

Nordea

**Analyses of
Key Companies having
Business Operations
in the Arctic**

Extract of the report
Climate Change in the Arctic

April 2017

Main companies from key sectors in the Arctic

Table 4 List of main companies from key sectors in the Arctic Shell, conoco, bp, noble energy, transocean

Sector	Company Logo
Oil & Gas (19)	
Mining (10)	
Fishery (7)	
Others (3)	

Analyses of Key Companies having Business Operations in the Arctic

A. Oil and Gas Sector

Royal Dutch Shell

Main business activities in the Arctic

- Shell owns 27.5% interest in Sakhalin-2 on the Sakhalin Island (Russia), an integrated oil and gas project located in a subarctic environment.
- In 2015, Shell has made drillings for oil and gas at the Burger J well in the Chukchi Sea (offshore Alaska, US), but the discoveries were insufficient to warrant further exploration in the area and the well was deemed a dry hole. The well was sealed and abandoned in accordance with US regulations.
- Shell has 18 state leases in the Beaufort Harrison Bay area in Alaska (US). (In 2016, it relinquished all but one federal lease in the Chukchi Sea and half of their federal leases in the Beaufort Sea. It concluded a commercial deal to transfer 21 Beaufort federal leases to the Arctic Slope Regional Corporation. It also transferred operatorship of the remaining federal leases (Shell had 40% interest) in the Beaufort Harrison Bay area to ENI).
- Shell has an onshore gas portfolio in Alaska Foothills (US), in which it has 33% non-Shell-operated interest along with Anadarko and Suncor.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Shell ended the offshore exploration drilling operations in Alaska in September 2015.
- Shell works with Wetlands International to identify and assess critical habitats in the Arctic regions, developing a tool that predicts the distribution of Arctic species; and ever since 2006, it has funded a science programme with the local governments of the North Slope in Alaska.
- Shell and IUCN have been working together since 2004 to minimise the impact on Western gray whales at Shell's jointventure operations in Sakhalin, Russia.
- Shell is a signatory of the United Nations Paris Agreement on climate change.
- Shell's four main contributions to reducing global GHG emissions are: supplying more natural gas to replace coal for power generation (Shell is one of the world's leading suppliers of natural gas and liquefied natural gas (LNG)); progressing carbon capture and storage (CCS) technologies; developing alternative energies; and implementing energy-efficiency measures. Shell's overall GHG emissions decreased in 2016 for the following reasons:



Royal Dutch Shell

HQ:
The Hague, Netherlands

Ticker:
RDS/A

Market Cap (USD mil.):
224,557

URL:
www.shell.com

- overall reduction in flaring;
- quest carbon capture and storage project in Canada's oil sands safely injecting more than 1 million tons of CO² per year;
- divestments, for example in Nigeria and the UK;
- and operational improvements across many facilities;

• Methane emissions - Shell has a range of initiatives for reducing methane emissions: programmes to detect and repair methane leaks and implementation energy-efficiency measures, as well as flaring and venting reduction programmes.

• Investments in research and development (R&D) – In 2016, Shell invested USD 1,014 million in R&D to improve the efficiency of products, processes and operations, and to develop new technology solutions for energy transition.

• In 2016, Shell created a New Energies business to continue exploring investment opportunities in areas including biofuels, hydrogen and renewable energy.

• Biofuels: Shell invests in new ways to produce biofuels from sustainable feedstocks such as waste and cellulosic biomass from non-food plants.

• In 2016, Shell unveiled an energy-efficient city car called the Shell Concept Car, in collaboration with Geo Technology and automotive engineers

Gordon Murray Design.

• Solar and wind technologies - At some offshore platforms in the North Sea, it uses solar PV and batteries to provide 100% renewable power generation, cutting costs, and reducing refuelling trips to the platforms. In 2001, Shell entered the onshore wind business in the US A, and has interests in six operational wind power projects in North America and one in Europe. In 2016, the share of the energy capacity from these projects was about 420 megawatts (MW).

Climate change or environment related controversies in the Arctic

On 5 September 2013; the US Environmental Protection Agency (EP A) announced the settlements with Shell Gulf of Mexico Inc. and Shell Offshore Inc., both subsidiaries of Royal Dutch Shell Plc., for the violations of the Clean Air Act permits by vessels used for drilling two oil-exploration wells in Arctic waters off Alaska in 2012. EP A documented numerous air permit violations for Shell's drill ships Discoverer and Kulluk. Shell agreed to pay a USD 710,000 penalty for the violations of the Discoverer air permit and a USD 390,000 penalty for the violations of the Kulluk air permit.

On 27 February 2013; Shell decided not to return to the Arctic in 2013 following two serious accidents with two drill ships while they were leaving drilling sites in the Beaufort and Chukchi Seas in two instances

in 2012. The company allegedly ignored the risks when it decided, in December 2012, to tow the rig out of Alaskan waters, in part to avoid millions of dollars in tax liability.

In February 2012; an independent report by the US Government Accountability Office identified a slew of environmental, logistical, and technical challenges associated with Arctic offshore drilling and concluded Shell's "dedicated capabilities do not completely mitigate some of the environmental and logistical risks associated with the remoteness and environment of the region."

On 28 July 2012; Greenpeace reported that its scientists were investigating submarine life in the Arctic, when they identified a high concentration of deep-sea corals in the Chukchi Sea, where Royal Dutch Shell planned to start drilling. The group objected Shell researchers' report that identified corals as occupying less than 4% of the habitat, saying the slow-growing soft coral was the "third most abundant" species in the area.

Exxon Mobil

Main business activities in the Arctic

- Alaska (US): ExxonMobil is the largest holder of discovered natural gas resources on the Northern Slope of Alaska. Operations:
 - 36% non-operating interest in the

Prudhoe Bay Unit.

- The Point Thomson natural gas condensate project
- Norman Wells marked the start of the quest for arctic oil and gas.
- Grand Banks - Hibernia Canada's largest offshore platform
- Grand Banks – Hebron- production will begin in 2017

- **Beaufort Sea:** Imperial is the operator of a Joint Venture with BP and ExxonMobil Canada in the Beaufort Sea for exploration licenses located more than 120 kilometers off the coast of Canada's Northwest Territories.

- **Kara Sea:** ExxonMobil and Rosneft are exploring the Kara Sea in licensed areas that include more than 125,000 square kilometers.

- **North Sea:** ExxonMobil operates four offshore projects and holds interest in 20 more in the Norwegian sector of the North Sea.

- **Russia:**

- Sakhalin Sakhalin-1 is one of the largest oil and gas projects in Russia.
- Chayvo field, using the onshore Yastreb rig and the offshore Orlan platform.
- Odoptu field
- Arkutun-Dagi field
- The De-Kastri export terminal

- **Russian Arctic Shelf:**

- In February 2013, ExxonMobil and Rosneft announced plans to increase the scope of their strategic cooperation by adding seven new blocks in



Exxon Mobil

HQ:
Irving, Texas, United States

Ticker:
NYSE: XOM

Market Cap (USD mil.):
342,300

URL:
www.exxon.com/en

the Russian Arctic.

- In 2014, geophysical and environmental studies began in sections of the Chukchi Sea, Laptev Sea and Northern Kara Sea, in licensed areas spanning 600,000 square kilometers.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- ExxonMobil extended-reach drilling technologies have allowed for field development from land by drilling horizontally under the sea. This approach reduces the number of offshore structures required to recover oil and gas resources by drilling multiple, long-reach wells at the same location, which helps reduce both underwater noise and environmental footprint.
- ExxonMobil uses special earthquake- and frost-resistant pipelines in some Northern areas.
- ExxonMobil developed the industry's only dedicated, in-house Arctic research program more than 40 years ago. Continued Arctic technology development has allowed for designing, building and operating gravity-based platforms capable of withstanding 6-million-ton icebergs in the North Atlantic and operating year-round in ice-covered waters offshore Sakhalin Island in Russia.
- ExxonMobil piloted and enhanced technologies in 2015 to monitor local

wildlife and improve their environmental performance on Alaska's North Slope.

