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Background Paper

Offshore Hydrocarbon: Current Policy Context in the Marine Arctic

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EXECUTIVE SUMMARY

Offshore hydrocarbon activity in the Arctic marine area is on the rise. There are numerous reasons for this. It is estimated that the Arctic sea bed may hold almost one-fourth of the world's undiscovered oil and gas deposits. Due to global warming, sea ice in the Arctic is melting rapidly and thereby the Arctic waters are increasingly open for resource exploration and exploitation. Global demand for oil and gas is also increasing despite policy efforts to switch to more climate-friendly energy sources. This demand further increases the pressures to exploit the Arctic's hydrocarbon deposits. Furthermore, the progress in technology, ship design, the drilling gear and logistics have made the accessibility to Arctic waters easier than before for the purpose of offshore hydrocarbon exploration and exploitation.

Offshore oil and gas activity may have potential adverse consequences on the local marine environment in the event of oil spills – spills, which can have direct or indirect social and economic impacts for the region. This chapter will first briefly address the magnitude of current oil and gas activities in the offshore Arctic and then it will outline the potential environmental, social and economic consequences of the offshore hydrocarbon activities. Third, the chapter will examine the international legal framework for practising offshore oil and gas activities in the Arctic, including transboundary environmental assessment of oil and gas activities. Fourth, the chapter addresses the current policy context in offshore oil and gas activities in the Arctic. The following are the key findings of the chapter:

- **Environmental threats are increasing.** Offshore oil and gas activities are likely to pose a challenge to the overall Arctic marine area. With the increase of oil and gas activities in the region, the likelihood of an oil spill steadily increases; a large oil spill could have major environmental effects on the Arctic marine area. Pollution from hydrocarbon activities may cause adverse affect to marine species such as fish species, marine mammals, birds and other animals.

- **There are increasing disruptions for traditional livelihoods and indigenous cultures.** Offshore oil and gas activities, in their part, may also threaten the human security of the local and indigenous communities, cultures of Arctic indigenous peoples and their traditional livelihoods (although in some cases the better living conditions created by offshore hydrocarbon activities can allow more time to practise traditional subsistence activities). Hydrocarbon activities can significantly contribute to the improvement of the local economies and social services (e.g. by creating employment opportunities and in this way connecting locals to the modern market economy).

- **Inadequate international legal frameworks increase the risks.** Offshore oil and gas activities are covered by the existing legal principles found, for instance, in the LOS Convention. There are only limited number of applicable treaties that address prevention of pollution from offshore installations, and/or outline measures for responding to the emergencies caused by these activities. Some gaps can be found in the transboundary environmental assessments, although here the legal situation is better. Yet, it should be noted that there is only one convention that is specifically tailored to the Arctic conditions, and that is a bilateral agreement - the 1983 Agreement between Denmark and Canada for Cooperation Relating to the Marine Environment – not a multilateral one. There is Arctic-specific guidance on how to safely conduct offshore hydrocarbon exploitation, provided by the Arctic Council's

Arctic Offshore Oil and Gas Guidelines. This document is, however, legally non-binding and there is as yet no overall evaluation on how it has influenced offshore oil and gas operations in the region.

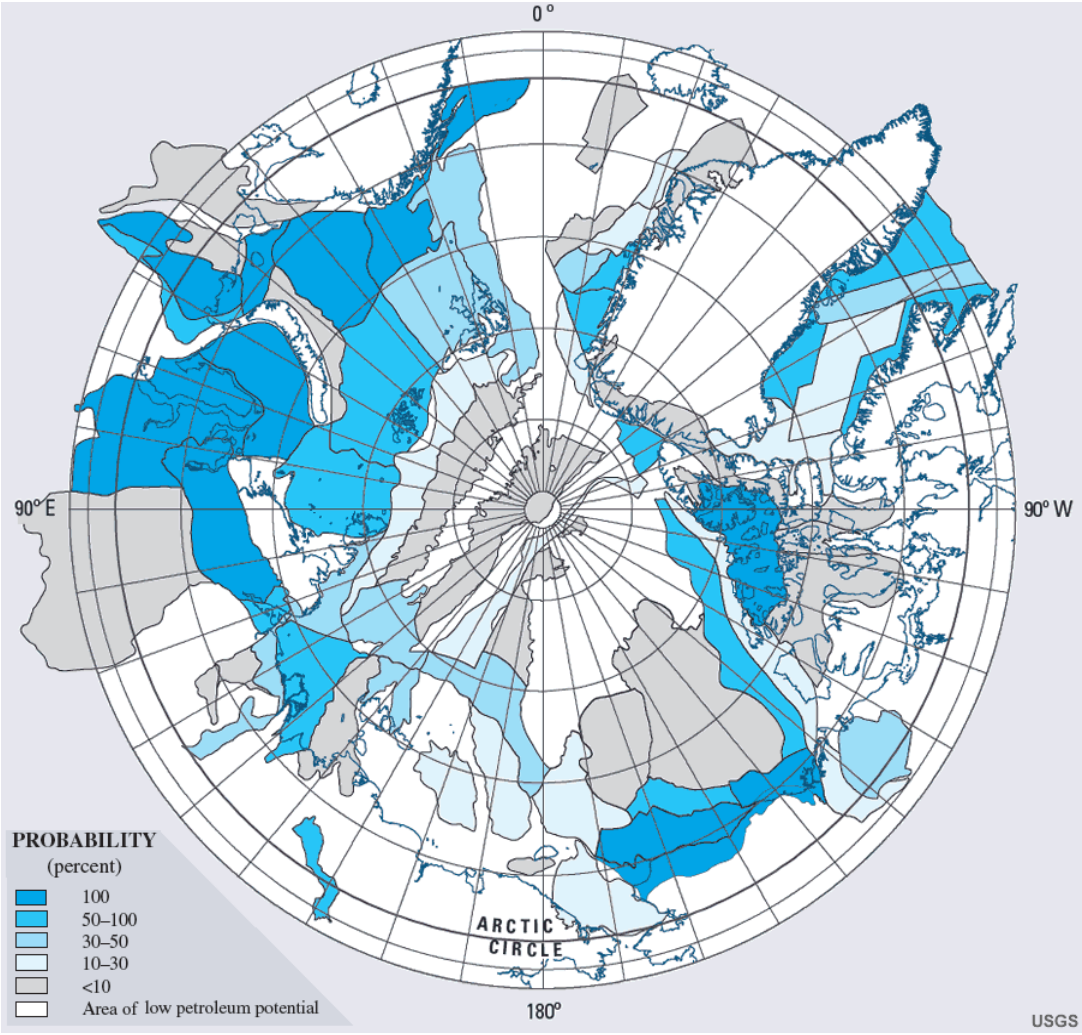

Figure 1: Estimates of Undiscovered Oil and Gas North of the Arctic Circle. Note: colour coding shows the assessed probability of the presence of at least one undiscovered oil and/or gas field with recoverable resources greater than 50 million barrels of oil equivalent.

Source: reproduced from USGS Arctic Oil and Gas Report (2008), Estimates of Undiscovered Oil and Gas North of the Arctic Circle, at: http://geology.com/usgs/arctic-oil-and-gas-report.shtml

1. INTRODUCTION

The Arctic Climate Impact Assessment Report – 2004 (hereinafter ACIA Report), has identified ten major findings as the resulting consequences of the rapid climate change in the Arctic. One of the findings (finding number six) states that the reduced sea ice is very likely to

increase marine transport and access to resources.[1] Ice conditions in the Arctic marine area have come close to the projection made by ACIA. The whole of the Arctic sea ice is dramatically melting as a result of climate change. Consequently, the sea routes in the Arctic are open and accessible for longer periods of time than they have been previously. Moreover, the routes are increasingly of interest for several reasons, one of which is the exploration and exploitation of the region's natural resources. Oil and gas (hydrocarbons) are the most significant non-renewable resources in the marine Arctic and activities related to them are gradually expanding. It is estimated that the Arctic seabed may hold as much as 25% of the world's undiscovered oil and natural gas reserves.[2] These reserves remain unproven but there is no doubt that the resources are substantial in the global context.[3] Most of the oil and gas reserves in the Arctic are located in Russia: oil in the Pechora Basin, gas in the Lower Ob Basin, and other potential oil and gas fields along the Siberian coast.[4] The Chukchi Sea, lying between North-western Alaska and Eastern Siberia, is estimated to hold a mean volume of 15 billion barrels of technically recoverable risked oil and 76 trillion cubic feet of natural gas.[5] Canadian oil and gas fields are concentrated in two main basins in the Mackenzie Delta/Beaufort Sea region and in the high Arctic. There are oil and gas fields also in other parts of the Arctic marine area, for example, in the Barents Sea. The onshore oil fields in Prudhoe Bay area in Alaska are the largest in North America. In addition, there are substantial reserves of natural gas and coal along the North Slope of Alaska.[6]

2. OFFSHORE HYDROCARBON EXPLORATION AND PRODUCTION IN THE ARCTIC

Oil and gas exploration and exploitation in the Arctic started in the 1920s; but in the second half of the 20th century it expanded rapidly. It is, moreover, projected that the activity as such will expand even further in the near future. Offshore oil and gas exploitation in the Arctic is already the major economic driver in many areas in the region.[7] In the past, due to the harsh climatic conditions it was difficult to drill for hydrocarbons in the Arctic. It was many times hard for the companies to make profits due to the very high costs involved in exploitation and creating transportation routes in the remote and harsh regions. In recent times, however, both energy industries and Arctic states have found oil and gas exploitation in the Arctic interesting. Number of reasons can be argued to be behind this: first, for example, the high

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1 ACIA: Impacts of a Warming Arctic, pp. 10-11, 82-85; See also Atkinson, 2007, Conference Presentation, online (viewed 21.03.2008).

2 Borgerson, 2008, online (viewed 09.04.2008); Gautier, 2007, online (viewed 21.02.2008), pp. 32. where it was reported that the new assessment carried out by USGS indicates that north-eastern Greenland may be a very important future petroleum province. See also AMAP: Arctic Oil and Gas, 2007, pp. 32.

3 Austvik, 2006, online (viewed 10.03.2008).

4 ACIA, 2005, Chapter 18: Summary…, pp. 1002.

5 Loy, Wesley: *Record bids for oil, gas leases in Chukchi Sea*, Anchorage Daily News, 7 Feb 2008, available online at http://www.adn.com/oil/story/307588.html (viewed 17.04.2008).

6 ACIA, 2005, Chapter 18: Summary…, pp. 1002.

7 AMAP: Arctic Oil and Gas, 2007, pp. 1.

price of oil and gas in the world market and a high demand for energy resources create pressures to find new oil and gas deposits; secondly, energy exploitation may become more feasible in the Arctic with the advances in ship design and drilling equipments; third, in comparison to many other hydrocarbon regions, the Arctic can be seen to be a safe one, given that there are no on-going conflicts.[8] Yet, there are also problems related to practising offshore hydrocarbon activities in a changing climate of the Arctic. Hydrocarbon activities in general require consistency and predictability in their operating environment, factors which are threatened by changing sea ice conditions e.g. increasingly moving ice in partially ice covered waters require more expensive design solutions from the offshore hydrocarbon activities.

The oil and gas development in Siberia has been dramatic: over the past few decades this region has produced 78% of Russia's oil and 84% of its natural gas.[9] Oil fields in the Prudhoe Bay in Alaska produced around 14 billion barrels by 2002.[10] In Arctic Alaska, offshore oil and gas activity is likely to increase. At the start of the year 2008, the US federal Minerals Management Service (MMS) announced it would auction exploration and development rights to 30 million acres of the American sector of the Chukchi Sea on 6 February 2008. An environmental research and production of an environmental impact statement have been done prior to the February 2008 sale.[11] In Canada, natural gas field development and pipeline construction may begin in the Mackenzie Delta, subject to approval, with oil and gas exploration and development expected to follow in the near shore Beaufort Sea. In Norway, Barents Sea gas production has already started in the Snohvit gas field.[12] Tanker movements are also increasing rapidly in Russian and Norwegian parts of Arctic marine area. Greenland and the Faroe Islands continue to explore for offshore oil and gas, and exploration activities are also starting around Iceland.[13] On going oil and gas activities in the offshore Arctic region are briefly discussed below:

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8 This fear is because of the oil crisis the world faced in October 1973, when the Arab members of the petroleum producing countries announced a ban on oil shipment to the countries supporting Israel in 1973 Arab-Israel war. See 25th Anniversary of the 1973 Oil Embargo, US Energy Information Administration, available at http://www.eia.doe.gov/emeu/25opec/anniversary.html (viewed 16.04.2008).

9 ACIA, 2005, Chapter 18: Summary…, pp. 1002; Arctic Circle Website: http://arcticcircle.uconn.edu/NatResources/gasdev.html (viewed 04.04.2008).

10 ACIA, 2005, Chapter 18: Summary…, pp. 1002; *Analysis of Oil and Gas Production in the Arctic Wildlife Refuge* on Energy Information Administration website, U.S. Department of Energy 2004, available online at tonto.eia.doe.gov/ftproot/service/sroiaf(2004)04.pdf (viewed 04.04.2008).

