part of the sea were however developed.

The Chinese company, CNPC, had taken a central role on the Russian side after it offered to take full responsibility for the Shtokman field in return for a 49% stake and little security apart from assurances from Russia's top politicians.

Norway's conservative coalition government was reelected in 2017, with, among other things, a strong vote in North Norway based on a promise to finally open the Lofoten area for exploration. Although the pro-oil part of the North Norwegian population was dissatisfied with the government's recent performance, the green turn of the competing coalition led by the Labor Party gave pro-oil voters little choice.

An unprecedented number of blocks were opened for exploration on the Norwegian side in 2018 and the industry grasped the opportunity and went on a hectic exploration campaign. On both sides, companies heavily invested in the development of Arctic petroleum technologies, but the lack of cooperation across the border limited progress on both sides as well as the potential market for new technologies. There were sufficient discoveries to extend the Norwegian pipeline grid northwards to the Lofoten archipelago, but there were insufficient gas finds in the Norwegian part of the Barents Sea to extend it any further, and the Chinese and Russian companies working in the Russian part of the Barents Sea opted for LNG instead, deploying a floating LNG plant to export the gas from the Shtokman field.

Supply industries on both the Norwegian and Russian sides had developed, aimed at delivering products and services to the fields in each country. On both the Norwegian and Russian sides, the volume of contracts awarded to the local supply industries had increased considerably because of the high volume of contracts awarded. However, local content policies motivated Chinese companies to work mainly with Russian partners, while the Norwegians worked with Western oil companies – there was little cooperation between Norwegian and Russian companies.

Scenario 3: "Let's Dance, but Where Is the Music?" – Good cooperation in the Barents Sea, but demand is hampered by climate policy

In the scenario "Let's Dance", Norway and Russia were keen to cooperate in the development of the Barents Sea, but the international market conditions were not conducive for investment.

Russian–Western relations were reasonably good and Norwegian–Russian relations were even better. Asian growth had stagnated, resulting in lower demand for energy. Consequently Russia had reduced its interests in Asia beyond keeping up deliveries of gas to China in accordance with the agreement on the Power of Siberia Pipeline reached in 2014. The Altai pipeline was only partially filled. The world had also become increasingly worried about climate change – and willing to do something about it. Both the Norwegian and Russian governments had

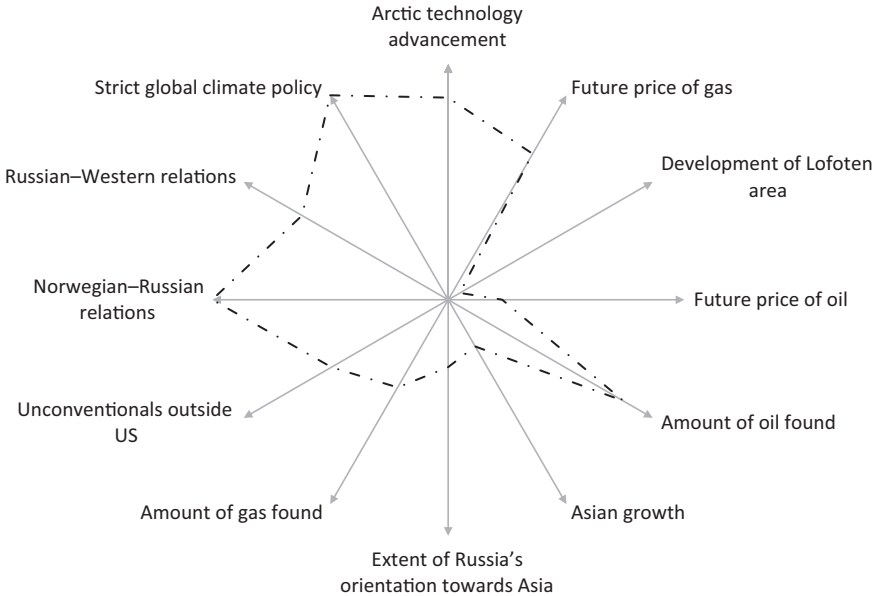

Figure 2.5 Fingerprint of the scenario "Let's Dance"

answered the call of the UN for green growth policies and implemented those. The Lofoten area was permanently closed for petroleum development, mainly due to local environmental concerns and fisheries interests.