- Offshore oil spill response - Exxon-Mobil elaborated an in-house oil spill response research program, which includes a focus on cold water and remote locations, such as the Arctic.

Climate change or environment related controversies in the Arctic

On 12 April 2016; it was reported that US senators and environmental advocacy groups were urging attorney generals from different US states to join governors from New York, California, Massachusetts, the Virgin Islands to investigate whether Exxon-Mobil misled the public and investors about the threat of climate change. The investigations came after the Los Angeles Times published an investigation on 9th October 2015 revealing that Exxon conducted studies trying to determine how global warming could affect its Arctic operations and make its bids for Arctic lease rights more profitable due to melting ice, while funding climate change denial groups. InsideClimate News also released a report on 16th September showing that as early as the late 1970s, Exxon scientists were briefing top executives that climate change was real, dangerous, and caused by the company's product.

On 24th March 1989; the oil tanker Exxon Valdez slammed into Bligh

Reef in Alaska's Prince William Sound (US) and spilled more than 11 million gallons of crude oil, damaging more than 1,300 miles of some of the most remote, wild shoreline. In 2010, the US government said that only 13 of the 32 monitored wildlife populations, habitats and resource services that were injured in the spill are fully "recovered" or "very likely recovered." Some are still listed as "not recovering".

Chevron

Main business activities in the Arctic

- The Chevron Arctic Center, based in Calgary, Alberta, is home to some of the world's foremost experts in Arctic exploration and development. The Center consists of a core group of Arctic subject matter experts who support Arctic exploration, asset development and business development projects across the Chevron global upstream.
- **Canada: Atlantic Canada**
 - In the Flemish Pass Basin offshore Newfoundland and Labrador, Chevron is conducting active programs across three exploration blocks.
 - Beaufort Sea: Chevron has been exploring for hydrocarbons in Northern Canada since the 1950s and considers the area an important future oil and gas region.

- **Norway:** On 5th May 2016, Norway offered 10 drilling licenses to Chevron and other companies.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Chevron has an Operational Excellence Management System and Environmental Stewardship Corporate Standard Process that is followed in all operations.
- Chevron received an overall score of 99 out of 100 points in the 2015 CDP S&P 500 Climate Change Report — the highest among all integrated oil and gas companies.
- The company compiles inventories of emissions, undertakes projects to manage operating emissions and applies innovative technologies to continually improve the energy efficiency of its operations.
- Chevron is reducing natural gas flaring and venting and the GHG emissions. It is a member of the World Bank-led Global Gas Flaring Reduction Partnership, and it has developed internal country-specific plans to minimise gas flaring.

Climate change or environment related controversies in the Arctic

N/A



Chevron

HQ:
San Ramon, California, U.S.

Ticker:
NYSE: CVX

Market Cap (USD mil.):
201,010

URL:
www.chevron.com

BP

Main business activities in the Arctic

- BP operates nine onshore fields on Alaska's Northern Slope. The offshore interests in the Arctic are currently limited to areas for exploration.
- BP also holds some investments in the offshore Arctic in Greenland and the Canadian Beaufort.
- BP hold a 19.75% share in Rosneft, Russia's largest oil company but does not currently have operations in the offshore Russian Arctic or directly partner with Rosneft on any of its offshore Arctic licensed areas.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- BP declares that it has been studying the environment on Alaska's North Slope since 1977 and it continues to support research to further understand polar bear behaviour, nesting birds in the tundra to gain a better understanding of potential impact of the industry, climate change and predators.
- BP is investing new large-scale gas projects and focusing on quality oil projects in core basins in order to shift to gas and advantaged oil.
- BP is developing and producing fuels and lubricants to make the cars more

efficient, thus reducing greenhouse gas emissions. This includes new lubricants that incorporate plant-based or recycled oils. BP is also establishing retail services to support electric vehicles.

- BP is investing the biofuels and wind businesses and new low carbon businesses.

Climate change or environment related controversies in the Arctic

On 5th October 2016; it was reported that 95 metric tons of oil leaked into the North Sea from BP's Clair platform due to technical issues, and it will not be cleaned up.

On 13th July 2016; US authorities fined BP Exploration Alaska with USD 130,000 for a 700-gallon spill involving natural gas, crude oil and produced water that occurred at Prudhoe Bay in April 2014. The BP spill affected 33 acres of Arctic tundra and gravel pad.

On 18th July 2011; it was reported that BP announced a pipeline rupture during testing and a spill between 2,100 to 4,200 gallons mixture of methanol and oily water in the Alaska's North Slope tundra.

On 29th November 2010; 46,000 gallons leaked into the Prudhoe Bay from a BP pipeline.

On 2nd March 2006; a spill of 212,252 US gallons of oil was discovered to



BP PLC.

HQ:
London, United Kingdom

Ticker:
NYSE: BP

Market Cap (USD million):
111,610

URL:
www.bp.com/en

have leaked from a pipeline owned by BP Exploration in the Prudhoe Bay, Alaska (US). BP was fined USD 20 million and accused of negligence.

From 1993 to 1995; Doyon Drilling employees illegally discharged waste oil and hazardous substances by injecting them down the outer rim of the oil wells. BP failed to report the illegal injections as soon as it learned of the conduct. The illegally injected wastes included paint thinner and toxic solvents containing lead and chemicals such as benzene, toluene and methylene chloride.

Conocophillips

Main business activities in the Arctic

- Alaska operations (US): ConocoPhillips operates the Kuparuk River Unit, Colville River Unit in Alaska's Northern Slope (US). Gas operations on Cook Inlet (Alaska). Oil operations in the Prudhoe Bay Field (Alaska). ConocoPhillips owns and operates five Polar Tankers, transporting crude oil of Alaska North Slope to refineries in Puget Sound, San Francisco, Long Beach, and Hawaii. ConocoPhillips owns and operates the Trans-Alaska Pipeline System (TAPS).

- Arctic Canada: ConocoPhillips holds interests in 49 significant discovery licenses and one exploration license. At Dec. 31, 2016, the total leasehold for the Beaufort Sea and Mackenzie Delta region was approximately 0.7 million net acres.

- Arctic Islands: ConocoPhillips holds interests in 13 significant discovery licenses. On 31st December 2016, the total leasehold for the Arctic Islands region was approximately 0.2 million net acres.

- Norway: Barents Sea and North Sea. In 2016, ConocoPhillips participated in two non-operated exploration appraisal wells in the Oseberg and Alvheim areas. Both wells were discoveries and are currently undergoing evaluation. In 2016, the company was awarded three exploration licenses.

- Offshore operations: ConocoPhillips announced in its 2015 Q4 earnings results that it will book an impairment for the Chukchi Sea leases. Subsequent to that action, the company and its co-venturers jointly decided to relinquish the remaining 61 leases to the Bureau of Ocean Energy Management (BOEM). The relinquishment was accepted by the BOEM on 26th April 2016. Given the current environment, the company's prospects in the Chukchi Sea are not competitive within its exploration portfolio.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- ConocoPhillips Alaska's measures to minimise its footprint:
 - The Anchorage Tower's data center's system was replaced with a flywheel driven kinetic energy system, similar to an electric vehicle. The project re-



Conocophillips

HQ:
Houston, Texas, United States

Ticker:
NYSE: COP

Market Cap (USD mil.):
61,700

URL:
www.conocophillips.com

sulted in a 20 percent energy savings and eliminated some 35 tons of lead acid batteries.

- ConocoPhillips uses “green” cleaning supplies and has reduced the overall number of different chemicals.
 - Installation of LED lighting.
 - Installation of 11 new energy - efficient condensing boilers in the Anchorage offices which are 93% energy efficient.
 - Installation of temp-a-start systems on all heavy equipment at Kuparuk, saving at least 230,000 gallons of diesel in the first year.
 - Implemented an enclosed automated system to puncture and drain aerosol cans. The hazardous fluids are collected and emptied and then the crushed aerosol cans are drummed and recycled.
 - Recycling program which includes metal, wood, electronics, paper products, plastic bottles, aluminum cans, batteries, toner and silver cartridges, x-ray film, packaging material and more.
- ConocoPhillips’ measures for a better air quality: monitoring stations in the North Slope (Alaska) measure temperature, wind speed, wind direction and concentrations of carbon monoxide, nitrogen dioxide, particulate matter, sulfur dioxide, and ozone.
 - ConocoPhillips is working with federal, state and local regulators, as well as local communities, and routinely develops and conducts multi-year baseline environmental studies programs.