11 Comments from Dennis Thurston from the US MMS. In fact, MMS had the Chukchi Sale at the end of the 5 year leasing program 2002-2007, but postponed it until February 2008 to collect more information on the environmental concerns including polar bears. The sale planned in 2004 was cancelled due to no interest. See also Thurston, 2003, online (viewed 08.03.2008).

12 Total company, press release, 21 Sep 2007, available online at: http://www.total.com/en/press/press_releases/pr_2007/070921-norway-snohvit-starts-production_13722.htm (viewed 17.04.2008).

13 AMAP: Arctic Oil and Gas, 2007, pp. 3. Iceland is about to open its Dreki (Dragon) maritime area for gas exploitation, now having strategic environmental assessment commenced for studying the impacts of this opening. The areas is located in a jointly divided maritime zone between Iceland and Norway's Jan Mayen. The Dragi SEA is interesting as it aims to apply all applicable international treaties in a very comprehensive manner, see Oil exploration in the Dreki area on the Jan Mayen Ridge, Icelandic Ministry of Industry, Mar 2007, available online at

2.1. Offshore Oil and Gas Activities in the United States

Most of the oil production in Alaska occurs in the onshore Prudhoe Bay area.[14] The three most important oil fields in Alaska are the fields of Endicott, Point Macintyre and Northstar. The Endicott oil field[15], which is the third largest of the seven main North Slope oil fields, produces oil from an artificial island connected to the onshore Prudhoe Bay oil field via a causeway. The Point Macintyre field[16] produces oil from the East Dock off of the Prudhoe Bay oil field. The third oil field, the Northstar[17] is located in the Beaufort Sea, about 12 miles NW of Prudhoe Bay and 2 miles from the shore.[18] Northstar oil is transported to shore by the first Arctic subsea pipeline which is 10 km long. A recent nearshore field has come on line. The Oooguruk Field in shallow State of Alaska waters of Harrison Bay is now producing with an estimated peak oil production of 20,000 barrels of oil per day from the 90-million-barrel deposit. The field is producing from a gravel island which is also used as a drill pad. In addition, there have been several leasing plans for Beaufort Sea[19], Chukchi Sea[20], Hope Basin[21] and Norton Basin.[22] These sales were all cancelled due to no interest, and neither of the areas is now on the new five year schedule.

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http://eng.idnadarraduneyti.is/media/Rafraen_afgreidsla/Report_on_oil_exploration-KK.PDF (viewed 12.04.2008). Information obtained from the officer of the National Planning Agency of Iceland on 25 March 2008 (e-mail communication).

14 U.S. Fish & Wildlife Service. 2001, online (viewed 21.03.2008).

15 The Endicott oil field was discovered in 1978 and started production in 1987. All together it contained 582 million barrels of recoverable oil. See Thurston, 2003, online (viewed 08.03.2008).

16 The field was discovered in 1986 and started to produce in 1992. It contained 400 million barrels of recoverable oil. See Ibid.

17 The field was discovered in 1984 and started production in 2001. It contained 176 million barrels of recoverable oil. Presently, the field produces 65,000 barrels a day. Oil is transported to shore by offshore pipelines which are buried 7-11 feet below the seabed to avoid ice gouging and scour. See Ibid.

18 Thurston, 2003, online (viewed 08.03.2008).

19 In Beaufort Sea, three sales were planned for 2003, 2005, and 2007 with approximately 9.4 million acres offered that lie 3-60 nautical miles offshore and are in 25 to 200 feet of water (with a small area north of Harrison Bay reaching to 3000 feet). Estimated conventionally recoverable resources are 3.6 to 12 billion barrels of oil with a mean of 6.9 billion barrels, and 13 to 63 trillions cubic feet, with a mean of 32 trillions cubic feet of gas (the ranges reflect 95%-5% probabilities). The first lease sale of the current round held on 24 September 2003 resulted in a total of 73, 576 hectares being leased off of Dease Inlet east of Barrow, off of Harrison Bay west of Prudhoe Bay and off of Beechy Point near Prudhoe Bay. See Ibid.

20 In Chukchi Sea, two sales have been scheduled for 2004 and 2007 with 34 million acres being offered. Areas for lease are located from 10 to 200 miles from shore in water depths of 32 to 230 feet. Conventionally recoverable resources are estimated at 13.6-154 trillions cubic feet of gas with a mean of 60.1 trillions cubic feet and 8.6 to 25 billion barrels of oil with a mean of 15.5 billion barrels (ranges reflect 95%-5% probabilities). See Ibid.

21 In Hope Basin two sales were scheduled along with Chukchi in 2004 and 2007 with 5 million acres being offered. Areas for lease are 3-110 miles offshore in 32-230 feet of water. Conventionally recoverable resources are estimated at 0-11.1 trillions cubic feet of gas with a mean of 3.4 trillions cubic feet and 0-300 million barrels of oil with a mean of 100 million barrels (the ranges reflect 95%-5% probabilities). See Ibid.

22 One sale has been planned in Norton Basin with 2 calls for interest in the period 2003-2004 with 25 million acres being offered 3-320 miles from shore in water depths of 25-650 feet. Conventionally recoverable resources are estimated at 0-8 trillions cubic feet of gas with a mean

2.2. Offshore Oil and Gas Activities in Russia

Russia's oil industry started to develop in the 19th century with the first fields that were discovered in the Baku region. The offshore development began on the Caspian Sea in the 1920s.[23] The Soviet Union was an important oil producer in 1980s but the production started to decline in 1990s as a consequence of the dissolution of Soviet Union.[24] However, production has recovered since 1999, which according to many analysts is due to the privatisation of the industry.[25] At present, Russia is an important producer of both oil and gas. Russia has proven oil reserves of 60 billion barrels, most of which are located in Western Siberia between the Ural Mountains and the Central Siberian Plateau.[26] Russian crude oil production reached 9.2 million barrels a day in 2006. Furthermore, Russia has the largest natural gas reserves in the world, with approximately 1,700 trillion cubic feet, and was the world's largest natural gas producer and exporter in 2005. Regardless of the magnitude of the resources, the production of natural gas in Russia has increased only little in recent years and the growth is projected to continue only slowly.[27] The demand for Russian oil and gas is high in the world market, in particular in Europe but potential growth of production hinders due to the Federal pipeline monopoly of Transneft, which does not allow any private transport pipelines, and also does not build enough infrastructure to handle increased production.[28]

The continental shelves of the Arctic seas are considered to have a great potential, with estimated natural gas resources of 70 trillion cubic metres in the subsoil of the Barents, Pechora and Kara Seas alone.[29] According to the most recent estimates, up to 80% of Russia's potential oil and gas reserves are concentrated on the Arctic shelf. Russia has already filed its submission for an extended continental shelf to the Commission on the Limits of the Continental Shelf under the LOS Convention (detailed discussions are at Section V of this paper). For the time-being, oil and gas in the region have only been extracted on

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of 2.7 trillions cubic feet and 0-200 million barrels of oil with a mean of less than 100 million barrels (the ranges reflect 95%-5% probabilities). See Ibid.

23 Lesikhina and Rudaya et al., 2007, online (viewed 19.03.2008).

24 The production reached 12.5 million barrels per day in 1988. However, roughly 25% of Russia's oil reserves and 6% of its gas reserves are on Sakhalin Island in the far eastern region of the country. The production fell to less than six million barrels /day in 1997 and 1998. See Pirog, 2007, online (viewed 29.03.2008).

25 Pirog, 2007, online (viewed 29.03.2008).

26 Dean and Barry, 2005, pp. 214. According to the authors Russia accounts for approximately 5-6 percent of the world's proven oil reserves and about on-third of the world's natural gas reserves. See also Gelb, 2006, online (viewed 27.03.2008).

27 Pirog, 2007, online (viewed 29.03.2008).

28 See, for example, the following websites (viewed: 02.09.08):

http://www.alacrastore.com/storecontent/oxford/DB135490
http://en.rian.ru/analysis/20070625/67766237.html
http://pipeliners.blogspot.com/2005_02_01_archive.html

29 Fifteen oil and gas fields had been explored in the Barents, Pechora and Kara Seas, and in the Bay of Obsk by the end of 2002. In terms of size, three of the fields were classified as unique, nine as large-scale, two as average size and one small. See Lesikhina and Rudaya et al., 2007, online (viewed 19.03.2008).

Kolguev Island[30], in Cape Kharasavey and in the Bay of Obsk.[31] Russia's oil and gas activities in the Arctic are expected to begin in the following areas: in the Prirazlomnoe oil field,[32] the Medynsko-Varandey area,[33] the Kolokolmor and Pomor area.[34] The right to use the subsoil in the Medynsko-Varandey, Pomor and Kolokolmor areas of the Barents Sea has been granted to the private company "Arcticshelfneftegaz" until 2025. Between 2009 and 2010, "Arcticshelfneftegaz" plans to begin commercial exploitation of the oil using ice-resistant stationary platforms.[35] The Dolgin oil field was discovered by Gazprom in 2000. In 2005, Gazprom obtained the licence to utilise this area of the subsoil for the purpose of prospecting and extracting mineral resources. An exploratory well was drilled from July to October 2007. Two additional wells are scheduled to be drilled in 2008. "Gazflot" (a subsidiary of Gazprom) has been licensed to develop the field.[36]

2.3. Offshore Oil and Gas Activities in Canada

According to *Oil and Gas Journal (OGJ)*, Canada had 179 billion barrels of proven oil reserves as of January 2008.[37] The first Arctic Island well in Canada was drilled in the high

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30 In 1998, the Federal state unitary enterprise "Arcticmorneftegazvedka" extracted 26,000 tons of oil at the Peschanoozer oil field on Kolguev Island. See Ibid.

31 According to estimates, the total potentially recoverable offshore oil and gas resources in Russia are approximately 100 billion tonnes of oil equivalent (made up of 16 billion tonnes of oil and more than 82 trillion cubic metres of gas). The bulk of these resources (around 76%) are located on the shelves of the Barents and Kara seas. Only 9-12% of the total potential offshore oil and gas resources on the Russian shelf have been explored. Recoverable potential resources of oil and gas are 22.7 billion tons in the Barents Sea. In the potential resources structure, gas-forming hydrocarbons predominate (21.6 trillion cubic metres), with liquid resources (oil and condensate) accounting for 1.1 billion tonnes. In the Pechora Sea, recoverable potential resources in terms of oil and gas are estimated at 4.9 billion tons. In this estimate, condensate accounts for 2.2 billion tons, and gas amounts to 2.7 trillion cubic metres. See Lesikhina and Rudaya et al., 2007, online (viewed 19.03.2008).

32 The Prirazlomnoe oil field is located in Russia's European (North) Arctic Continental shelf in the Pechora Sea, 60 km from the Varandey settlement (Nenetsky Autonomous District), 950 km from Arkhangelsk and 1025 km from Murmansk. A license to develop the Prirazlomnoe field was issued to Sevmorneftegaz in 2002. The project to develop the offshore Prirazlomnoe field is a pilot project for all Russian companies operating on the Arctic shelf. The project has attracted significant interest and attention in the process of developing and organising the field. Recoverable oil reserves from the Prirazlomnoe field are estimated at 83.2 million tons, with the maximum volume extracted annually amounting to 6.5 million tons. See ibid.

33 the Medynsko-Varandey licensed area covers a total area of 2,495 km2, which is situated in the south-eastern part of the Barents Sea, in the shallow waters of the Pechora Sea with depths of up to 19 metre. The field is situated 1,000 km from Murmansk and 410 km from Naryan-Mar. See ibid.

34 The Kolokolmor and Pomor licensed areas are situated in the southern part of the Pechora Sea. In this area, the sea does not exceed a depth of 40 m. The nearest ports are Naryan-Mar (distance: 200 km) and Murmansk (800 km). Significant oil and gas resources have been revealed here. The estimate is that 300 million tons of oil may be recovered from these licensed areas. The fields consist of a great number of seams, with hydrocarbons being found at depths ranging roughly from 1,000 to 4,000 m. See ibid.