At the global level, a serious follow-up agreement to the Kyoto Protocol was finally agreed upon just before the extension of the Kyoto Protocol ran out in 2020. Strict measures were swiftly ratcheted up, putting downward pressure on the price of oil. The price of natural gas was higher, as gas was used to replace coal, which had become prohibitively expensive under the new climate regime. This also put pressure on the development of unconventionals, especially shale oil.

The new climate regime was accompanied by much stricter environmental regulations and requirements for Arctic offshore petroleum operations in Norway and Russia. This put pressure on companies to advance their Arctic petroleum technologies. Due to the cooperative climate, the Russian and Norwegian petroleum majors managed to develop new advanced technologies at a reasonable cost, due only to close research cooperation. However, the lack of development in the Lofoten area meant that there was no infrastructure to connect the Barents Sea with the rest of the Norwegian continental shelf. Instead, a pipeline was finally completed in 2025 to take Shtokman gas from Murmansk through Karelia to Vyborg, and Shtokman was to come on stream in 2026 – with the same consortium of companies as in the initial agreement: Gazprom, Statoil, and Total. However, apart from the Shtokman and Johan Castberg projects, there were few developments, especially oilfields, in the Barents Sea as demand was subdued by the new climate agreement. Faced with

limited capacity and uncertainty about the future of the petroleum industry in the High North, the local supply industry in both Norway and Russia had to make U-turns in their strategic priorities to answer the call for green growth policies. Most of the firms had chosen to diversify market portfolios and to develop and supply products and services for projects other than petroleum industrial ones, related to, for example, green cities, building wind turbines, etc. There were several interesting examples of how technological innovation had stimulated Norwegian and Russian companies to cooperate.

Wild cards

Wild cards are events that have low probability, but high impact if they do occur – similar to the concept of "black swans". They are, thus, clustered in the top left corner of the graph in Figure 2.6. The fact that such unexpected events do happen all the time is one of the reasons for using Shell's imaginative scenario-building methodology rather than forecasting and projecting trends.

Frequently – but not always – they are exogenous to the system and trends that underpin the main scenarios. Alternatively, they may arise when a trend reaches a threshold or tipping point (cf. Anker, Baev, Brunstad, Overland, & Torjesen, 2010, p. 131; Brunstad, Magnus, Swanson, Hønneland, & Overland, 2004, p. 163). Wild cards are thus often stand-alone events that would throw other variables into the air and impact on many different trends. In that regard they are mini-scenarios in their own right, therefore standing alone rather than being integrated into the main scenarios.