Climate change or environment related controversies in the Arctic

On 28th September 2014; it was reported that ConocoPhillips and BP PLC were pleading with US regulators not to make them follow new guidelines proposed by the Interior Department that would require the companies to keep emergency spill response equipment on hand and prohibit the use of chemical dispersants in remote Arctic waters due to the high costs.

On 5th March 2014; it was reported that six villagers from Nuiqsut, Alaska, US , filed a lawsuit against ConocoPhillips, seeking an injunction to shut down the construction of its CD -5 oil project on the North Slope, Alaska.

On 19th December 2012; ConocoPhillips Alaska signed a consent agreement with the US Environmental Protection Agency (EP A) to pay USD 45,000 penalty over a December 2007 spill near the Kuparuk topping

plant on Alaska's North Slope. Also regarding the 2006 and 2007 spill, the company has also agreed to Alaska's Department of Environmental Conservation to restore the 0.32-acre spill area and pay penalties of USD 267,000.

TransCanada

Main business activities in the Arctic

- Alaska Pipeline Project Length proposed plan from a new gas treatment plant in Prudhoe Bay, Alaska to the Alberta border:
- Mackenzie Gas Project, a proposed 1,196 km (748 mi.) natural gas pipeline system along the Mackenzie Valley of Canada's Northwest Territories to connect Northern onshore gas fields with North American markets.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- In 2014, the most recent year for which data is available, TransCanada recorded a savings of USD 6.8 million from environment related R&D initiatives which significantly reduced the impact on the environment. These initiatives include the development of a mathematical model to quantify site contamination, reducing the need for invasive testing and extensive site remediation; research supporting the effective management of creosote

tiles; and a non-invasive, water-free electronic alternative to the hydrostatic testing of pipelines.

- TransCanada is participating as a founding partner in the U.S. Environmental Protection Agency's (EPA) new Natural Gas STAR Methane Challenge Program, launched in March 2016.
- Since 2012, TransCanada has been among Canada's top CDP-scoring companies.

- TransCanada participates in supporting the energy shift from coal-fired generation to natural gas, nuclear and renewables. It has investments in natural gas, nuclear, wind, hydro and solar generating facilities with more than USD 5 billion investments in emission-less energy sources, accounting for over one-third of the power it produces.

Climate change or environment related controversies in the Arctic

N/A

Husky Energy

Main business activities in the Arctic

- Husky has an extensive portfolio of assets in Western Canada and is active in the exploration and production of heavy oil, light crude oil, natural gas and natural gas liquids.
- In the Atlantic region, the Company continued to add infill wells in 2016,



TransCanada Corp.

HQ: Calgary, Canada

Ticker:
TSE: TRP

Market Cap (USD mil.):
41,276

URL:
www.transcanada.com



Husky Energy

HQ:
Calgary, Canada

Ticker:
TSE: HSE

Market Cap (USD million):
15,584

URL:
www.huskyenergy.com

with new production from the North Amethyst and South White Rose extensions

- In the Flemish Pass Basin, the Company and its partner wrapped up an extensive exploration and appraisal program in the Bay du Nord discovery area, with two new oil discoveries at the Bay de Verde and Baccalieu prospects. Preparations were finalized for two exploration wells that are scheduled to be drilled starting with mid-2017.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Husky declares that it focuses on emission reduction activities, including capturing carbon dioxide (CO₂), minimizing fugitive emissions and managing flaring and venting activities, as well as reducing its energy consumption. Carbon dioxide is captured at the Lloydminster Ethanol Plant to aid in enhanced oil recovery (EOR). About 30 tons of CO₂ a day are captured in an initial pilot project at the Pikes Peak South Lloyd Thermal Project for use in EOR. The Company is evaluating additional technologies
- Husky has an Environmental Performance Reporting System, providing for transparency and consistent data related to air quality and carbon management programs.
- Husky has a Fugitive Emission Man-

agement Program that detects and repairs leaking equipment to reduce emissions.

Climate change or environment related controversies in the Arctic

N/A

Noble Energy Main business activities in the Arctic

- Noble Energy is a contractor for Royal Dutch Shell for drilling activities in the Chukchi and Beaufort seas off Alaska coast (US).

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Noble Energy obtained a reduction of 61% of flaring emission in 2015 since 2013.
- Noble Energy relies on natural gas to power its onshore drilling and well completion operations.
- Noble Energy does not produce fuels or refine petroleum products. It also does not use, produce or consume any ozone-depleting substances in the operations.
- Noble Energy declared that it expanded habitat restoration activities, and improved the management of impacts on water resources.



Noble Energy

HQ: Houston, Texas,
United States

Ticker:
NYSE: NBL

Market Cap (USD mil.):
15,490

URL:
www.nobleenergyinc.com

- Noble Energy implemented a voluntary LDAR program across the Marcellus Sea area to reduce the potential for leaks at production facilities where limited regulatory requirements for LDAR exist.

Climate change or environment related controversies in the Arctic

On 8th December 2014; Noble Energy Inc agreed to pay USD 8.2 million in fines and USD 4 million in community service payments to settle felony charges brought by the US Department of Justice (DOJ) related to the company's drilling operations in offshore Alaska, US. The DOJ claimed that Noble Energy violated the safety, environmental and record keeping laws for the ship used in the US Arctic waters. The ship was under contract with Royal Dutch Shell PLC. The DOJ also claimed that Noble Energy failed to keep proper records for its operation of the Shell owned Kulluk drilling ship that ran aground in December 2012.

Transocean Main business activities in the Arctic

- Transocean owns two custom-designed, high-capacity, dual-activity semisubmersible drilling rigs, equipped for year-round operations in harsh environments, including those of the Norwegian continental shelf and sub-Arctic waters.

- From December 2016, Transocean Arctic also won a drilling contract of four wells for 250 days in the Alvheim and Volund fields, offshore Norway.

- As of 9th February 2017, 11 units of the drilling fleet were located in the UK's North Sea.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Transocean has one global Environmental Management System (EMS) standard applied to all rigs. The EMS has tools designed to ensure that all of operations are managed in an environmentally responsible manner. It seeks to drive continuous improvement and is globally compliant to ISO 14001.

Climate change or environment related controversies in the Arctic

On 8th August 2016; a Transocean semi-submersible drilling rig with approximately 280 metric tons of diesel on board was hard aground in Scotland's Western Isles after finishing a contract with Marathon Oil in the Norwegian sector of the North Sea this month.

On 10th December 2015; the Norwegian Petroleum Safety Authority said Transocean's semi-submersible rig Transocean Arctic does not meet all the requirements when it comes to the



Transocean

HQ: Zug, Switzerland

Ticker:
NYSE: RIG

Market Cap (USD mil.):
5,020

URL:
www.deepwater.com

management of emergency preparedness and the working environment.

Nunaoil A/S

Main business activities in the Arctic

- Nunaoil is Greenland's national oil company (NOC) and is an active partner in all exploration and exploitation licenses in Greenland. Therefore, the company has great insight into the hydrocarbon exploration which takes place on the offshore areas of Greenland. NUNAOIL participates in the exploration licenses on behalf of Namminersorlutik Oqartussat (the Government of Greenland) and collaborates with various international oil companies on the exploration of commercial deposits of oil and gas in Greenland. The company's ownership interest in licenses varies from 6.25% to 12.5%.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Nunaoil is collecting environmental data, to obtain a better and more detailed understanding of the wind, weather and ice conditions within the area.
- The company is monitored by the Ministry of Mineral Resources and the Ministry of Nature, Environment and Justice for the compliance with all HSE requirements environment.