35 ARCOP workshop report, 2006, online (viewed 16.04.2008), pp. 113.

36 Ibid, pp. 112.

37 Energy Information Administration, Official Energy Statistics from the U.S. Government, online (viewed 25.08.08).

Arctic in the winter of 1961-62 on Melville Island. In 1969, a significant gas discovery was made at Drake Point on Melville Island. Drilling continued in the Arctic both onshore and offshore on the man-made islands. Reserves of 17.5 trillions cubic feet of gas were proven. An oil discovery was made at Bent Horn N72 on Cameron Island (now in the Territory of Nunavut). In 1985, oil production commenced at Bent Horn on Melville Island with a shipment of 100,000 barrels of oil destined for a refinery in Montreal. These shipments continued, sometimes twice annually, until the late 1990s.[38] In the early seventies, exploration activity in the Beaufort Sea/Mackenzie Delta resulted in the drilling of many wells both onshore and offshore. The first wells were drilled from artificial islands and drill ships. Exploration continued into the middle 1980s in response to special tax incentives put in place by the Canadian government, as part of a National Energy Policy whose goal was self-sufficiency in oil. In August 2000, new lands were made available for exploration in the Mackenzie Delta/Beaufort Sea.[39] Currently, three oil production licences are in operation in Terra Nova, White Rose, and in Hibernia in Newfoundland and Labrador:[40] two Floating Production Storage and Offloading Facilities and one fixed platform. Offshore oil and gas activity in the region is expanding.[41] The total recoverable oil reserves are estimated to be 300-400 million barrels in Terra Nova oil field, 250 million barrels in White Rose[42] and 615 million barrels in Hebarnia.[43]

2.4. Offshore Oil and Gas Activities in Norway

Norway has proven oil reserves of 10.2 billion barrels. It has about 50 percent of Western Europe's oil and gas reserves. In 2004, Norway exported an average of 2.9 million barrels of oil a day, making it the third-largest exporter of crude oil in the world, behind Saudi Arabia and Russia. The Norwegian Government aims to maintain oil production for at least another 50 years.[44] Norway also has significant gas reserves. It was the world's third-largest gas exporter in 2004, behind Russia and Canada. Gas from the Norwegian continental shelf accounts for about 15 per cent of total European gas consumption, and this percentage is expected to increase. Given the level of proven resources, including those that are recoverable through enhanced extraction techniques, the present level of gas production can be maintained for about 100 years. In other words, gas will play an increasingly important

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38 Thurston, 2003, online (viewed 08.03.2008). Thurston, 2003, online (viewed 08.03.2008); AMAP: Arctic Oil and Gas, 2007, pp. 16.

39 See ibid.

40 The 'AMAP area' has been determined as the marine areas, as agreed by the Arctic Monitoring and Assessment Programme (AMAP) of the Arctic Council, according to which parts of the North Atlantic Ocean including the Labrador Sea belong to Arctic marine area. See www.amap.no; also see Arctic Human Development Report (AHDR) (2002-2004) at pp. 17-18.

41 Fraser et. al., 2006, pp. 148.

42 Energy Information Administration, available at: http://www.converger.com/eiacab/canada.htm (viewed 25.08.08).

43 Hebarnia Oil Production Platform, available at: http://www.kiewit.ca/eastern/pro_39194501.html (viewed 25.08.08)

44 The most important individual markets (first recipient countries) for Norwegian crude oil were the UK, the Netherlands, France, Germany, and the US. Total crude oil production (including condensate and natural gas liquids (NGL)) averaged approximately 3 million barrels a day. See Norwegian Ministry of Foreign Affairs, 2005, online (viewed 09.03.2008).

role in Norwegian resource exploitation activities.[45] Oil and gas activities in the Norwegian Arctic are mainly located in the Barents Sea. The first licenses for oil and gas exploration in the Norwegian Barents Sea were awarded in 1980, leading to the discovery of Snøhvit in 1984. In 2003, the Norwegian government decided to continue oil and gas exploration in the southern parts of the Barents Sea except in the areas that are defined as especially vulnerable.[46] Starting in 2007, Liquid Natural Gas (LNG) gas from the Snøhvit field is being produced in the Norwegian sector to supply to the world market, while the Goliat oil field also in the Norwegian sector will enter its production phase in the coming decade. Additionally, with increasing offshore oil and gas industrial activities, there will be an increasing maritime transport along the coast of Russia and Norway.[47] Very recently StatoilHydro has found hydrocarbons in the Obesum prospect located in Barents Sea. Although it is too early to estimate the size of the finds but the results for the well show that the reservoir contains both oil and gas.[48]

2.5. Offshore Oil and Gas Activities in Greenland

Exploration for hydrocarbons in the maritime area offshore West Greenland was initiated in the beginning of the 1970s. In the following years five exploration wells were drilled in areas with moderate water depths, but traces of hydrocarbons were found in only one well—Kangâmiut – 1.. In 1992, the Geological Survey of Denmark and Greenland (GEUS) discovered oil seeps on the south-west side of Nuussuaq peninsula, and in the following years seeps were recorded over a wide area extending from northern Disko through Nuussuaq to the southern part of Svartenhuk peninsula (70◦ - 71◦30' N). In 1996, the Canadian company GrønArctic Energy Inc. drilled an exploration well on Nuussuaq peninsula in which traces of hydrocarbons were found. In 2000, a group led by Statoil drilled an exploration well offshore central West Greenland. Even though the well, Qulleq – 1, did not strike hydrocarbons, it provided much valuable new information of importance for the planning of future exploration activities.[49] In the period 1999-2002, commercial geophysical companies acquired extensive new speculative seismic data from offshore West Greenland. The recently acquired seismic data have revealed the existence of hitherto unknown sedimentary basins offshore from west Greenland. A provisional integrated evaluation of seismic, gravity and magnetic data has indicated the presence of an interconnected basin system along the so-called Ungava Fracture Zone. This basin system may link the petroleum-prospective areas off Labradon on the east coast of Canada with the observed oil

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45 As a result Norway has become a major supplier of natural gas in Europe, and the Norwegian continental shelf is connected to the continent by several pipelines. In 2005, the export value of crude oil and natural gas sales was about NOK 433 billion, approximately 52 per cent of total Norwegian exports, and the petroleum industry's share of GDP was about 25 per cent See Moe and Schei, 2006, online (viewed 23.03.2007). See also Norwegian Ministry of Foreign Affairs, 2005, online (viewed 09.03.2008).

46 Austvik, 2006, online (viewed 10.03.2008).

47 Dahle and Camus, 2007, online (viewed 10.03.2008), pp.12.

48 Press release, 07.03.2008, available online on Oilinfo website at: http://www.oilinfo.co.uk/?tpl=nyheter, (viewed 10.03.2008).

49 Government of Greenland Bureau of Minerals and Petroleum, *Announcement Objectives and Plans for Future Oil and Gas Exploration in Greenland* 2003, online (viewed 10.03.2008)

seeps on Disko and Nuussuaq.[50] On 9 January 2008, the Greenlandic mineral and petroleum ministry signed agreement with Cairn, the company which has proved its efficiencies in oil and gas exploration and exploitation, to join the search for oil and gas in Greenland. Four new licences were signed covering approximately 45,144 km^2. This makes Cairn the company with the largest share of current licences in Greenland.[51]

[50] See ibid.

[51] Speech by Minister for Minerals and Petroleum Kim Kielsen (of Greenland) at: http://www.cairn-energy.plc.uk/downloads/Greenland_Speech_by_Minister_Kim_Kielsen_9_January_2008.pdf (viewed 10.03.2008).

Figure: 2 – Hydrocarbon Activities in the Arctic according to country:

Country	**Areas and Reserves**
United States	Most of the activities occur onshore in the Prudhoe Bay. Nearshore Fields include: Endicott oil field – 582 million barrels of recoverable oil. Point Macintyre field – 400 million barrels of recoverable oil. Northstar field – 176 million barrels of recoverable oil. Oooguruk oilfield -- 90-million-barrel of recoverable oil
Russia	Mostly onshore in Western Siberia – 60 billion barrels of oil reserves. Russian Arctic Shelves – 80% of Russia's potential oil and gas reserves. Significant gas reserve – approximately 1,700 trillion cubic feet. Prirazlomnoe oil field – 83.2 million tonnes of recoverable oil. Kolokolmor and Pomor area – 300 million tonnes of recoverable oil.
Canada	Drake Point onshore – 17.5 trillions cubic feet of gas. Bent Horn onshore Melville Island – production started in 1985 with a shipment of 100,000 barrels of oil. Terra Nova oil field contains 300-400 million barrels of recoverable oil. White Rose oil field contains 250 million barrels of recoverable oil. Hebarnia oil field contains 615 million barrels of recoverable oil. Beaufort Sea/Mackenzie Delta – onshore and offshore Exploration continues.
Norway	Overall proven oil reserve is 10.2 billion barrels. Significant gas reserves. Barents sea area – attracts oil and gas activities.
Greenland	Exploration activities are moving forward. Nuussuaq peninsula – traces of hydrocarbons were found. There remains petroleum prospective area between western Greenland and the east coast of Canada.

3. POTENTIAL ENVIRONMENTAL CONSEQUENCES IN THE MARINE ARCTIC

Oil and gas activities may have potential consequences to the overall Arctic environment, human security of communities, local economies, traditional livelihoods and identities, and also to health and food and well-being of local communities. Climate change may allow for increased transport and greater access to the Arctic resources (particularly fossil fuels). This

not only creates potential environmental consequences, but the burning of the extracted fuels to meet global energy demand further accelerates climate change. The environment is thus greatly affected by oil and gas activities in the Arctic.

3.1. Pollution from Oil Seeps and Oil Spills

Contributions to major environmental pollution may come from oil seeps and oil spills. The increase of oil and gas exploitation increases the risk of spills and leaks.[52] Eighty to ninety percent of petroleum hydrocarbons entering the arctic environment at present are thought to come from natural seeps. Oil spills may occur from oil and gas activities. Spills as such are also due to the use of petroleum products such as fuel and lubricating oils, some of which escape as exhaust or from leaks. Oil spills during exploitation and transportation are the most serious and direct source of pollution.[53] While a small spill may have substantial impacts in marine environment, a large oil spill is generally considered to be a major environmental threat at sea. A large marine spill may spread over hundreds of kilometres. Near-shore facilities and tanker routes near land also pose a greater risk of coastal damage from which spills may disperse widely in the ocean.[54] In addition, the offshore oil and gas industry may generate huge amount of water in connection with oil and gas activities, which may contain chemicals, and thereby may cause contamination in the sea water if discharged into the ocean.[55] Reinjection of the produced water is now applied to avoid contamination, for example, no US Arctic offshore production discharges produced water into the ocean or land – it is all reinjected. The key associated risks from seeps and spills, however, are as follows: [56]

i) Oil and gas exploration presents the risk of losing well control, which results in discharge of oils or releases of gas and the potential for fire, as well as other accidental spills and releases from operating activities and introduction of heavy metals associated with drilling muds.

ii) Oil and gas production presents the opportunity for accidental oil spills and release of gas from both land and sea during storage and shipping.

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52 AMAP Arctic Pollution Issues: A State of the Arctic Environment Report, 2002, pp. 145.

53 Ibid. pp. 146.

54 AMAP: Arctic Oil and Gas, 2007, pp. 24.

55 OSPAR has, however, adopted Recommendation 2001/1 for the Management of Produced Water from Offshore installations. Under the recommendation each contracting party should ensure that the total quantity of oil in produced water discharged into the sea in the year 2006 has been reduced by a minimum of 15% compared to the equivalent discharge in the year 2000. The means used by the most of the contracting parties for achieving the goal of 15% reduction had been the re-injection of produced water. See 'Extract from the Annual Report of the OSPAR Commission 2006/07', OSPAR Oil and Gas Strategy, at: http://www.ospar.org/eng/doc/Annual%20Report%202006_7%20OIC.pdf (viewed: 15.08.08).

56 Arctic Guide for Emergency Prevention, Preparedness and Response, Arctic Council EPPR website, online (viewed 08.04.2008).

iii) Oil harbours and terminals present the threat of accidental releases from storage or during off loading.

iv) Major transportation routes of oil and other hazardous substances carry the risk of discharges and releases from accidents.

v) Oil pipelines have the potential to discharge oil.

The arctic marine environment has its unique features in terms of unique types of shore, unique oceanographic and shoreline seasonal changes, and slower weathering.[57] The Arctic is generally considered to be vulnerable to oil spills due to slow recovery of the cold, highly seasonal ecosystems in region, and the difficulty of clean up in remote, cold regions, especially in waters where sea ice is present. Much of the activities, however, are concentrated in the ice-free summer months, including seismic surveys as well as shipments of fuel and supplies by barge or tanker. The ability to cope with spills will vary greatly by time of year and weather conditions, as well as the volume and characteristics of the oil spilled. Spills in broken sea ice and under ice remain the most difficult to respond to as it can not be cleaned up effectively.[58]

3.2. Consequences of oil spills in Marine Arctic

Oil spills affect numbers of marine animals. Mainly fish stocks in the embryonic stage and feathered and fur bearing animals are affected by oil spills resulting in problems in inhalation and ingestion of oil; oil spills can also create long term contamination that may affect populations and ecosystems for decades.[59] The impact of large spills can be long lasting and substantial. Although the Arctic has not faced any large oil spills in its marine environment from oil and gas activities, the 1989 Exxon Valdez oil spills in southern Alaska and the oil spills in the North Sea[60] in December 2007 already provide the indication of likely impacts of oil spills to the marine environment. Experience suggests that the potential impacts of an arctic spill are likely to be severe for its species and ecosystems.[61] In the arctic, seasonal aggregations of animals may be particularly vulnerable (e.g. marine mammals in open water areas in sea ice, seabirds at breeding colonies or feeding sites, or fish at spawning time, may be particularly vulnerable. The risk also includes smaller diffuse spills that might occur from

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[57] Arctic shore type is unique in the sense that it consists ice shelves, glacier margins, ice foot features, tundra coast; unique oceanographic and shoreline seasonal changes are due to open water, freeze-up, frozen condition and break up. See Field Guide for Oil Spill Response in Arctic Water, 1998, Arctic Council EPPR website (viewed 08.04.2008).