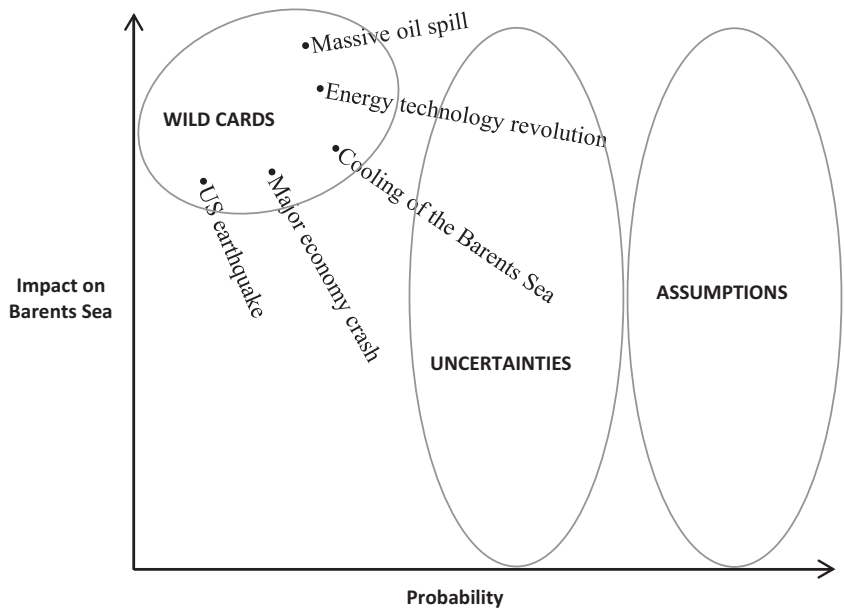

Figure 2.6 Wild cards in the development of petroleum resources in the Barents Sea

In working on the wild cards for this book, it was noticeably difficult to think of unpredictable events that would lead to rapid petroleum development in the Barents Sea. Most events that we have managed to think of would reduce the likelihood of rapid petroleum development.

Wild card 1: a massive oil spill

We have considered an oil spill per se as only an uncertainty rather than a wild card, but a massive oil spill is a wild card, especially if it occurs somewhere in the Arctic. It is not certain how it would affect the oil and gas industry, as there have previously been big spills that did not lead to major changes in the industry in spite of broad media coverage and changes in regulations. However, changes in regulations could make fields more expensive to develop, and the Lofoten area is already closed (at least for the time being) due to environmental concerns, showing that such concerns can in fact have an impact.

For the development of the Barents Sea, the massive oil spill was the death knell. Oil had been the most attractive resource due to higher oil than gas prices, but, due to the costly new regulations, only very large oilfields could be developed.

Wild card 2: a big earthquake in the US blamed on fracking

A 2017 earthquake in Oklahoma City killed 12 people and brought down many buildings, as well as several railway and highway bridges. The event received television coverage around the world. It led to a temporary ban against fracking near residential areas in the US and all-out bans on fracking in many other countries. The knock-on effect of this was that oil and gas prices rose, especially in the US, but gradually also in other parts of the world.

For the Barents Sea, this meant that the Shtokman project was revived, with a floating LNG terminal and aimed largely at the North American market.

Wild card 3: one of the major economies crashes

During the coming years, one of the world's major economies may crash, with a major negative impact on the development of the petroleum resources in the Barents Sea. The economies we consider here are China, the EU, and the US.

China

Escalating tensions with Japan finally caused Japanese companies to start withdrawing from China. Municipal and company debt reached unsustainable levels, and, in a series of attempts to bring the situation under control, the real estate market unraveled at the same time as many municipal and corporate bonds matured. China had been on an upward spiral for a long time, now it was on a downward one and from 2018 to 2021 it went steeply downwards. This forced the Chinese to reduce their rapidly rising wage and other costs, which in turn led to (even) lower imports and to social unrest in China, which in

turn further undermined Chinese growth. The Chinese threw out their environmental ambitions, stopped replacing coal with natural gas, and reduced oil imports. At the same time, the West was reducing its consumption of fossil fuels, both for economic and climate reasons. This brought oil and gas prices down, which in turn brought developments in the Barents Sea almost to a halt.

The United States

The US economy had been the first to overcome the financial crisis that started in 2008. However, the US recovery was driven by printing money, which led to a new stock market bubble rather than sustainable growth. Although US exports improved with the lower value of the dollar and lower energy costs from shale gas, the trade balance continued to be seriously off balance, and the US could not pay its debt. When attempts were made to reduce the printing of money, economic growth quickly slowed, so the printing was resumed again. This led to an economic crash in the US in November 2018. As the markets were no longer convinced by promises of quantitative easing, the crash was even worse than that in 2008 and the American dollar lost more than half its value. The Chinese lost one of their main export markets and the whole world economy fell two years in a row. Along with the world economy, oil and gas prices fell, undermining the development of the Barents Sea.