Climate change or environment related controversies in the Arctic

N/A

Cairn Energy

Main business activities in the Arctic

- In 2016, Cairn secured three licenses in the Barents Sea, including one as Operator.
- Cairn holds exploration acreage and 24 licenses in the UK and Norway including the Barents Sea.
- Between 2009 and 2010, Cairn drilled eight wells in Greenland that failed to find commercial quantities of hydrocarbons.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Cairn declares that its approach to climate change includes: GHGs measuring and reporting; further consideration of climate change risks and opportunities associated with all projects; promoting efficient use of energy in activities and, wherever possible, including efficient and timely completion of projects; integrating climate change considerations and potential costs into investment decisions; stakeholder engagement.



Nunaoil

HQ: Zug, Switzerland

Ticker:
N/A

Market Cap (USD mil.):
N/A

URL:
www.nunaoil.gl

- In 2016, Cairn transitioned to the GRI Standards of sustainability reporting.

- For offshore activities, Cairn manages emissions to air and discharges into the sea. Sewage, organic kitchen waste, bilges and contaminated drainage water are all treated and discharged in strict compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL).

- Cairn acknowledges the rising importance of climate change and, in 2016, it has assessed this as “high” within the CR materiality assessment.

Climate change or environment related controversies in the Arctic

On 23rd May 2012; environmental authorities of Denmark demanded Cairn Energy to stop using a hazardous substance in its oil exploration off the Greenlandic west coast. Reports revealed that the company released over 160 tons of a chemical called Ultrahib during 2010 and 2011 operations, when it drilled a limited number of test wells.

On 21st November 2010; it was reported that Cairn Energy PLC refused to publish full details of its oil spill response plan for Arctic exploration. The company and the Greenland gov-

ernment said the plan was secret to prevent sabotage by third parties. Environmental groups raised concerns over the lack of transparency. Between 2010 and 2011, several protests were organized by Greenpeace activists.



Cairn Energy

HQ: Edinburgh, United Kingdom

Ticker:
LON: CNE

Market Cap (USD mil.):
1,220

URL:
www.cairnenergy.com

Repsol

Main business activities in the Arctic

- Norway: Repsol holds mineral rights to 35 blocks in the country: 18 for exploration, with a net surface area of 4,289 sq km, and 17 for production and development, with a net surface area of 410 sq km.
- Canada: Repsol has two exploration sites in the North of Canada.
- US : Repsol has two exploration sites in Alaska.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- In 2016 Repsol along with none other companies created a fund to invest USD 1 billion over 10 years to develop and accelerate the commercial deployment of low-emission technologies.
- Repsol established a target to reduce 1.9 Mt CO₂e by 2020.
- Repsol has invested EUR 357 million in reduction actions out of EUR 500 million committed until 2020.
- Repsol undertakes periodic leak detection and repair campaigns at gas production facilities and is researching new opportunities as it considers natural gas can play a key and immediate role in reducing fossil fuel emissions.

- Repsol's energy efficiency plans have included projects of energy integration of units, the optimization of steam consumption, modifications to furnaces and boilers, the installation of variable speed motors and more-efficient dynamic equipment, improvements to insulation, and measures to reduce flared and vented gas.

- Repsol has eight facilities and one multisite business certified according to the ISO 50001 International Standard.

Climate change or environment related controversies in the Arctic

On 9th April 2013; it was reported that a 6,600 gallons of a mixture containing crude oil and other fluids spill occurred from Repsol's hose in Alaska's North Slope, Se. The US Environmental Protection Agency fined the company USD 30,000.

In the winter of 2012; another spill of than 100,000 gallons of drilling mud occurred at Repsol's North Slope operation, US . The Alaska Oil and Gas Conservation Commission revoked permits for two other Repsol wells, requiring that they reassess the potential for gas hazards.



Repsol

HQ: Madrid, Spain

Ticker:
REP:SM

Market Cap (USD mil.):
22,027

URL:
www.repsol.com

Eni Spa

Main business activities in the Arctic

- Main development projects:
 - Goliat field (Eni operator 65%) in the Barents Sea, Norway.
 - Yamal (Russia): Sambursgkoye, Urengoykoye, Yaro, Severo, G&C onshore developments.
- Producing fields: Samburgkoye - Yamal peninsula (Russia) and Nikaitchuq (Alaska)
- Exploration discoveries and potential: Norwegian Barents Sea and Russian Barents Sea.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

Energy efficiency: Eni's energy-efficiency measures implemented since 2008 have enabled a saving at normal capacity of about 370,000 tons of oil equivalent, of which more than 20% stems from optimising upstream logistics, amounting to a cumulative reduction of over 1m tons CO2 eq/year

- Since 2010, it has implemented an energy-management systems that complies with ISO 50001.
- Reduction in fugitive methane emissions. Eni also elaborated a methane emissions control plan for our upstream activities in line with the requirements promoted by the Climate

and Clean Air Coalition.

- Green fuels: Eni began producing its high-performance fuels LST BluDieselTech and BluSuper; it opened the first liquid natural gas (LNG) service station in Italy, Piacenza; it launched the Green Diesel, a fuel is derived from the hydrogenation of vegetable oils.

- Focusing on low carbon energy sources. natural gas. Today 48% of Eni's portfolio of certain reserves is made up of gas.

- Targets: 43% reduction in the GHG performance index on production up to 2025 and a 25% on hydrocarbon volumes sent for routine flaring by 2019.

- Results: 75% decrease in the volume of gas in 2014 compares to 2007; 25% reduction of GHG emissions upstream on production from 2010 to 2015; 28% reduction in total GHG emissions from 2010 to 2015.

Climate change or environment related controversies in the Arctic

On 4th January 2017; Eni SpA's Norwegian facility Goliat, in the Barents Sea closed down production after the discovery of a technical error with the pipe connecting the platform with loading oil tankers. It was the fifth production halt since the platform came into operation in January 2016. Eni has allegedly reported 34 technical errors during the year.



Eni Spa

HQ:
Rome, Italy

Ticker:
NYSE: E

Market Cap (USD mil.):
56,740

URL:
www.eni.com/en_IT/home.page

On 28th December 2014; a fire took place at a North Slope drilling avenue in Alaska, US , operated by Eni Petroleum, subsidiary of Eni SpA.

On 4th September 2012; a mobile drilling facility of Eni in the Barents Sea developed a 5.7 degree list after its ballast tank took on water. Norway's Petroleum Safety Authority (PSA) has decided to initiate an investigation of the stability incident.

Statoil

Main business activities in the Arctic

- Norway: Statoil operates more than 40 assets in the North Sea, the Norwegian Sea and the Barents Sea, and also operates a significant number of exploration licences. Statoil is responsible for over 70% of all oil and gas production on the NCS .
- Russia: Statoil is a partner in the Kharyaga oil field development, part of Timan-Pechora basin located in the Nenets Autonomous District 60 kilometres North of the Arctic Circle.
- Canada: Statoil is the operator of five discoveries offshore Newfoundland in the Flemish Pass Basin. Statoil also holds working interests in four projects offshore Newfoundland.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Statoil states that it has a steady and dedicated focus on research and development in Arctic environments, working on cost-efficient environmental monitoring, effects of sound on marine life, quantifying the physical environment, safe and efficient design and operation and year-round oil spill response capabilities.

- Statoil was a founding member of the Barents Sea Cooperation (BaSEC), set up in 2015. It now includes 18 oil and gas companies who are collaborating on exploration activities in the northernmost frontier exploration area on the Norwegian Continental Shelf. BaSEC has developed a tool to be used by operators planning exploration activity.

- Statoil participates in the MARAMBS project, which is a joint investment project with Total and ConocoPhillips, with financial support from the Research Council of Norway. The project runs from 2016 to 2018 and is designed to help oil and gas companies avoid damage to vulnerable marine species

- In 2010, Statoil initiated Tte SYMBIOSIS research project, with financial support from other oil companies as well as the Research Council of Norway to develop a combination of ecosystem and oil impact models to understand the possible consequences of an oil spill on the Barents Sea.