[58] *Comulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*, 2003, op.cit.,, pp. 100; AMAP: Arctic Oil and Gas, 2007, pp. 2.

[59] Ibid. pp. 10.

[60] North Sea oil spill has occurred on 12 December 2007. According to BBC, the accident occurred at the Statfjord oilfield some 200km (125 miles) away from the west Norwegian city of Bergen. The spill, estimated at 21,750 barrels (approx 3,000 metric tons), is the country's second largest ever, Norway's oil safety authority said. See BBC News: http://news.bbc.co.uk/2/hi/europe/7140645.stm (25.03.2008). See also Aftenposten at: http://www.aftenposten.no/english/local/article2149724.ece (25.03.2008).

[61] *Comulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*, 2003, op.cit. pp. 24-25.

increased transportation by shipping in the Arctic.[62] Contaminated sea water from oil and other petroleum products have a detrimental impact on all elements of the ecosystem, which is discussed in the sections below.

Consequences for birds

There are a great number of bird species that inhabit open sea areas and the waters in the Arctic. They reside in coastal islands and adjacent to the shore or to the ice barrier. Oil causes contamination to birds' food supply, eggs, and habitat. External contamination by oil destroys plumage, mats feathers and causes eye irritation. Exposure to oil can be picked up on the breast feathers of adult birds and transported to the nest and cover the eggs, which is the most sensitive stage of oil toxicity to the fledgling birds in the nest. Although the magnitude of effects on birds differs among species and from one oil spill to another, it is common that a small quantity of oil may prove sufficient to cause death during incubation. In addition, oily feathers hinder birds from flying and deprive them of their ability to retain warmth causing an eventual death from hypothermia - which is an abnormally low body temperature. Birds ingest oil when they clean their feathers, drink, consume contaminated food and breathe in the fumes. When a bird swallows certain quantity of oil, it results in a rapid death. Swallowing of oil by a bird also may result in oil poisoning that leads to a slow death from hunger and illness.[63] Although the general perception is that the seabirds are extremely vulnerable to oil spills, this conclusion may be based primarily on studies of a few species that are most likely to suffer the greatest spill-related impacts, whereas there are other species that are not generally affected. However, there is a community level impact of a spill at large, which includes: 1) reduction in species richness of the community; 2) change in the combined abundance of all species; 3) restriction in the distribution of species; and/or 4) differences in effects on different guilds. All of these consequences may affect the web of interactions among community members.[64] Oiling of marine birds takes place at sea or near shore facilities of oil and gas activities. Some of the affected birds fly to the beach thereafter, thus contributing to birds' mortality. However, oil spill from offshore installations is a less important source for birds' mortality. Furthermore, there is little evidence of any correlation between the amount of oil spilled and numbers of seabirds affected.[65]

Oil pollution from the offshore activities may contribute to sea bird mortality,even though it is a less important source for bird mortality. Another source of mortality is migration due to the industrial activities related to oil and gas exploration and exploitation. Migration stopovers occur over the course of several days at various locations. Generally, many individuals never return to the previous location due to a permanent source of anxiety – to a large extent due

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62 AMAP: Arctic Oil and Gas, 2007, pp. 24.

63 Lesikhina and Rudaya et al., 2007, online (viewed 19.03.2008); AMAP: Arctic Oil and Gas, 2007, pp. 24-25, 35.

64 John A Wiens, 'Effects of the Exxon Valdez Oil Spill on Marine Bird Communities in Prince William Sound, Alaska', 6 *Ecological Application*, No. 3 (1996) at 829.

65 C.J. Camphuysen and M. Heubeck, 'Marine oil pollution and beached bird surveys: the development of a sensitive monitoring instrument' 112 *Environmental Pollution* (2001) at 448.

to industrial activities. Mortality rate thus increases in the course of dislocation and migration.[66]

Consequences for Fish

Oil pollution of sea waters can directly kill fish and cause the gradual reduction in fish stocks by destroying the food base and spawning areas. Spawn and fish larvae are particularly sensitive to the effects of petroleum products. Under the influence of hydrocarbons, the larvae of many aquatic organisms become poisoned and killed during the first three days after the oil spill. Some southern fish species such as polar cod, arctic cod, saffron cod and navaga, spawn under sea ice in winter. Their eggs incubate there and hatch when the ice begins to melt in spring as plankton blooms occur and the larvae have adequate food supply. An oil spill in such spawning areas could severely reduce that year's recruitment.[67] Contamination by petroleum products not only has a toxic effect on all species in the food chain within the marine ecosystem, but may also pose a real threat to human health due to the accumulation and retention of hydrocarbons in the bodies and fatty tissues which man consumes. This is because fish metabolize hydrocarbons quickly; they may retain enough to affect their quality as food. Fish containing hydrocarbons are unsuitable as food, even when the oil content in water measures only 0.1 parts per million. Tainting of fish products has been reported in several spills in sub arctic seas and even in the Cameron River in the Canadian Arctic. Such tainting has led to the closing of fisheries, declining in consumption of fish, and reduced sales of fish. Also, contaminated fishes cause injuries to seabirds and other animals that prey on them.[68]

Consequences for marine mammals

The polar bear, seal and walrus are the most common during the icy period in the Arctic waters. Marine mammals with fur (sea otters, polar bears, seals, new-born seal bears) are more vulnerable to oil spill than other sea mammals. Fur, which is contaminated with oil starts to mat and loses its ability to retain heat and water. Moreover, oil can cause irritation to the skin and eyes and impede the animal's normal ability to swim.[69] Whales, seals and cetaceans in the Arctic are more resistant to oil than, for example, polar bears. Whales and most seals, which rely on blubber rather than fur for insulation, are generally less vulnerable to oiling. However, the oil that enters the organism can cause gastrointestinal bleeding, renal failure, liver poisoning and blood pressure disruption. Fumes resulting from the evaporation of oil lead to problems in the respiratory organs of mammals which are located near to, or in

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66 Krasnov, Yu. and Gavrilo, M. and Nikolaeva, N.and Goryaev, Yu. and Strøm, H.: *Main results of the studies of East-Atlantic flyway populations of sea ducks in the Barents Sea region*. Abstracts of the Waterbirds Around the World Conference. Edinburgh, 2004; AMAP: Arctic Pollution Issues, 1998, pp. 153; Lesikhina and Rudaya et al., 2007, online (viewed 19.03.2008).

67 AMAP: Arctic Oil and Gas, 2007, pp. 24-25.

68 Ibid.; AMAP: Arctic Oil and Gas, 2007, pp. 24-25.

69 Arctic Pollution Issues, 1998, AMAP, pp. 153-154.

the immediate vicinity of, large-scale oil spills.[70] Moreover, oil spills and contamination result in loss of their food supply.[71]

3.3. Other physical disturbances connected to oil and gas activities

In addition to spills, oil and gas activities have other indirect impacts in the marine environment. Physical disturbances include the construction of the gravel island and the causeway which were built on the Northern coast of Alaska. They can impede fish migrations and near-shore water flow. Drill cutting piles on a drilling rig can disturb bottom-dwelling animals. The use of ice breaker can affect ice habitats and create considerable noise. Fish and marine mammals can be affected by noise, particularly by sounds generated from seismic exploration. They avoid under-sea noise.[72] This avoidance behaviour is generally temporary and continues until the noise is ceased. The effects of noise can extend tens of kilometres from the source. In the Beaufort Sea of Alaska, bowhead whales have been observed to change swimming direction in response to noise sources up to 30 kilometres away. Whale hunters in northern Alaska report that they must travel farther offshore to find whales, which they attribute to the displacement of whales from near-shore areas by industrial noise. Moreover, hydrocarbon-related transportation and other activities create pressures for infrastructural change, which may cause fragmentation of habitat. Habitat fragmentation may adversely affect many species, particularly highly mobile species such as reindeer and caribou and sparsely populated species such as brown or grizzly bears and other large predators. Many animals have dense seasonal aggregations on breeding grounds, along migratory pathways, or along the ice edge and in open water polynyas in the sea ice, making them temporarily vulnerable to even a localised event. Even without pollution or accidents such as spills, oil and gas activities can reduce the wilderness character of a region.[73]

4. Potential Social and Economic Consequences in the Marine Arctic[74]

In the Arctic, oil and gas activities have already been projected as one of the major drivers of social and economic change. It is also expected that this change will increasingly expand in the future. Environmental consequences of oil and gas activities, as discussed in the previous sections, are connected to social change as many human activities are affected by

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70 AMAP: Arctic Oil and Gas, 2007, pp. 24-25.

71 Oil & gas exploration & production in arctic offshore region, Guidelines for environmental protection, Report No. 2.84/329 2002, pp. 9.

72 *Comulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*, 2003, op.cit., pp. 98.

73 AMAP: Arctic Oil and Gas, 2007, pp. 25.

74 ACIA, 2005, Chapter 18: Summary and Synthesis, pp. 1000- 1004; AMAP: Arctic Oil and Gas, 2007, pp. 26-29, 36-37; Didyk and Jemelianova, online, (viewed 30.03.2008); AHDR, 2004, pp. 121-27; Hoogensen and Bazely et al., 2006, online (viewed 26.03.2008).

environmental consequences in the Arctic. There are, however, other changes that cannot be separated from the industrial activities leading to oil and gas exploration and exploitation. Infrastructural development, fragmentation of wildlife habitat ,and increasing participation in the market economy of locals due to industrial and development activities in connection with oil and gas activities, cause societal changes in many regions in the Arctic. With this societal change, people in the Arctic region are largely affected in terms of their identity, cultural integrity and their traditional way of livelihood. Moreover, governance practice in the Arctic is often deeply rooted in cultural traditions, which are also significantly affected.[75]

Although most of the Arctic countries are technologically and economically developed, the indigenous peoples of the region often continue to preserve a traditional way of life even if they simultaneously adapt to the trends of the modern world. The initiatives from the indigenous organizations of the Arctic as well as national legislation of the respective countries and international instruments can play a role in protecting the cultural heritage of the Arctic. The major effect of oil and gas activities is thus the possible disruption of traditional use of the local lands. Consequently, due to this disruption occurring from both onshore and offshore oil and gas activities, hunting, fishing and herding, which are an integral part of their livelihood, are affected. This may also result in the unavailability of traditional food that cannot be replaced by imported food from outside.[76]

Human health of indigenous and other local communities is another concern connected to oil and gas activity. Petroleum hydrocarbons can be toxic and can lead to a number of health problems, depending on concentrations. Oil and refined petroleum products can affect skin through contact and lungs from inhalation of vapours. Chemicals such as benzene and other volatile petroleum hydrocarbons can affect the nervous system. Long-term exposure to some petroleum hydrocarbons at moderate concentrations can cause cancer and death. Release of well gases can spread petroleum hydrocarbons and sulphur compounds, which are a threat if inhaled at high concentrations or over a long period.[77]

Oil and gas activities require the large-scale operations provided by the national and transnational companies with adequate capital to support such large operations. Thus the capital, equipment, and labour mainly come from outside the Arctic region and products are sold on the world market. Although there is relatively little time available to train local residents, locals are also employed in the activities as such, in addition to workers brought from outside. Employment opportunities are thus created for indigenous peoples. Wages and cash borne out of the activities connect the indigenous and other local people of the Arctic to the modern market economy. However, the arrival of large numbers of new workers can cause social and cultural disruption in small, remote communities. Moreover, oil and gas operations typically means that a great deal of activity occurs in early stages, particularly during construction when employment opportunities come quickly but they do not last long, which leaves the locals unemployed again. There are also positive effects of oil and gas activities for the locals. Oil and gas activities generate revenue for the national government. And since indigenous and other local people in the Arctic may suffer in certain respects due to oil and gas activities, they may be compensated for the damages they incur. Moreover,

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[75] AHDR, 2004, pp. 121.

[76] Traditional food is healthier and better adjusted to northern conditions. AHDR, 2004, pp. 74.

[77] AMAP: Arctic Oil and Gas, 2007, pp. 29.

revenue earned from the activities may be used for health care, education and training, well-being, strengthening of local governance system and the creation of atmosphere of permanent income-generating activities for the local and indigenous inhabitants.[78] As has been shown, the interplay between oil and gas activities and other drivers of change in the Arctic has significant consequences for the social and economic system.