The EU

There was stagnation, continued high unemployment, debt, and increasing political instability in some countries. Increasingly unruly member countries saw less and less benefit in the union and started challenging it – in particular Denmark, Hungary, and the UK. These developments led to a downward spiral, including another economic crisis, the rise of Euroskeptic parties (mostly right-wing, but, in a few places, left-wing), the weakening of environmental policy, and increased use of coal. For the Barents Sea this meant chaos and low demand in its main gas market, making it even more difficult to develop new gas fields.

Wild card 4: an energy technology revolution

There was a breakthrough in Canada in 2015 in the storage of CO_2 from a coal-fired electricity plant, leading to a revival for coal. Electricity companies joined forces to develop a pipeline network for capturing and transporting CO_2 to suitable locations for storage, and managed to cut costs for the production of the necessary materials for the pipelines. This led to reduced investment in the oil and gas sector. Furthermore, in 2020 another energy technology breakthrough was achieved when Lockheed Martin finalized the technology for mass production of mobile fusion reactors. The prospect of cheap and abundant electricity led to a substantial reduction in the development of new gas fields. For the Barents Sea, the effect was that all new field developments were put on hold and further exploration drilling in the prospective Fedynsky High area was abandoned.

Wild card 5: cooling of the Barents Sea

After a volcano eruption in Indonesia in 2018, a large cloud of volcano ash covered most of the earth's atmosphere. The result was a global cooling that lasted for six years. During the cooling period the ice cover in the Arctic increased considerably, causing a setback in development work. The cooling also caused reduced temperatures worldwide, increasing the need for fuel for heating. For the Barents Sea projects, the situation resulted in an increased interest in Arctic technology, with a delay, however, in exploration drilling and development studies due to the increased ice coverage.

Table 2.1 Overview of common assumptions for the three scenarios

Assumptions	*Scenario 1 "After You, Sir"*	*Scenario 2 "Parallel Play"*	*Scenario 3 "Let's Dance"*
World markets vs. international political bodies	World markets and the geopolitical context will be more important than circumpolar or other international political bodies		
Demand for energy	Global energy demand is going to continue growing, driven by a combination of population growth and economic growth		
Asian market growth	Asian markets will continue to grow. Russia will continue diversifying its exports by expanding exports to the Asia–Pacific region		
Global climate policy	Climate change will remain on the political agenda		
Barents petroleum exploration	Large fields are not very likely to be found outside the potentially interesting structures that have already been identified for exploration, especially on the Norwegian side		
Arctic petroleum production	There will be significant interest in oil and gas production from the Arctic, but development will be dependent on the costs of operations, maintenance, and logistics. The cost of petroleum exploration and production will remain high in the Arctic, even if significant technological progress is made.		
Arctic marine bio-resources	The Barents Sea will remain a globally important marine habitat important for Arctic marine species and commercial fisheries		
Arctic weather conditions	Arctic weather conditions will continue to challenge personnel and hardware		
The Northern Sea Route	The Northern Sea Route will remain secondary as a transport route for oil and gas from the Barents Sea to Asia		
Business-to-business cooperation	Oil companies will continue to want access to each other's parts of the Barents Sea, but there will be limited room for small players, especially on the Russian side		

Table 2.2 Overview of uncertainties for the three scenarios

Uncertainty factors	*Scenario 1 "After You, Sir"*	*Scenario 2 "Parallel Play"*	*Scenario 3 "Let's Dance"*
Future price of gas	Low	High	High
Future price of oil	Low	High	Low
Asian growth	High	High	Low
Unconventionals outside US	High	Low	Medium
Strict global climate policy	Medium	Lax	Strict
Amount of oil found	Medium	Medium	High
Amount of gas found	High	Medium	Medium
Development of Lofoten area	No	Yes	No
Arctic technology advancement	Low	Medium	High
Norwegian–Russian relations	Good	Bad	Good
Russian–Western relations	Medium	Bad	Good
Extent of Russia's orientation towards Asia	Yes	Yes	No

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