Statoil

HQ:
Stavanger, Norway

Ticker:
NYSE: STO

Market Cap (USD mil.):
57,070

URL:
www.statoil.com

Climate change or environment related controversies in the Arctic

On 15th October 2016; Statoil's Songa Endurance drilling rig of a well in the North Sea Troll field lost control led to a gas leak that pushed seawater more than 30 meters up the derrick.

On 13th October 2015; Norway's Petroleum Safety Authority said it would conduct an investigation into an oil spill occurred on Statoil's Statfjord field in the North Sea on October 8. The spill could be within the range of 40 cubic metres of oil.

On 29th December 2013; Statoil shut down production on its Statfjord A sea platform due to an oil leak. It was the fourth oil spill for Statoil in the Arctic. On 26th May 2012; a leak of 3,500 kilograms of gas occurred on a platform owned by Statoil in the Heimdal field in the North Sea, Norway.

On 4th December 2010; a gas leak occurred at Statoil's Gullfaks platform in the North Sea, Norway, while a pipeline was being replaced. Norwegian authorities fined the company USD 5.1 million.

On 13th April 2005; oil exploration drilling from Statoil's offshore rig Eirik Raude in the Barents Sea off Northern Norway has been shut down after its third spill into Arctic waters in just two months.

Rosneft

Main business activities in the Arctic

- Rosneft has oil and gas exploration assets and production sites in the North and Far East of Russia (Sakhalin 1 and Sakhalinmorneftegaz) and in the Russian offshore, the Kara Sea (West Arctic offshore), the Laptev Sea (East Arctic offshore), the Okhotsk Sea (the Far East offshore and Sakhalin offshore).

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- In 2015, the Company's Arctic Scientific Center and the Arctic and Antarctic Research Institute performed joint studies of sea ice and hydrometeorological conditions at the Company's license areas in the Barents Sea, the Kara Sea, the Laptev Sea and the East Siberian Sea. To that end, the Company launched three major expeditions – Kara-Winter 2015, Kara-Summer 2015 and ChukotkaSummer 2015.

- Kara-Winter 2015 was the most extensive and thorough study of the Arctic in the past 20 years. Rosneft invested a total of RUB 116.9 billion in innovation, including RUB 36 billion in research and development.

- KaraSummer 2015 expedition. The studies covered 7 license areas in the Kara Sea, the Laptev Sea and the western part of the East



Rosneft

HQ: Moscow, Russia

Ticker: MCX: ROSN

Market Cap (EUR million): 60,092

URL: www.rosneft.com

Siberian Sea; 16 submersible buoy stations. Expedition costs totaled RUB 34 million.

- Chukotka-Summer 2015. The deployment of an automatic weather station on Wrangel Island marked an important milestone in the research, as it helped to recover the system of Arctic weather observations almost completely.
- In April and December 2015, RN-ShelfArctic held two public consultation meetings in the settlement of Iskateley, Zapolyarniy District, Nenets Autonomous Okrug. The discussion focused on the engineering survey and integrated geophysical survey programs, including environmental assessment, at the Yuzhno-Russkiy license block.
- Cooperation with Rosatom for the exploration technologies and equipment, support of Arctic offshore oil and gas development and production (including the support of such activities with Atomflot icebreakers), process control and measurement systems, energy efficiency, occupational safety and environmental protection.
- In 2015, the Company developed and adopted a program for the preservation of biological diversity in marine ecosystems at its license blocks in Russia's Arctic region. The Company conducted a stocktaking of its environmental liabilities for accounting purposes in 2015, adjusting liabilities

arising from both production operations in 2015 and emissions produced in prior periods.

- In 2015, an independent certification authority performed an audit to assess the compliance of the Company's integrated HSE system to the ISO 14001 standard for environmental management systems and identify its strengths.
- The Microbial Biotechnology Laboratory at MGU 's Biology Department is working on developing an oil spill bioremediation product for Arctic waters.
- The Company has launched a special innovation project to develop a control system with an unmanned underwater vehicle for performing environmental checks at the heads of offshore exploration wells in Russia's Arctic at a depth of 20 to 300 meters.
- In 2015, RN -Shelf-Arctic carried out an underwater survey of the heads of exploration wells drilled in the Barents Sea in Russia's Arctic region in 1985-2001. The survey that covered the Zapadno-Prinovozemelsky, YuzhnoRusskiy and Pomorsky license blocks allowed the company to get a high-precision 3D model of the contours of the surrounding seabed and a video of downhole equipment. The wells did not have any negative impact on the environment, with no hydrocarbon spills or man-made hazards identified.

- RN-Shelf-Arctic also undertook an effort to repopulate river and lake species as compensation for damage caused to the local ecosystems by geophysical studies at the Zapadno-Prinovozemelsky and ZapadnoMatveyevsky license blocks in 2014 and at the Zapadno-Matveyevsky block in 2015.

- Rosneft and the Russian National Committee for the United Nations Environment Program (NP UNEP-COM) cooperate under the Program of the Presidium of Russian Academy of Sciences entitled Fundamental Exploratory Research in the Interests of the Russian Arctic Development and the Environment section (including the Arctic work group) of the Research and Coordination Council of the Federal Agency of Scientific Organizations (FANO).

- In 2015, Rosneft and WWF Russia performed several meetings regarding preparation of the program on preservation of marine ecosystems biodiversity on the Rosneft's Arctic offshore license areas of Russia and the recent environmental consequences from oil spills at oil producing facilities in the framework of the Roadmap of measures for 2015-2016, signed June 30, 2016 to execute Memorandum of Understanding signed June 21, 2013.

Climate change or environment related controversies in the Arctic

On 24th August 2013; the Greenpeace ship Arctic Sunrise entered the North-

ern Sea Route off Russia's coastline to protest against plans by Rosneft Oil Company and Exxon Mobil Corp (ExxonMobil) to drill near the Russian Arctic National Park. A Greenpeace campaigner emphasized that the Russian Arctic National Park was a special place full of rare and threatened Arctic wildlife, and that if Rosneft and ExxonMobil brought in offshore drilling platforms they would risk catastrophic blowouts and spills that could devastate the region.

On 13th June 2013; Greenpeace reported that the environmental damage caused by oil spills incurred by Rosneft Oil Company in Western Siberia, Russia, remained largely ignored by the Russian government, investors in oil industry and European consumers. With 2,700 leaks a year, Rosneft paid fines for the larger ones, but small ones got unnoticed. Rosneft was responsible for half of the 20,000 single spilling accidents in a year worldwide making Rosneft the global leader in oil spills with a 10,000 incidents. Old and misused infrastructure and equipment were to be blamed for the spills. The Russian oil industry, Greenpeace said, leaked over 30 million barrels of oil every year, with thousands of hectares of forests slowly dying from toxic contamination and fires, and water basins contaminated with oil. Many birds and animals were killed by the oil contamination. Indigenous people of the area, the Khanty, Mansi, and Nenets were forced to abandon their traditional lifestyle. Russia's lack of legislation made the oil industry

spill over 30 million barrels of oil on land every year, equivalent to seven Deepwater Horizon disasters.

On 14th August 2012; it was reported that a report from Russian Environmental Control Agency revealed that Rosneft Oil Company was the worst polluter in the Khanti Mansiysk region of Russia. Rosneft recorded 2727 registered spills in the region in 2011. The report stated that Rosneft had barely reduced the number of oil spills from 2009 to 2011. A local business daily, Vedomosti, also reported that out of the four main oil companies in the region, Rosneft had spent the least on environmental protection measures.