5. LEGAL CONTEXT CONCERNING OFFSHORE HYDROCARBON ACTIVITIES

The United Nations Convention on the Law of the Sea (LOS Convention), which has been ratified by 155 states as of March 2008 (EC is also a party to the Convntion), and which largely codifies customary international law, lays down the basic rules over the sovereign rights over offshore hydrocarbon resources. Broadly speaking, under the LOS Convention, the sea-bed up till the continental margin is a natural prolongation of the coastal state's continental land area (or island's continental shelf).[79] The continental shelf is comprised of the continental margin, that is, physical continental shelf, slope and the rise. The exclusive right to explore and exploit mineral and offshore hydrocarbon and other non-living resources beneath or on the sea-bed within the legal continental shelf belongs to the coastal state.[80] In case the continental margin does not extend up to the EEZ maximum limit (200 nautical miles from the baselines), the coastal state nevertheless has sovereign rights over the sea-bed and its resources up to that limit (even though this area would otherwise be deemed to be deep sea-bed). Where the continental margin exceeds 200 nautical miles from the baselines (the so-called extended continental shelf), the state has a right to whole of its physical continental margin. In these cases, the coastal state is required to make a submission to the Commission on the Limits of Continental Shelf as soon as possible or ten years from when it became a party to the Convention.[81] This is an expert body that will evaluate whether Article 76 criteria are fulfilled by the coastal state in drawing the outermost limit of its continental shelf. Under LOS Convention, the outer limits of the continental shelf will be “final and binding” only after the coastal state has enacted them in accordance with the recommendations by the Commission.[82] The area beyond the limits of outer continental shelf falls outside the national jurisdiction of the coastal state which according to the LOS Convention is termed as “the Area”.[83]

These are very relevant rules from the perspective of offshore hydrocarbon exploitation in the Arctic since they entitle the Arctic littoral states to make vast claims over the sea-bed resources given that the LOS Convention allows coastal states much flexibility in drawing the

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78 Obviously, beneficial for the region will be consequences which correspond to socio-economic interests of the population when it comes to improvement of life conditions and quality, ensuring the principles of sustainable development, taking into consideration demands of the present and future generation. See Didyk and Jemelianova, online, (viewed 30.03.2008).

79 See Article 76(1), UNCLOS.

80 See Article 76 (3), UNCLOS.

81 See Article 4 (Annex II), UNCLOS.

82 See Article 76 (8).

83 Under Art. 1, para. 1, of the UNCLOS "Area" means "the sea-bed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction".

outermost limit of their continental shelves. Of the Arctic states, all but the US are parties to the LOS Convention. However, as of 31 October 2007, the US Senate Foreign Relations Committee approved the Law of the Sea Convention, sending it to the full Senate for ratification.[84]

It appears from the overall geographical structure of the Arctic Ocean that the vast area of the sea bed will be under the continental shelf of one or another Arctic state if the extended continental shelf claims are successful. Since Russia became a party already in 1997, it made its submission on 20 December 2001, which was also the first submission ever made to the UN Commission on the Limits of the Continental Shelf. Norway, of the Arctic states, made the submission in 2006. Canada (deadline November 2013) and Denmark/Greenland (deadline November 2014) are intensely preparing their submissions. It also seems clear that some of these claims will be overlapping, especially over the Lomonosov ridge, which will likely be claimed by Canada and Denmark (Greenland) in addition to Russia. The US argued in its reaction to the Russian submission that the Lomonosov ridge "is a freestanding feature in the deep, oceanic part of the Arctic Ocean basin, and not a natural component of the continental margins of either Russia or any other State".[85]

[84] See 'Law of the Sea Clears Committee', at http://lugar.senate.gov/sfrc/sea.html (viewed 02.05.2008).

[85] According to the US, Lomonsov Ridge is a freestanding feature in the deep, oceanic part of the Arctic Ocean Basin, and not natural component of the continental margins of either Russia or any other state. See 'Reaction of the United States' at: http://www.un.org/Depts/los/clcs_new/clcs_home.htm (27.03.2008). Also see U.S. 'Reaction to Russian Continental Shelf Claim', 96 Am. J. Int'l L. 4 (2002) at 969-970.

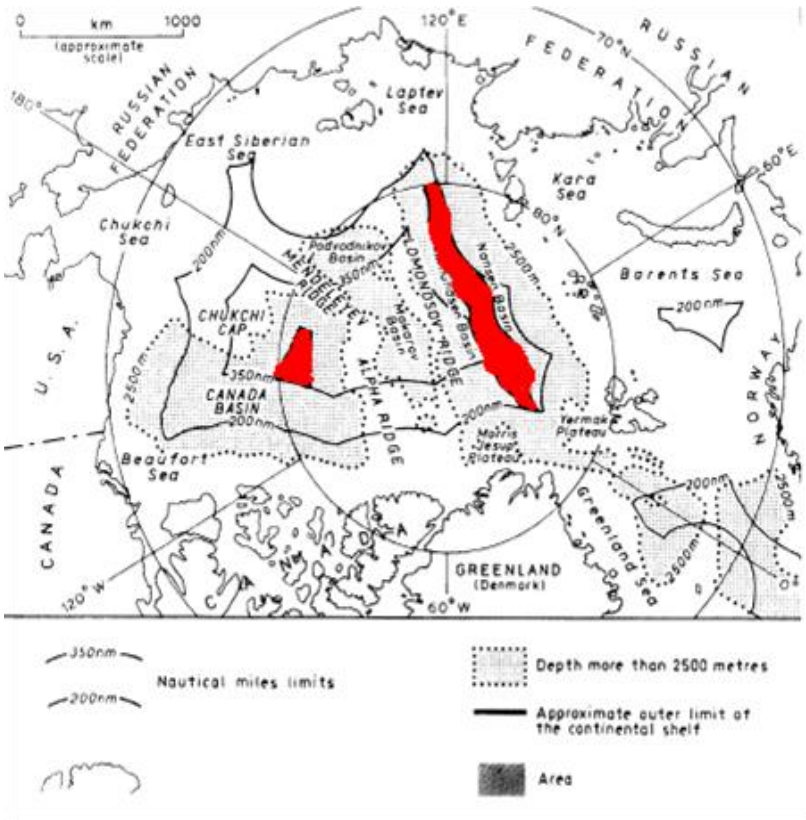

Figure: 3 – The Continental Shelf in the Arctic marine area. The red area indicates 'the Area' which presents the sea bed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction. Source: *The Law of the Sea and Polar Maritime Delimitation and Juridisction* in A.G. Oude Elferink and D.R. Rothwell (eds), at p. 150.

The media and some international and security researchers have suggested that the broad continental shelf claims by the Arctic states are prompted by melting sea ice, a development that opens the continental shelf and deep sea-bed to potential hydrocarbon resources and to the related interests. They perceive that there is already a fierce competition between the Arctic states as to who gets there first to occupy the resources (mainly oil and gas), manifested in the planting of the Russian flag on the ocean floor on 2 August 2007.[86] Some have also warned that the resource development in the region may even result in military conflicts between Arctic states.[87]

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[86] Russia Plants Flag under N Pole, BBC News at: http://news.bbc.co.uk/2/hi/europe/6927395.stm (viewed 25.03.2008). See also *Putin stirs the waters* at http://nearabroad.wordpress.com/2007/08/05/putin-stirs-the-waters/ (viewed 13.03.2008) where reactions were quoted from the Arctic nations. The U.S, for example, said that Russia planting its tri-color flag on the seabed under the North Pole doesn't validate the former communist country's claim to the mineral-rich Arctic territory.

[87] Borgerson, 2008, online (viewed 09.04.2008).

Yet, at least so far, the Arctic states have all acted with respect to their continental shelf claims in accordance with their obligations under the LOS Convention. Even Russia made its submission within the 10-year time-limit and the Commission returned the submission back to Russia for it to collect further scientific information, which Russia has been collecting since. Currently, all the Arctic states (except the US) are engaged in submitting their claims to the Commission before their 10-year deadline expires. It is also true that there is potential for sovereignty disputes between the Arctic states because some of the continental shelf claims are likely to overlap and the US, in its reaction, seemed to regard much of the Arctic Ocean floor as not belonging to any state's continental shelf.[88] The LOS Convention contains mandatory dispute-resolution rules, with some important exceptions,[89] but it is difficult to predict whether these will be observed if outright conflicts break out.

There are also some other Arctic marine areas, where the continental shelf rights are unresolved. One such place is the continental shelf emanating from the Svalbard islands – a place – the legal status of which was defined by the 1920 Svalbard Treaty (with 39 parties). The Treaty accords Norway full sovereignty over the islands[90] but ensures that economic activities can be practised in the Treaty area up to the territorial sea.[91] Norway has consistently held that the non-discrimination rights of the other contracting states' nationals do not apply to the Svalbard's continental shelf because the literal reading of the Treaty accords rights to other parties only to the extent of the territorial sea. The other parties have held, however, that since the conclusion of the Treaty, the law of the sea has evolved considerably, and thus the Treaty has to be interpreted in line with this development. In their opinion, the Svalbard Treaty would thus accord non-discrimination in terms of oil and gas exploitation rights to the Svalbard shelf to all the contracting states nationals. This view was taken up by Spain and Russia when reacting to the 2006 submission by Norway to the Commission on the Limits of Continental Shelf.[92] In addition, since Norway and Russia have not yet been able to agree over their maritime boundary, and the Commission is not empowered to resolve maritime delimitation disputes, the continental shelf boundary between Russia and Norway is still to be settled leaving vast tracts of sea-bed to a state of legal uncertainty as to whom they belong.[93] In a similar vein, the US and Canada have not been able to resolve their maritime boundary in the Beaufort Sea, an area with potential for hydrocarbons, thus leaving the legal status of the sea-bed uncertain.

Despite this uncertainty, the general rule under LOS Convention is that the exploitation of natural resources including offshore oil and gas in the sea bed is subject to the exclusive control of the coastal state up until the length of the continental shelf.[94] Exclusive control of

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88 Commission on the Limits of the Continental Shelf on UN website at: http://www.un.org/Depts/los/clcs_new/clcs_home.htm (viewed 09.04.2008).

89 See Part XV, UNCLOS.

90 Article 1, Svalbard Treaty (Spitsbergen Treaty) 9 February 1920, available at: http://www.lovdata.no/traktater/texte/tre-19200209-001.html (viewed 17.04.2008).

91 Article 2, ibid.

92 Commission on the Limits of the Continental Shelf, available at: http://www.un.org/Depts/los/clcs_new/clcs_home.htm (viewed 09.04.2008).

93 See Norwegian Reaction to Russian Continental Shelf claim, at: http://www.un.org/Depts/los/clcs_new/clcs_home.htm (viewed 09.04.2008).

94 See Article 77, UNCLOS.

the coastal state, however, does not affect the legal status of superjacent waters or of the air space above those waters, which means that legal rights of other states remain unaffected in the waters above the continental shelf.[95] Sovereign rights of states over such waters extend only to the length of the EEZ, where the coastal states enjoy sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living of the waters superjacent to the seabed and of the seabed and its subsoil. The sovereign rights of the coastal states include other activities with regard to economic exploitation and exploration of the zone, such as production of energy from the waters, currents and winds.[96] In addition the Convention, confers upon the coastal state jurisdiction for the "protection and preservation of the marine environment".[97] Therefore, coastal states' sovereign rights are subject to protection and preservation of marine environment. Thus, activities relating to offshore hydrocarbon are also subject to the provisions of the LOS Convention at least to the extent the protection and preservation of the marine environment is concerned.

There are some international treaties that place general legal restraints on offshore hydrocarbon exploitation, but only indirectly and in a very soft manner, and thus these are left outside of the scope of this chapter.[98] The LOS Convention, in Part XII, however, provides generally applicable rules governing marine environmental pollution, which is also applicable to offshore oil and gas activities. For example, coastal states are obligated to take appropriate measures in order to prevent, reduce and control marine pollution that may arise out of offshore oil and gas activities.[99] Such measures should be taken in a way that pollution is not transferred from one place to another or transformed from one type to another type of pollution.[100] Coastal states shall also ensure that the use of technology in offshore activities will not result in any pollution.[101] To prevent, reduce and control pollution occurring in the marine area in its jurisdiction, coastal state's responsibilities include, where necessary, to seek global or regional cooperation,[102] to notify early in advance of any incidental pollution or danger of pollution that a coastal state is aware of,[103] to monitor risks and effects of pollution and to keep under surveillance the effects of the activities permitted in the offshore area,[104]

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95 See Articles 58 and 78, UNCLOS.

96 See Article 56, UNCLOS.

97 See Article 56 (1) (b) (iii), UNCLOS.

98 For instance, the climate regime (the UNFCCC and the Kyoto Protocol) requires states to direct their energy policies away from the use of fossil fuels, and thus it indirectly has an impact on hydrocarbon exploitation as well. The Convention on Biological Diversity also requires states to assess, control and permit economic activities in view of their impact on biological diversity, but it is worded in a very flexible manner, to the extent that many argue that its provisions are soft-law obligations. In a similar vein, the Polar Bear Convention requires the range states to protect the polar bear and its habitat and thus requires indirectly the states to take these considerations into account when permitting economic activities, including offshore hydrocarbon activities.