Gazprom OAO

Main business activities in the Arctic

- Gas pipelines and LNG export routes through the Arctic offshore, North of Russia and Far East (Sakhalin and Kamchatsky peninsula)
- Gazprom Neft Group is producing oil at the Prirazlomnoye field — Russia's only project for hydrocarbon resource development in the Arctic shelf.
- Gazprom pioneered the development of the Russian Arctic shelf, launched a fundamentally new gas production centre in the Yamal Peninsula, and is building large-scale gas infrastructure in Russia's East.
- Prirazlomnoye is currently Russia's

only Arctic offshore field to have started commercial oil production.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Gazprom Group has developed the Program of preservation of the biological diversity of marine ecosystems of the Arctic of the Russian Federation. The program considers recommendations of an environmental community expertise, Ministry of Natural Resources and Ecology, the World Wildlife Fund (WWF) and the Global Environment Facility (GEF).
- In 2015, a new version of the Environmental Policy was approved, setting out additional commitments to environmental safety that the Company undertakes in developing hydrocarbon fields on the Russian continental shelf and Arctic Zone.
- The Company's efforts to reduce its climate footprint are guided by Russia's Energy Strategy to 2030, the Russian State Environmental Protection Programme 2012–2020, and the Climate Doctrine of the Russian Federation.
- In 2015, greenhouse gas emissions at facilities of PJSC Gazprom and its wholly-owned subsidiaries registered a reduction, driven by a decrease in the natural gas consumption in compression process, more efficient use of fuel and energy and the implementa-



Gazprom OAO

HQ: Moscow, Russia

Ticker: MCX: GAZP

Market Cap (EUR million):
48,500

URL: www.gazprom.com

tion of other energy-saving initiatives. Every year, PJSC Gazprom submits to the Federal Service for Hydrometeorology and Environmental Monitoring of Russia (Roshydromet) the results of a quantitative assessment of its annual greenhouse gas emissions for the government agency to compile Russia's National Greenhouse Gas Inventory in line with the requirements of the United Nations Framework Convention on Climate Change (UNFCCC) and Russian laws.

- PJSC Gazprom is involved in preparing materials for Russia's National Communications on Greenhouse Gas Emissions. Since 2009, the Company has participated in the Carbon Disclosure Project (CDP). In 2011–2015, PJSC Gazprom obtained the best scores among Russian oil and gas companies based on the results of its responses to CDP's questionnaires.

- The energy efficiency targets of PJSC Gazprom and its major subsidiaries are set out in the PJSC Gazprom's Energy Saving and Energy Efficiency Improvement Concept for 2011–2020.

- Mid-term and short-term energy saving and energy efficiency programmes are developed to ensure progress towards corporate targets. The Company's target levels of energy efficiency performance indicators for 2011–2020 include: — Achieve the savings target of at least 28.2 mm t c.e. for fuel and energy consumption for own operational needs; — At least

11.4% reduction of specific natural gas consumption for own operational needs; — Reduction of greenhouse gas emissions by at least 48.6 mm tons of CO₂ equivalent.

- The energy-saving programmes and initiatives implemented during 2015 gave actual savings of 2.7 mm t c.e. of fuel and energy, including 2,255.3 mmcm of natural gas, 260.6 million kWh of electricity, and 205.0 thousand Gcal of heat energy. Gas transportation by trunk pipelines accounted for the biggest savings of fuel and energy — 83.7%, gained through the implementation of a vast range of energysaving initiatives.

Climate change or environment related controversies in the Arctic

On 10th December 2014; Facing Finance released a report entitled Dirty Profits 3, stating cases of serious violations of internationally established norms and standards by 25 controversial companies. In 2013, Gazprom OAO was the fifth company responsible for greenhouse gas emissions and was classified as number one responsible for emissions resulted from natural gas. In December 2013, Gazprom started mining oil in the Arctic Barents Sea and was heavily criticized by Greenpeace and other organizations over the risk of the melting of the Arctic ice, for endangering the region's marine ecosystem and for not being prepared to handle a potential spill.

A number of 28 Greenpeace activists and two journalists were imprisoned for three months and criminal investigations continued until September 2014. In 2014, Gazprom received the Public Eye Award for violating federal safety and environmental standards in its Arctic Sea operations and was held responsible for 206 oil spills across six land operations. Official records claimed the company was responsible for 1,000 onshore spills a year. Greenpeace Russia accused the company of being involved in an offshore drilling disaster that killed 53 people in December 2011, when the Kolskaya jack-up rig capsized. The Save Ukok coalition of Russian NGOs said Gazprom failed to address the environmental impacts of the planned Altai Gas Pipeline, which also posed a socio-economic and environmental threat to Southern Siberia and the Ukok Plateau. Gazprom was also involved in the Sakhalin II Oil and Gas project, which was criticized by the Sakhalin Environmental Watch for its negative social and environmental impacts.

On 23rd January 2014; campaigners at World Economic Forum in Davos, Switzerland, awarded Gazprom OAO Public Eye shame award for its Arctic oil drilling. Campaigners, Greenpeace and the Berne Declaration, claimed that Gazprom's oil drilling would lead to long-term pollution of the Arctic region.

On 22nd January 2014; Greenpeace Russia reported that Gazprom OAO tried to conceal an oil spill in the North of the Tomsk region, Siberia, Russia. In August 2013, despite a report from a local NGO revealing an oil spill in the region, Rosprirodnadzor, the Russia's environmental supervision agency, said that no oil contamination was found. Gazprom stated that the spill was small and that the oil was fully recovered. However, the analysis of the satellite images recorded by Greenpeace Russia of the same oil field revealed 71 oil spills over a total area of 3.1 hectares. Greenpeace Russia made an official request to prosecutors to examine the area.

On 18th October 2013; nearly 10,000 people protested at more than 100 events in 36 countries to call for the immediate release of 30 activists who were imprisoned in September 2013 and charged with piracy by the Russian authorities. They were imprisoned after a peaceful protest against Arctic oil drilling at a Gazprom OAO oil platform in the Pechora Sea. Also on 17 October 2013, in Murmansk, Russia, where the 30 were being held, the Greenpeace office was broken into, and a mock cage, which was going to be used during protests, was stolen.

On 8th October 2013; Greenpeace International criticized Gazprom OAO for its spill response in the Prirazlomnaya field in Arctic. A response published by Greenpeace alleged that its emergency spill response plan was

only for limited ice conditions. US Geological Survey had concluded that the response plan had severe limitations due to extreme conditions in the Arctic. It also alleged that its rig in Okhotsk, Russia, drilled beyond approved operational window and without full safety assessments and towed in winter, which was forbidden by the rig manufacturer.

In December 2011; Gazprom Neft was responsible for Russia's worst offshore oil disaster, when a floating rig sank in the Sea of Okhotsk, killing 53 workers. According to the company's 2012 sustainability report, the company reported 2,626 pipeline ruptures that year and 3,257 ruptures in 2011.

Lukoil

Main business activities in the Arctic

- Norway: two licenses in the Norwegian sector of the Barents Sea.
- Russia: Arkhangelsk Region - Lukoil is involved in the development of the V. Grib diamond field.
- The Nenets Autonomous Area - Varandei fixed offshore ice-resistant offloading terminal (FOIROT) related to oil and gas development, production, marketing and transportation.
- Yamalo Nenets - Lukoil is developing YNAA fields.

- Krasnoyarsk Territory – since May 2015, Lukoil obtained the license to develop the Vostochno-Taimyrsky license area and now plans to expand its presence in terms of production and social and economic projects.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- The Company is currently implementing its fifth target functional 2014–2018 LUKOIL Group Environmental Safety Program worth RUB 128 bln. The Program sets the following priorities:
 - utilization of newly generated waste;
 - utilization of “old (pre-privatization) dam age”;
 - associated petroleum gas utilization rate of at least 95% by 2016;
 - increase in Euro-5 compliant eco-friendly fuel production;
 - emergency prevention and preparedness for emergency response;
 - introduction of automated industrial environmental monitoring systems;
- In September 2013 the Russian President signed a decree On Reduction of Greenhouse Gas Emissions. In furtherance of the aforesaid decree, on 2 April 2014 the Russian Government issued Order No. 504-r approving of the Plan that provides for elaboration of the following:
 - concept of development of the monitoring, reporting and verification system with regard to greenhouse gas emissions;



Lukoil

HQ:
Moscow, Russia

Ticker:
MCX: LKOH

Market Cap (USD mil.):
43,821

URL:
www.lukoil.com

- guidelines and methods for inventory taking of greenhouse gas emissions across the key economic sectors;
 - carbon intensity reduction targets for products manufactured by the major sectors of the Russian economy;
 - systems of regulation of the most hazardous greenhouse gases.
- Lukoil is investing in green electricity generated by hydroelectric power plants (HPP) in Russia, in addition to developing solar and wind power projects.
 - It works on winter and arctic diesel fuels with sulfur concentrations under 10 ppm that do not use any depressor additives.