99 See Article 194, UNCLOS.

100 See Article 195, UNCLOS.

101 See Article 196, UNCLOS.

102 See Article 197, UNCLOS.

103 See Article 198, UNCLOS.

104 See Article 204, UNCLOS.

and also to provide prompt and adequate compensation in the event of damage caused by pollution by natural or juridical person under the jurisdictions of the coastal state.[105] Thus, with respect to the sea bed activities, such as offshore oil and gas activities, subject to its national jurisdiction, states must adopt and enforce national laws and regulations to prevent, reduce and control pollution arising out of such activities. Such laws, regulations and measures adopted by states are no less effective than international rules, standards and recommended practices and procedures.[106] In addition to that, states shall take other measures to implement applicable international rules and standards arising in connection with seabed activities.[107] When a coastal state assumes specific obligations under other conventions for the protection and preservation of the marine environment, such obligations should be consistent with the general principles and objectives of the LOS Convention.[108]

There are a number of other instruments applicable in connection with offshore oil and gas activities (excluding transportation).[109] The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)[110] is a regional convention that applies to 'those parts of the Atlantic and Arctic Oceans and their dependent seas which lie north of 36 north latitude and between 42 west longitude and 51 east longitude'[111] The OSPAR Convention defines 'offshore activities' as those activities carried out in the maritime area for the purposes of the exploration, appraisal or exploitation of liquid and gaseous hydrocarbons and 'offshore sources' as 'offshore installations and offshore pipelines from which substances or energy reach the maritime area'.[112] The concept of 'offshore installation'[113] is defined as 'any man-made structure, plant or vessel or parts thereof, whether floating or fixed to the seabed, placed within the maritime area for the purpose of offshore activities'. Of the Arctic countries, Denmark, Finland, Iceland, Sweden and Norway have signed and ratified the convention.

The most relevant part of the Convention from the perspective of this chapter is Annex III of the Convention, which deals with prevention and elimination of pollution from offshore sources. The contracting parties are required to use the best available techniques and the best environmental practises when adopting programmes and measures for the purpose of preventing pollution from offshore sources (Art. 2). In addition to prohibiting dumping of

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105 See Article 235, UNCLOS.

106 See Article 208, UNCLOS.

107 See Article 214, UNCLOS.

108 See Article 237, UNCLOS.

109 Oil and gas transportation via ships is dealt with in another part of this report.

110 The 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic, which can be found from 32 I.L.M. 1069 (1993). It was opened for signature in Paris on 22nd September 1992 and entered into force on 25th March 1998. Further information available online at www.ospar.org/eng/html/welcome.html (viewed 10.04.2008).

111 Article 1 (ai), but excluding: 1. the Baltic Sea and the Belts lying to the south and east of lines drawn from Hasenore Head to Gniben Point, from Korshage to Spodsbjerg and from Gilbjerg Head to Kullen, 2. the Mediterranean Sea and its dependent seas as far as the point of intersection of the parallel of 36 north latitude and the meridian of 5 36' west longitude;

112 Ibid., Article 1 (k).

113 Ibid., Article 1 (l). In addition 'Offshore pipeline' is defined to mean 'any pipeline which has been placed in the maritime area for the purpose of offshore activities' according to Article 1 (m).

wastes or other matter from offshore installations, the Convention lays down a requirement for the competent authorities of the contracting states to subject emissions from offshore sources of substances, 'which may reach and affect the maritime area'[114] to prior authorisation and regulation. A system of monitoring and inspection must also be established to 'assess compliance with authorisation or regulation'.[115] Article 5 of the Convention requires the contracting parties also to introduce permit systems for dumping of disused installation in the maritime areas. This was not enough for the contracting parties, as the ministerial meeting of the OSPAR Commission adopted a prohibition to dump disused offshore installations within the maritime area.[116] In general, the Convention regime has evolved dynamically – also in respect to offshore hydrocarbon exploitation - with the decisions and recommendations by the OSPAR Commission.[117] Also relevant from the viewpoint of practicing offshore hydrocarbon activities is the Annex V adopted in 1998, which aims at biodiversity and ecosystem protection—topics addressed more closely in another chapter of this report.

The Agreement Between Denmark, Finland, Iceland, Norway and Sweden Concerning Cooperation in Measures to Deal with Pollution of the Sea by Oil or Other Harmful Substances (Copenhagen 29.03.1993) applies to the Arctic waters of Greenland, Iceland and Norway. It specifies measures of monitoring and dealing with events such as oil spills occurring within the waters under the jurisdiction (territorial sea, EEZ and continental shelf) of the parties. The Agreement includes exchange of information, reporting, assistance, costs connected with operations and possible damages in any potential oil spill that may occur.[118]

International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)[119] provides that the parties to the convention establish necessary measures either nationally or through co-operation in order to deal with pollution incidents. Furthermore, the requirements of the convention include that ships and offshore units have oil pollution emergency plan.[120] All the Arctic states are parties to the convention except the Russian Federation.[121]

Important bilateral agreement has been established between Canada and Greenland (Denmark) – the two countries that share the longest maritime boundary in the world. The 1983 Agreement between Denmark and Canada for Cooperation Relating to the Marine

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114 Article 4 (1).

115 Ibid., Article 4 (2).

116 See the OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations, at http://www.ospar.org/documents/dbase/decrecs/decisions/od98-03e.doc (viewed 17.04.2008).

117 http://www.ospar.org/eng/html/welcome.html

118 http://untreaty.un.org/unts/144078_158780/10/5/3331.pdf (Convention text)

119 International Convention on Oil Pollution Preparedness, Response and Co-operation (1990). Adopted on 30th November 1990 and entered into force 13th May 1995. Further information available at www.imo.org (viewed 11.04.2008).

120 Background information for the convention provided by International Maritime Organization at www.imo.org (viewed 11.04.2008).

121 Status of Convention available at www.imo.org/includes/blastDataOnly.asp/data_id%3D21441/status-x.xls (viewed 10.04.2008).

Environment aims at the prevention of pollution from offshore installations.[122] The parties are required to take measures to 'ensure that installations engaged in exploration for or exploitation of the natural resources of the seabed and subsoil in their respective areas of responsibility are designed, constructed, placed, equipped, marked, operated and maintained in such a manner that the risk of pollution of the marine environment is minimized'.[123] There are joint contingency plans in case pollution incident occurs from offshore hydrocarbon exploration or exploitation in Annex A to the Agreement. In addition, there are other contingency agreements and joint efforts developed to response to pollution incidents arising out of possible oil spills.[124]

Figure: 4 – The applicable conventions and their relevance with offshore oil and gas activities can be summarised as follows:

Applicable Conventions	**Parties and covering area**	**Relevance with Offshore Hydrocarbon Activities**
United Nations Law of the Sea Convention (1982)	All the Arctic states except the United States are the parties. Thus the Convention covers whole of the marine Arctic except the part belonging to the United States. The US, however, is bound by the customary law principles, most of which have	The Convention provides rules regarding continental shelf, outer continental shelf, exclusive economic zone etc. The provisions are relevant in the context of exploration and exploitation of oil and gas activities. The Convention also provides generally

122 The text is reproduced in 23 I.L.M. 269 (1984).

123 Ibid., Article 5.

124 For example, the 1974 Agreement Relating to the Establishment of joint pollution Contingency Plans for Spills of Oil and Other Noxious Substances (Canada and the United States), available at: http://www.cec.org/pubs_info_resources/law_treat_agree/transbound_agree/SourceFiles/F15-AGREEMENT.HTML (viewed: 01.09.08); the 1989 Agreement Between the United States and the Soviet Union Concerning Cooperation in Combating Pollution in the Bering and Chukchi Seas in Emergency Situation, at: http://www.akrrt.org/mou/Kp-US_USSR_89.pdf (viewed: 01.09.08); the 1994 Agreement Between the Government of the Kingdom of Norway and the Government of Russian Federation on Cooperation and Response to Oil Pollution in the Barents Sea, see Alexei Bambulyak and Bjorn Frantzen, 'Oil Transport from the Russian Part of the Barents Region' (2007), p. 71 at: http://www.crrc.unh.edu/workshops/arctic_spill_summit/oil_transport_ru_no_2007.pdf (viewed: 01.09.08); other efforts include: joint exercise to access response to a maritime distress scenario, see, 'Canada: Joint Oil Spill Training USCG-Canada', at: http://www.uscgalaska.com/go/doc/780/173402/ (viewed: 02.09.08); there are also other arrangements between Alaska Juneau Rescue Coordination Center (USA) and Joint Rescue Coordination Center Victoria, British Columbia (Canada) for the shared international boundary at Dixon entrance, at: http://www.uscgalaska.com/go/doc/780/67881/ (viewed: 02.09.08); the United States and Russia have also joint coordination arrangements. The Russian-American Joint Planning Group consisting of the State Marine Pollution Control Salvage and Rescue Administration (SMPCSRA) of Russia and the U.S. Coast Guard have joint contingency planning and training in Incident Command System for response in the Bering and Chukchi Seas, which is governed by a MOU. Also the U.S. Department of Energy and the Russian Ministry of Energy concluded an agreement entitling 'the US-Russia Dialogue on Oil Spill Prevention and Response', which is an ongoing dialogue to analyse and discuss oil spill prevention and response issues in the Arctic.

	been incorporated in the Convention.	applicable rules governing marine environmental pollution that may come out from the oil and gas activities.
The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Convention (1992)	Denmark, Finland, Iceland, Sweden and Norway are the parties within the Arctic region. The Convention applies within the Atlantic and Arctic ocean and their dependent sea lying north of 36 north latitude and between 42 west longitude and 51 east longitude.	The Convention deals with, among the others, offshore activities carried out in the maritime area for the purpose of exploration, appraisal or exploitation of liquid and gaseous hydrocarbons, and other offshore sources such as installations and pipelines from which substances reach to maritime area and cause pollution.
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) (1990)	All the Arctic states except Russian Federation are parties to the Convention. Thus, the Convention applies to the whole of the Arctic area except Russia's part.	The Convention requires national or cooperative measures to deal with pollution incidents and oil pollution emergency plan.
The Agreement between Denmark, Finland, Iceland, Norway and Sweden Concerning Cooperation in Measures to deal with Pollution of the Sea by Oil or other Harmful Substances (1993)	Denmark, Finland, Iceland, Norway and Sweden are the parties. The Agreement applies to Arctic waters of Greenland, Iceland and Norway.	The Agreement specifies measures of monitoring and dealing with events such as oil spills occurring within the waters under the jurisdiction of the parties in the territorial sea, EEZ and continental shelf.
Bilateral Agreement between Denmark and Canada for Cooperation Relating to the Marine Environment (1983)	Canada and Denmark are the parties. The Agreement covers Arctic marine areas between Canada and Greenland (Denmark).	The Agreement provides provisions to ensure appropriate measures in the engagement of installations for exploration and exploitation of natural resources of the seabed and subsoil in the respective areas of the countries so that risk of pollution is minimized.

6. OFFSHORE HYDROCARBON AND TRANSBOUNDARY ENVIRONMENTAL IMPACT ASSESSMENT

The main transboundary environmental impact assessment (EIA) Convention is the Espoo Convention on Environmental Impact Assessment in a Transboundary Context.[125] This Convention was signed by all the eight Arctic states, but three of them are still to become parties to it (Russia, the US and Iceland). Yet, since the Espoo Convention seems to have become a global standard for how to conduct TEA, it is increasingly being used by states even in cases where they are not legally obligated to do so.[126] Since the three Arctic states that are not parties to the Espoo Convention have not withdrawn their signatures, it is expected that at some point in time they will become parties to the Convention.

The Espoo Convention applies, according to its Appendix I to 'offshore hydrocarbon production'[127], 'major storage facilities for petroleum, petrochemical and chemical products'[128] and 'large-diameter oil and gas pipelines'[129]. However, it should be noted that the origin state for a planned activity is obligated to commence the transboundary EIA procedure (by notifying the potentially affected state on the basis of Article 3) only if such planned activity is likely to cause adverse transboundary impacts to the environment under the jurisdiction of another contracting state. In other words, the origin state is not obligated to notify the potentially affected state if the planned activity (e.g. oil exploitation) will not cause significant adverse transboundary impact. Important to note is that the Espoo Convention does not apply to cases of potential harm to global commons (such as high seas), but only when the proposed activity is likely to cause pollution to the environment located in another state's jurisdiction.

When the Espoo Convention was drafted, strategic environmental assessment (SEA) – procedure whereby the environmental and health effects of plans, programmes and policies are examined with the help of authorities and civil society – was still in development; the parties to the Convention only indicated their willingness in Article 2 (7) to endeavour to apply the principles of the Convention to strategic level decisions. The parties to the Convention decided to develop a special protocol on SEA, which was signed on 21 May 2003 by 35 states and the EC, with the Arctic signatories including Norway, Finland, Sweden and Denmark. The Protocol focuses on creating national SEA procedure but also stipulates rules by which transboundary SEA is to be organised in certain cases of transboundary environmental effects.[130] This Protocol was largely inspired by the SEA directive of the EC, which also contains provision on transboundary SEA.[131] The SEA transboundary procedure

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125 Convention on Environmental Impact Assessment in a Transboundary Context, Espoo, 25 February 1991, available online at http://www.unece.org/env/eia/documents/legaltexts/conventiontextenglish.pdf

126 Bastmeijer and Koivurova, 2008, pp. 347-389.

127 See, Appendix I to the Espoo Convention, at 15.

128 Ibid., 16.

129 Ibid., 8.

130 In the SEA Protocol, the transboundary Article is in Article 10, available online at http://www.unece.org/env/eia/documents/legaltexts/protocolenglish.pdf (viewed 14.4.2008).

131 Article 7 of the Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, at

has far less potential in the Arctic since four of the Arctic states have not even signed the Protocol, and the Protocol has not entered into force as yet. Yet, via the European Economic (EEA) Agreement, the SEA directive currently applies also to Iceland and Norway. On the other hand, since Greenland opted out of the then EEC and Svalbard islands was excluded from the EEA agreement, these areas are not governed by the SEA directive. Both the SEA directive and the SEA protocol explicitly apply to offshore hydrocarbon exploitation.[132]

The Espoo Convention establishes a legal basis for a TEA between those five Arctic states that are party to it. There are also other treaties that provide for TEA procedures between Arctic states.[133] There are, in effect, quite a few treaties in force between the eight Arctic states that provide for a TEA type of procedure. There are many applicable treaties and other regulations between the Nordic states[134] and between the US and Canada (thus also covering the Alaska-Yukon border)[135] and one, as discussed previously, between Canada and Denmark (Greenland).[136] There are also universal treaties that apply throughout most of the Arctic (except for the USA) and contain a TEA, which covers also the potential damage to global commons but is worded in such a way that may even question their legal status. Good example is the Biodiversity Convention, which requires contracting states, 'as far as possible and as appropriate' to promote and encourage conclusion of multilateral and bilateral arrangements on TEA, leaving the legal status of such an obligation unclear. On the other hand, important is that the CBD encourages states to extend such TEA's to planned activities

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http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0042:EN:NOT (viewed 14.4.2008). In the SEA Protocol the transboundary Article is Article 10, see at http://www.unece.org/env/eia/documents/legaltexts/protocolenglish.pdf (viewed 14.4.2008).

132 The Protocol requires SEA to be made for programmes that set the framework for future development consent, as enshrined in Article 4 (2) and Annex I (listing the same projects as in Appendix I of the Espoo Convention). The SEA directive requires in its Article 3: '2. Subject to paragraph 3, an environmental assessment shall be carried out for all plans and programmes, (a) which are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use and which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC'.

133 For a detailed assessment, see Koivurova, 2002, pp. 181-286.

134 In addition to the above-mentioned EIA and SEA directives, there are, e.g.: The 1974 Nordic Environment Protection Convention (NEPC), the English text can be found from 3 I.L.M. 591 (1974); the 1976 Guidelines for Communication Between Finland, Norway, Sweden and Denmark on Security Issues Related To the Nuclear Installations Constructed Near the Border, Finnish Treaty Series 19/1977; The 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic, which can be found from 32 I.L.M. 1069 (1993).

135 The following apply in between the US and Canada: The 1975 Agreement Between the United States of America and Canada Relating to the Exchange of Information on Weather Modification Activities, the text that is reproduced in 14 I.L.M. 589 (1975); The 1987 Agreement Between the Government of Canada and the Government of the United States of America on the Conservation of the Porcupine Caribou Herd, which can be downloaded at http://arcticcircle.uconn.edu/ANWR/anwrint-agreement.html (14.4.2008); The 1991 Agreement Between the Government of the United States of America and the Government of Canada on Air Quality, which is reproduced in 30 I.L.M. 676 (1991). There is also pending work to conclude a TEIA treaty under the auspices of the North American Free Trade Agreement, see more closely Craik, 2008, pp. 93-118.

136 1983 Agreement Between Denmark and Canada for Cooperation Relating to the Marine Environment, the text which is reproduced in 23 I.L.M. 269 (1984).

which are likely to significantly affect the biological diversity in areas beyond national jurisdiction. Stronger obligation is contained in Article 206 of the LOS Convention, as will be studied below.[137] There are also borders that are not covered by any TEA type of treaty, such as those between the US and Russia and Russia and its Nordic neighbours. However, the other UN ECE treaty, the 1992 Convention on the Transboundary Effects of Industrial Accidents does provide a TEIA procedure between Russia and its Nordic neighbours in situations where it applies.[138] Unfortunately, it does not provide transboundary EIA for offshore hydrocarbon activities since the Convention does not explicitly apply to '(f) accidents caused by activities in the marine environment, including seabed exploration or exploitation; (g) spills of oil or other harmful substances at sea'.[139]

An interesting TEA procedure applicable in Arctic waters is Article 206 of the LOS Convention, given that all but the US are parties to it. When there are reasonable grounds of believing that planned activities within the jurisdiction or control of a state may cause substantial pollution of or significant harmful changes to the marine environment, the Convention requires that states must assess the potential effects of such activities, including offshore hydrocarbon activities, on the marine environment. Since the provision speaks of the effects on the marine environment in general, it means that states are obligated to conduct an assessment of the effects of activities taking place in their maritime jurisdiction on the marine environment located in other states' jurisdiction as well as on international areas. The assessment of transboundary impacts on the marine environment located in another state's jurisdiction cannot be very systematic. There are no provisions on how potentially affected states can contribute to an assessment. More importantly, the duty of assessment is qualified by the phrase 'as far as practicable', giving the origin state a fair amount of discretion. The results of assessments must be communicated to the competent international organizations, 'which should make them available to all states'[140]. A potentially affected state can thus obtain information through this channel.

There is also work within the Arctic co-operation to produce guidance on how to conduct EIA and transboundary EIA in Arctic conditions, resulting in Guidelines for Environmental Impact Assessment in the Arctic, which were agreed to be applied by the Arctic states in the Alta ministerial in 1997. These apply to offshore oil and gas activities as well, although the more relevant instrument here is the Arctic Council's Offshore Oil and Gas Guidelines. The EIA

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137 Article 206 of the 1982 United Nations Convention on the Law of the Sea (Article 206), which is reproduced in 21 I.L.M. 1261 (1982); and Article 14 of the 1992 Convention on Biological Diversity, reproduced in 31 I.L.M. 818 (1992). All other Arctic states are parties to both of these treaties than the US.

138 Reproduced in 31 I.L.M. 1330 (1992). The applicability of the Convention derives from its definition of 'hazardous activity' as 'any activity in which one or more hazardous substances are present or may be present in quantities at or in excess of the threshold quantities listed in Annex I to the Convention and which is capable of causing transboundary effects', which encompasses most large-scale industrial activities. However, there is large list of exclusions from the scope of the Convention.

139 See Article 2 of the Convention available at www.unece.org/env/documents/2006/teia/Convention%20E.pdf (viewed 16.04.2008).

140 Article 205 of the UNCLOS.

Guidelines provide important guidance as to how EA should be conducted to give due consideration for the special conditions in the Arctic.[141]

7. POLICY CONTEXT ADDRESSING ARCTIC OIL AND GAS ACTIVITY

One of the main objectives of the Arctic Environmental Protection Strategy (AEPS), which was established in 1991, is to identify, reduce and as a final goal eliminate pollution. All the Arctic states are participants.[142] AEPS identified six major Arctic environmental problems (including oil pollution) that needed immediate response action.[143] The Arctic Council was established in 1996, replacing AEPS. The Arctic Council is the main inter-governmental initiative today in the Arctic – aimed at ensuring environmental, social and economic sustainable development in the Arctic region.[144] Resolutions or the decisions of the Arctic Council are not strictly legally binding but they provide significant policy options and recommendation that may lead to the creation of 'soft law' to mitigate environmental

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141 The drafting of the instrument was prompted by the realisation that the Arctic states share many challenges in applying EA in their Arctic areas. For example, the participation of the public in EA is constrained by the region's small population, which includes many indigenous peoples; the long distances and the limited number of cities and towns also affect how public participation is organised. Moreover, although environmental conditions vary in different parts of the Arctic, environmental assessment must address the similarities in the region's ecosystems and the challenge of integrating indigenous peoples and their traditional knowledge into the decision-making processes. Chapter 11 of the Guidelines provides useful recommendations for the Arctic states on how to organize their transboundary EA procedures. As all the Arctic states are signatories to the Espoo Convention, the Guidelines are meant to adjust the requirements of the Convention to the Arctic. Above all the Guidelines instrument urges that all activities assessed according to the national EA legislation should be screened also from the viewpoint of whether transboundary impacts are likely. Paragraph 8 of chapter 11 of the EIA Guidelines. Thus, all activities to which a national EA procedure is applied should be screened in view of likely transboundary impacts in the Arctic context. In addition, lower thresholds may be needed for those activities listed in the Espoo Convention if proposed to operate in the Arctic conditions. According to the Guidelines, the origin state should initiate the transboundary EA procedure in a very early phase of its national EA procedure. The Guidelines document recommends that already in the scoping phase of the national EA procedure, potential transboundary impacts should be identified and methods to be used for assessing them should be agreed upon between the concerned states; joint steering groups are recommended to perform these tasks (para. 4). The Guidelines also urges cooperation in the implementation of the transboundary EA procedures taking place in the Arctic (paras. 7 and 8). The Espoo Convention provides for a basic right for all those private legal subjects of the affected state located in the area likely to be affected to participate in the transboundary EA procedure, just as the private legal subjects of the origin state may also participate. The Guidelines goes further and urges the Arctic states to be as inclusive as possible when organising a transboundary EA procedure: 'Communities in the area of anticipated impacts should be given an opportunity to participate, irrespective of their location relative to the border' (para. 10). In the Arctic context, these communities normally are indigenous peoples, as referred to in chapter 11. The Guidelines document also emphasises that even though the activities may be far away from the border, transboundary impacts may occur anyway, especially with respect to large-scale activities such as oil and gas activities (para. 9).

142 AEPS, 30 ILM (1991), para. 1 at 1629.

143 Declaration on the Protection of Arctic Environment, AEPS, Rovaniemi, June 1991 pp. 12-18, at: arctic-council.npolar.no/Archives/AEPS%20Docs/artic_environment.pdf (viewed 17.04.2008); Rothwell, 1995, pp. 296.

144 Arctic Council website at: www.arctic-council.org (viewed 31.03.2008).

problems. The Arctic Council has significantly contributed in the area of offshore oil and gas activities in the Arctic. The Protection of Arctic Marine Environment (hereinafter PAME) working group has worked on offshore oil and gas guidelines. Policy guidelines on oil and gas activities have also been developed by International Finance Cooperation of the World Bank Group[145] and by the energy industries themselves.[146]

The Arctic Offshore Oil and Gas Guidelines were revised by PAME Working Group in 2002. The earlier version was adopted in 1997. The initiative represents the combined efforts of the PAME, EPPR, AMAP and CAFF working groups. The endorsement of these Guidelines recognises a uniform understanding of the minimum actions needed to protect the Arctic marine environment from unwanted environmental effects caused by offshore oil and gas activities.[147] The Guidelines are intended to define a set of recommended practices for those who are responsible for regulating the offshore oil and gas activities, including transportation and onshore activities that are an integrated part of the offshore activity in the Arctic.[148] The guidelines document provides that the authorities shall establish policies based on the

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145 Environmental, Health, and Safety Guidelines Offshore Oil and Gas Development, International Finance Cooperation, World Bank Group (2007) at: http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_OffshoreOilandGas/$FILE/Final+-+Offshore+Oil+and+Gas+Development.pdf (27.03.2008). In April 2007, International Finance Corporation from the World Bank Group published guidelines entitled 'Environment, Health and Safety Guidelines for Offshore Oil and Gas Development' (in short EHS Guidelines). The Guidelines are referred as technical documents with general and industry specific examples of Good International Industry Practice (GIIP). The Guidelines contained the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable cost. With regard to oil and gas activities, they include information relevant to seismic exploration, exploratory and production drilling, development and production activities, offshore pipeline operations, offshore transportation, tanker loading and unloading, ancillary and support operation, and decommission. Thus, the Guidelines provides industry specific impacts and management procedure which highlighted possible environmental consequences that may occur from offshore oil and gas activities and that also may effect human health and safety and security in the region concerned.

146 See for example, 'Oil and Gas Industry Guidance Voluntary Sustainability Reporting', American Petroleum Institute (API)', at: http://www.oilandgasreporting.com/downloads/SustainabilityReporting.pdf (31.03.2008). See also Oil & Gas Exploration & Production in Arctic Guideline for Environmental Protection, International Association for Oil and Gas Producers (OGP), Report No. 2.84/329 (2002), at: http://www.ogp.org.uk/pubs/329.pdf (01.04.2008). Energy producing industries active in the offshore oil and gas activities also produce guidelines in order to ensure environmental safety, human security and preparedness to response in case of any environmental pollution. Although the guidelines as such are designed for the companies and industries as targeted audiances, but they provide useful information for others as well. The guidelines assure industry's commitment to minimise adverse environmental impact.