Climate change or environment related controversies in the Arctic

On 4th October 2016; a spill was observed from the Verkhne-Vozeykoye field in Russia presumably developed as a Lukoil pipeline joint ruptured near an oil-gathering line. Lukoil says the area affected by the spill is three hectares. However, people on site say that the spill area was far bigger.

On 9th May 2016; residents in the Izhmy district, Russia, accused Lukoil of an oil spill that could amount to several hundred tons of oil discovered in the Yarega river, and could eventually spread to the larger Pechora river that ends up in the Barents Sea. Residents said the authorities were covering up Lukoil by saying the spill comes from

an old exploration well abounded before 1950.

In May 2014; four Lukoil reservoirs with a total of 20 thousand tons oil caught fire. Firefighters needed two days to get control over the burning tanks. Another fire occurred on 11 June 2014 at Lukoil's fields near Usinsk, Russia.

On 11 April 2014; it was reported that the Komi communities supported by the municipal council officially requested Lukoil OAO to cease its operations in the Izhma district of Russia until requirements of indigenous people were met.

On 20 April 2012; an oil spill started at the Trebs field in the Russian Arctic and affected an area of 8,000 square meters. The workers tried to open an old well, causing oil to gush uncontrollably for 37 hours, up to 500 tons of oil per day. The oil well was operated by a joint venture between Lukoil and Bashneft. Greenpeace criticized the company for not cleaning up after the spill. Oil products were found in water samples four months after the spill.

Novatek

Main business activities in the Arctic

- Novatek has 39 licenses for exploration and production in Yamalo-Nenets Autonomous Okrug region in Russia. It carries commercial production of natural gas, gas condensate and crude oil across 13 fields. The company also stabilizes gas condensate at the Purovsky Plant and processes stable gas condensate at the Ust-Luga Complex.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Environmental aspects are taken into account in designing new production facilities: cutting-edge technology and equipment are used to considerably reduce the adverse environmental impact and risk of environmental accidents. The Company builds new and upgrades its existing waste disposal sites, equips its facilities with state-of-the-art drilling waste treatment units, sets up new sewage treatment facilities and revamps older ones.

- In 2015 environmental expenditures of NOVATEK, its subsidiaries and joint ventures aggregated RBL 776 million.

- The Heritage Environmental Damage Remediation Program included actions to remediate land, surface and ground water.

- Throughout 2015, Novatek performed environmental monitoring at all of the license areas and production facilities of the Company.

- In 2015, Yamal LNG remediated 310 hectares of land and relinquished them to the Yamal district government. In order to compensate for the water resource damage, peeled fry was released into the Ob-Irtysh basin river.

- The Company systematically works to decrease its harmful greenhouse gas emissions into the atmosphere. In 2015, the Program for Rational Use of Associated Petroleum Gas ("APG") enabled the Company to reach a 96% APG utilization rate at the Samburgskoye and East-Tarkosalinskoye fields.

- The Company continued its participation in the Carbon Disclosure Project (CDP) in 2015 whereby information on greenhouse gas emissions and operational energy efficiency is disclosed.

Climate change or environment related controversies in the Arctic

On 7th March 2016; one person was killed and another one was injured by a blast near a Novatek oil field in Siberia, Russia.



NOVATEK

Novatek

HQ: Tarko-Sale, Russia

Ticker: MCX: NVTK

Market Cap (EUR million):
36,960

URL: www.novatek.ru/en

Dynagas

Main business activities in the Arctic

- Dynagas is a Liquefied Natural Gas (LNG) maritime transportation company operating in the Arctic. Climate change or carbon emission reduction related initiatives within and beyond the Arctic

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Dynagas states that its core policies are exceeding industry standards through adoption of ISO standards (14001, 9001, 18001, 50001) and are continually revised to meet evolving requirements and management practices.

Climate change or environment related controversies in the Arctic

N/A



Dynagas

HQ:
Monaco

Ticker:
NYSE: DLNG

Market Cap (USD mil.):
628.87

URL:
www.dynagas.com

B. Mining Sector

Severstal

Main business activities in the Arctic

- Severstal Resources supplies almost all of the iron ore and approximately 70% of hard coking coal required by Severstal's steel business. It operates three mines in the North of Russia: Kostomuksha, Olenegorsk and Vorkuta.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Severstal states that it has focused on environmental projects which include the installation of new BOF filters at Cherepovets to reduce air emissions as well as successful initiatives to reduce sulphur dioxide emissions at Karelsky Okatysh.
- Compliance with ISO management system standards: The Environmental Management System (EMS) of Cherepovets Steel Mill meets the requirements of ISO 14001:2004; Four Severstal businesses have Environmental Management Systems meeting the requirements of ISO 14001.

Climate change or environment related controversies in the Arctic

On 28th February 2016; 26 miners who were trapped in a Severstal coal mine above the Arctic circle have died and rescue operations have been halted after a third blast underground killed several rescue workers. The min-

ers were trapped after a sudden leak of methane gas caused two blasts that led parts of the Severnaya mine in Vorkuta to collapse.

De Beers

Main business activities in the Arctic

- De Beers owns 51% of the Gahcho Kué Diamond Mine, located in the Canadian tundra in the Northwest Territories.
- In 2016, De Beers shut down its Snap Lake diamond mine in the Northwest Territories, Canada.
- Victor Mine is a remote fly-in/fly-out mine located in the James Bay Lowlands of Northern Ontario, Canada, approximately 90km West of the coastal community of Attawapiskat First Nation. Victor Mine is an open pit mine and Ontario's first diamond mine.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Modern rehabilitation techniques, aided by the traditional knowledge of community members, enable the restoration of the environmental health and productivity of the area.

Climate change or environment related controversies in the Arctic

On 6th December 2016; a Canadian environmental group has taken



Severstal OAO

HQ:
Tarko-Sale, Russia

Ticker:
MCX: CHMF

Market Cap (USD mil.):
11,812

URL:
www.severstal.ru/en

DE BEERS

De Beers Group

HQ:
Johannesburg, South Africa

Ticker:
N/A

Market Cap (USD mil.):
N/A

URL:
www.debeersgroup.com

DeBeers Canada to court, claiming the company failed to report toxic levels of mercury and methylmercury in the waters surrounding Victor Diamond Mine.

Agnico Eagle Mines **Main business activities** **in the Arctic**

- The Meadowbank open-pit gold mine in the Kivalliq region of Nunavut, Canada.
- The Meliadine advanced-stage gold project in Nunavut, Canada's Low Arctic.
- Amaruq, a gold project located in the Kivalliq region of Nunavut, Northern Canada.
- The Kittila mine located in Finland, North of the Arctic Circle.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Agnico Eagle is part of the Carbon Disclosure Project, GRI and International Cyanide.
- The RMMS is consistent with the ISO 14001 Environmental Management System.
- The Kittila and Meadowbank mines were certified under the International Cyanide Management Code.

• Agnico Eagle was awarded the top prize in the category of Sustainable Development at the 26th Annual Gala of Elites hosted by the Central-Abitibi Chamber of Commerce and Industry.

• Measures for Reduction of Energy Consumption:

- Meadowbank - Generator efficiency improvement with new operation matrix at the Power House, Replace electrical heaters by glycol, Replace fuel heaters (frost fitter) by glycol heaters Install an automatic system to follow our fuel consumption "fuel tracking system".
- Meliadine - New generator and heat recovery for the portal area – 2 work places (kW) 350,400 kW, Reduce size of the heater in the STP (35 to 15) (kW).
- Kittila - District heating system was built to utilize the waste heat of the mill. Number of different operations have been connected to the district heating system, but no major energy savings were achieved last year.