147 PAME Arctic Offshore Oil & Gas Guidelines, 2002, pp. 7, at http://old.pame.is/sidur/uploads/ArcticGuidelines.pdf (viewed 01.04.2008). The Guidelines were originally written in response to the Report of the Third Ministerial Conference on the Protection of the Arctic Environment (Inuvik, Canada, March 20-21, 1996) which expressed concern regarding the potential impacts related to future increases in offshore petroleum activity in the Arctic. The Report requested PAME: to develop "guidelines for offshore petroleum activities in the Arctic, in particular guidelines for timely and effective measures for protection of the Arctic environment. In this regard, the Ministers welcomed the initiative of the United States to conduct a government designated expert meeting to develop such guidelines, in cooperation, as appropriate, with other AEPS Working Groups."

148 See PAME, pp. 8.

outcome of the EIA procedures in order that offshore oil and gas activities are conducted in a manner that promotes human health, safety and protection of environment.[149] In order to achieve these objectives, a precautionary approach, including polluter pay principle[150] and principle of sustainable development[151] shall be applied.

Overall, the PAME guidelines document identified certain fundamental issues that have to be taken into account in any offshore oil and gas activities. An EIA procedure is the first step to be used. It is to determine the impacts of offshore oil and gas exploration, development, transportation and infrastructure. In some countries, the state assumes the responsibility for the PEIA (Preliminary Environmental Impact Assessment) and the operator is responsible for the EIA for the specific projects or activities. In other countries, all environmental assessments are conducted by the state.[152] The assessments address the overall ecosystem and social and economic effects. They also include a long-term focus that addresses both effects and planning. They include a discussion on cumulative effects of oil and gas activities with the effects of other activities.[153] In addition, the PAME guidelines document emphasises the need for an effective dialogue amongst regulators, potential operators and stakeholders through consultation. Consultation should be commenced at the planning stage and continue throughout the lifetime of the project. It ensures transparent interaction and minimises potential risks for all parties. Consultation also provides a mechanism to resolve disagreements and provide appeal rights to all parties. Consultation is generally carried out through public hearings, but it can also work effectively through informal discussions, focus group and key interviews and questionnaires.[154]

Since offshore oil and gas activity may cause serious effects on Arctic communities, indigenous peoples, and sustainability and conservation of flora and fauna, the PAME guidelines provide recommendations in order to protect and minimise adverse impacts on

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149 Ibid. pp. 10.

150 National authorities should endeavour to promote the internationalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment. See ibid pp. 10-11.

151 In permitting offshore oil and gas activities Arctic governments should be mindful of their commitment to sustainable development, including, inter alia, protection of biological diversity, the duty not to transfer, directly or indirectly, damage or hazards from one area of the marine environment to another or transform one type of pollution into another, promotion of the use of best available technology/techniques and best environmental practices, the duty to cooperate on a regional basis for protection and preservation of the marine environment, taking into account characteristic regional features, the need to maintain hydrocarbon production rates in keeping with sound conservation practices as a means of minimizing environmental impacts. See ibid. at 11.

152 Ibid., pp. 13.

153 PEIAs and EIAs should consider, in particular, the following effects: human communities including indigenous ways of life; cultural heritage; socio-economic systems; other human activities (e.g., tourism, scientific research, fishing, and shipping); overall landscape (e.g., fragmentation); subsistence lifestyles (e.g. harvest practices and availability of food supply); oil spill preparedness and response in sea ice conditions; permafrost and transition zones; climate; sustainability of renewable resources; flora and fauna including marine mammals; air, water and sediment quality; ports and shore reception facilities; ice dynamics; and the interaction among any of the above. See ibid., pp. 16.

154 PAME (2002), pp. 20.

living resources, the ecosystems, the traditional ways of life and the cultural values of the indigenous peoples and in order to coordinate the oil and gas activities as well as other human activities in the region.[155] Safety and environmental management is another issue that shall be applied in offshore oil and gas activity. It consists of two basic regulatory approaches: a performance-based approach and a prescriptive approach. The former indicates that the regulator sets specific goals but does not specify how the operator must meet these goals. This system allows the operator the flexibility to specify how they intend to comply with a regulatory body's mandate that operations be conducted safely and in an environmentally sound manner. The latter is based on a series of specific regulatory requirements, which typically represent minimal expectations on behalf of the regulatory body. Compliance with these requirements is normally evaluated by a regulatory body through review and evaluation of a series of plans, permits, and related documents and through a system of field-based inspections and evaluations.[156] The operator's management should define and document its safety and environmental policies and strategic objectives. The operator should also take steps to ensure that all contractors engaged in operations are also able to meet the requirements of the parent operator management system and applicable laws and regulations.[157] Offshore oil and gas activities produce a variety of wastes in the form of aqueous and solid discharges and atmospheric emissions. The PAME guidelines document, therefore, recommend that a policy of zero discharge of the main waste streams (produced water and drilling wastes) commence at the planning and construction stage, in particular zero discharge of drilling waste and produced water.[158]

Offshore oil and gas activities cause noise, atmospheric emissions and, may produce toxic chemicals. Also, one of the major concerns is pollution from oil spills. Thus, operators should establish and maintain emergency preparedness so that the mitigation of an incident can be carried out without delay in a controlled, organised, and safe manner. Each oil spill is unique in the sense of local environmental condition and the specific types of oil that is spilled.[159] Risk analyses should be carried out in order to identify the accidental events that may occur and the consequences of such accidental events. Moreover, analysis should be carried out to design the emergency preparedness requirements so as to meet the specific circumstances of the operation. Preparedness relating to oil pollution should ensure that the source of any oil pollution is first secured, and any release is effectively contained and

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155 For example, to incorporate local and traditional knowledge into the decision-making process including the initial siting studies and disposition of resource use rights, e.g., ethnological expert studies are being used in Russia in which scientific and local knowledge are combined; to ensure meaningful participation of indigenous people and other residents in the decision making process; to urge and, where appropriate, require industry to integrate cultural and environmental protection considerations into planning, design, construction and operational phases of oil and gas activities; to improve cross-cultural communication methods to ensure full and meaningful participation of indigenous residents including procedures to incorporate local knowledge; and to identify and prohibit or restrict oil and gas activities in ecologically and culturally sensitive areas. See PAME (2002), pp. 20-22.

156 See PAME (2002), pp. 22.

157 Ibid., pp. 24.

158 See ibid., pp. 31-32.

159 Field Guide for the Oil Spill Response in Arctic (1998) at: eppr.arctic-council.org (viewed 10.04.2008).

collected near the source of the discharge as quickly as possible. Particular attention should be paid to response contingencies in ice conditions, where oil spill response, including containment, may require a range of techniques depending on the condition of the ice. The preparedness should also address protection of public health, environmental resources including shorelines, ice and water interfaces, and economic and cultural resources.[160] Despite all these recommendations, WWF Arctic – the most important environmental observer – expressed its concerns with respect to the ability of responders to effectively clean up an Arctic marine oil spill due to the limits of existing oil-spill response technologies. In addition, the Arctic offers the highest level of ecological sensitivity and the lowest level of capacity to clean up after an accident. Consequently, WWF called for a moratorium in Arctic oil exploration until the development of effective oil-spill technology and removal methods are conceived.[161] The PAME Working Group has also included in its work plan for 2006-2008 an agenda that covers the environmental impacts of the oil and gas activities and related marine protection. The work plan includes: revisions of the finding and recommendations of the Arctic Council oil and gas assessment, examinations of the adequacy of Arctic Council guidelines related to the prevention of marine environmental impacts of oil and gas activities in light of the oil and gas assessment, and finding the potential gaps and need to update oil and gas assessment in the Arctic.[162]

8. CONCLUSION

It is clear from the discussion above that the Arctic is heavily impacted by climate change, in particular by the retreat and thinning of the region's sea ice. Melting of the sea ice may accelerate the use of Arctic marine areas for various commercial activities, including offshore hydrocarbon exploration and exploitation. As described above, there are many factors that make the use of the offshore hydrocarbon resources in the Arctic increasingly profitable. Yet, it should not be forgotten that the commercial use of the offshore hydrocarbon resources already started some time ago, and, as studied above, already significant exploitation and especially exploration activities in the region are in place.

As also studied above, the extraction of the region's offshore hydrocarbon deposits will have various kinds of impacts to the vulnerable Arctic environment and its ecosystems in the Arctic marine area. These impacts occur in different stages of exploiting the resource and transferring the products to the markets, of which this chapter has focused on offshore hydrocarbon development at the site (and excluded the environmental consequences caused by the transportation of oil and gas). As shown above, there are various socio-economic

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160 PAME (2002), pp. 41.

161 WWF has commissioned a report called – Oil spill response challenges in arctic water – which pointed out the existing limitations with respect to the capacity to fight oil spills in arctic water, and also highlighted the gap between the risk of spill and the possibility of an effective response. See Ronning, 2008, pp. 16-17.

162 PAME Work Plan 2006-2008, at: http://arcticportal.org/uploads/Sy/6p/Sy6ptJ3iUiGmsBKRthkARQ/A4-Work-Plan-2006-2008.pdf (viewed 16-04.2008).

consequences from various stages of hydrocarbon development to the region's indigenous and other local communities.

The legal situation is fairly clear regarding the question of who possesses sovereign rights to the offshore hydrocarbon resources. As shown above, there are some regions where the Arctic coastal states have not been able to delimit some of their maritime boundaries with their neighbours. The greater problem arises from the current submissions developed (or in development) by the Arctic states over large tracts of continental shelf outside of 200 nautical miles to the UN's Commission on the Limits of Continental Shelf. There is clearly a danger of disagreements, even serious ones, to arise between the Arctic states as to who gains the sovereign rights to the continental shelf and even to some sea-bed ridges. It is still too early to judge how this trajectory will continue, but at least so far, the Arctic coastal states have acted in full compliance with the LOS Convention.

Yet, the legal context seems much more difficult if we examine the applicable legal instruments designed to manage the environmental and socio-economic consequences from hydrocarbon exploitation. The LOS Convention (and some other general conventions, such as the Biodiversity Convention) does provide applicable legal principles, but these are fairly general and vague and thus do not give clear legal guidance on states, companies and other stakeholders. There are some conventions that do set out environmental preventive obligations on how to conduct offshore hydrocarbon exploitation in an environmentally safe manner, such as the OSPAR Convention and the bilateral agreement between Canada and Greenland (Denmark). Yet, these cover only part of the arctic marine area, leaving a clear gap in legal regulation in this respect. There is more detailed legal regulation to counter the emergencies related to offshore hydrocarbon development, such as the OPRC. Yet, to counter the challenge of responding effectively to emergencies related to hydrocarbon exploitation in the Arctic marine area seems to relate more to the difficulties of responding to such emergencies in the Arctic, where the response operations are very difficult to perform. There is also a fair amount of transboundary EIA and SEA treaties applicable in the region, as was studied above. Some gap areas, however, remain, especially those between Russia and its Nordic neighbours and between the US and Russia. It is to be hoped that also the rest of the Arctic states (Iceland, Russia and the US) as signatories to the Espoo Convention will become parties to it.

In general, it can be noted that except the Canada – Greenland (Denmark) agreement, there is no Arctic-specific legal guidance on how to perform offshore hydrocarbon exploitation in the very difficult operating conditions of the Arctic. It is possible to argue that there are distinct legal obligations flowing from the Polar Bear Treaty regarding how offshore hydrocarbon exploitation must be conducted, given that the Treaty requires the five range states to protect not only the bear but also its habitat. Yet, this also encounters the familiar difficulties facing other legal instruments with broad legal principles, which do not give any clear legal guidance to stakeholders in specific situations. This can be seen as a possible gap in regulation, since oil and gas activities in a region with very difficult operating conditions poses potential threats to the Arctic's vulnerable environment, ecosystems and even human communities.

Without any legally binding treaty specific to offshore hydrocarbon exploration and exploitation, it is difficult to see how the booming offshore hydrocarbon exploitation can be kept sustainable. Now, as was shown in the subsection on policy context, there does exist

Arctic-specific guidance on how to perform exploitation in an environmentally sustainable way (e.g. the Arctic Offshore Oil and Gas Guidelines and some other documents adopted as part of the Arctic-wide co-operation process). However, these are legally non-binding and it is difficult to assess whether they have any significant impacts, given that no evaluation of their effectiveness has been done. Thus, a lack of any clear guidance on states on how to perform offshore hydrocarbon activities (and how to organise transboundary EA) in their marine waters, is an obvious gap since general conventions – even though applicable in the Arctic marine waters – do not take into account the very specific conditions of the Arctic. There is adequate normative guidance in the Arctic Offshore Oil and Gas Guidelines, which are updated and revised regularly, but since there is no evaluation of their impact it is difficult to conclude whether they have any significant impacts.

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