Climate change or environment related controversies in the Arctic

On 10 April 2017; a 30,000-litre diesel spill occurred at Agnico Eagle's Meliadine project in Nunavut, Canada. The company said the diesel did not reach any freshwater and material affected by the spill has been excavated.

On 6th July 2016; Agnico Eagle re-



AGNICO EAGLE

[Agnico Eagle Mines](#)

HQ:
Toronto, Canada

Ticker: NYSE:
AEM

Market Cap (EUR million):
10,530

URL:
www.agnicoeagle.com

ceived criticism for its “fishout program” of drain the entire Phaser Lake and relocate all of its fish in order to expand its open pit Meadowbank gold mine in Nunavut, Canada. It was the second time the company used the practice. The practice is criticized though it is a legal in Canada.

The Meadowbank mine; has been under investigation since 2014 by Environment Canada and Aboriginal Affairs and Northern Development Canada for a contaminated seepage event that occurred in 2013.

In August 2015; Environment Canada charged the Company with two violations under the Fisheries Act.

In September 2015; Kittila mine observed water seepage coming from the toe of the NP3 dam. Uncontrolled discharge of treated water continued over a period of 36 hours. All water from this discharge was collected and pumped back in the holding pond for storage or to be re-used as process water.

Teck

Main business activities in the Arctic

- Teck Resources operates the Red Dog mine - a zinc and lead mine located in a remote region of the Arctic, within the boundaries of the Red Dog Mine census-designated place in the Northwest Arctic Borough of the U.S. state of Alaska.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Teck has extensive programs at the Red Dog Operations to mitigate fugitive dust associated with transportation and refining.

- In 2015, Red Dog witnessed reductions in their energy and carbon intensities as a result of continued focus on operational efficiency.

- Teck has historically purchased plant seeds for environmental reclamation activities at Red Dog Operations from commercial seed providers.

Climate change or environment related controversies in the Arctic

According to the U.S. Environmental Protection Agency (EPA);

Red Dog Mine creates more toxic waste than any other operation in the US. Over 99% of the “toxic waste” reported by Red Dog are rocks (waste rock and tailings), which naturally contain less than 2% sulfide minerals.

On 31st December 2016; an estimated 140,000 pounds of zinc concentrate that spilled from a truck when it went off the road underway near the Red Dog Mine. A cleanup was underway.

In 2015; there was one significant spill. A trailer carrying zinc concentrate from the Red Dog mine to the port overturned in October 2015 and

Teck

Teck Resources

HQ:
Vancouver, Canada

Ticker:
NYSE: TECK

Market Cap (USD mil.):
12,520

URL:
www.teck.com

released approximately 65,500 kilograms of concentrate to the tundra and across an intermittently flowing drainage.

In 2015; Teck responded to two separate incidents involving contractor transport trucks near the port at Red Dog Operations.

Rio Tinto Group Main business activities in the Arctic

- Rio Tinto operates Diavik Diamond Mine in the North Slave Region of the Northwest territory of Canada, employing 1,000 people, and producing approximately 7 million carats (1,400 kg/3,100 lb) of diamonds annually.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Diavik engages with local Aboriginal communities and its environmental monitoring programs include incorporating traditional knowledge from local communities.
- Diavik collects run-off water, which is used in processing and can be treated before being released in the environment.
- Diavik has entered into an Environmental Agreement with local Aboriginal groups, and federal and territorial governments. Concluded in

March 2000, the agreement formalizes Diavik's environmental protection commitments, establishes reclamation security requirements, and provides transparency and oversight to local communities.

- Diavik, in participation with Canadian universities and researchers, undertakes numerous scientific studies focused on environment and geology at the mine site. This includes research into effects of mine blasts on fish, evaluations of potential plant species for reclamation, and monitoring of dust distribution using lichen as a bioindicator

Climate change or environment related controversies in the Arctic

N/A



Rio Tinto Group

HQ:
London, United Kingdom

Ticker:
LON: RIO

Market Cap (USD mil.):
72,497

URL:
www.riotinto.com

Store Norske Spitsbergen Kulkompani

Main business activities
in the Arctic

- Sveagruva (meaning Swedish Mine), or simply Svea, is a coal mine in the Norwegian archipelago of Svalbard, producing up to 4 million metric tons of coal annually.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

N/A

Climate change or environment related controversies in the Arctic

N/A

Baffinland Iron Mines Corporation

Main business activities
in the Arctic

- Baffinland develops a large open pit iron mine in the Mary River area of Baffin Island, Nunavut, Canada.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- The Environmental Assessment process with the Nunavut Impact Review Board is the primary step established under the Nunavut Land Claims Agreement.

- The federal government, local communities, and the Nunavut Water Board are involved in reviewing a project's potential water use and discharges

- As part of Baffinland's Project Certificate, Baffinland conducts research on numerous species of wildlife and monitors their environment to ensure that these species are not adversely impacted and that the entire ecosystem continues to function during and after the mining operations. Monitoring results are reviewed with both the marine and terrestrial environment working groups to ensure that all stakeholders have the opportunity to comment on the work that Baffinland is conducting.

Climate change or environment related controversies in the Arctic

In August 2008; the CBC reported that Baffinland acknowledged three fuel spills.

On 22nd September 2008; 100,000 l (22,000 imp gal, 26,000 US gal) of contaminated water was released.

In May 2012; archeologist Sylvie LeBlanc described a chain of inuksuit that is parallel to the proposed route of the rail line as of unprecedented length and historical value, raising concern with the Nunavut Impact Review Board that explosions necessary to build the rail line will trigger vibrations which will damage the inuksuit.



Store Norske Spitsbergen
Kulkompani

HQ:
Longyearbyen, Svalbard
and Jan Mayen, Norway

Ticker:
N/A

Market Cap (EUR million):
N/A

URL: www.snsk.no



Baffinland Iron Mines
Corporation

HQ:
Oakville, Ontario, Canada

Ticker:
N/A

Market Cap (EUR million):
N/A

URL:
www.baffinland.com/?lang=en

On 2nd November 2016; CBC News reported that residents of Igloolik were describing a “hum or buzz”, coming from deep within the Fury Strait and Hecla Strait - near Steensby Inlet where Baffinland has one of its ports.

Kinross Gold

Main business activities in the Arctic

- Kinross Gold operates Fort Knox Gold Mine, which is an open pit gold mine in the Fairbanks mining district of Alaska.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Kinross states that it incorporates energy efficiency into the design of new projects and consider opportunities for renewable energy where feasible.
- Kinross states that it uses less energy, and has lower greenhouse gas emissions than most of its peers in the mining industry. During 2014 and 2015, it implemented a wide variety of energy efficiency initiatives, which cumulatively have delivered an annualized energy savings of nearly 0.5 million GJ, representing a 2.9% reduction over 2013 operations. Kinross has achieved approximately 34,000 tons/year of CO₂ e savings in 2014 and 2015.
- Kinross was one of 14 initial signatory companies to the International

Cyanide Management Code (ICMC) in 2005. All of Kinross' operations have been certified under the ICMC.

Climate change or environment related controversies in the Arctic

N/A

LKAB

Main business activities in the Arctic

- Luossavaara-Kiirunavaara operates Kiruna mine, the largest and most modern underground iron ore mine in the world. The mine is located in Kiruna in Norrbotten County, Lapland.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- LKAB participates in the European Union Emissions Trading System (EU ETS), which places a price on CO₂ emissions.
- LKAB states that it is committed to decarbonizing the primary route of steel making as much as possible. Its pellets enable a cleaner steel production compared to the average European steel making process. LKAB states that it is not only tackle climate change through the enabling effect of our product but also through our own efforts to reduce emissions.



Kinross Gold

HQ:
Toronto, Canada

Ticker:
NYSE: KGC

Market Cap (EUR million):
4,820

URL: www.kinross.com/default.aspx



Luossavaara-Kiirunavaara
AB

HQ:
Luleå, Sweden

Ticker:
N/A

Market Cap (EUR million):
N/A

URL: www.lkab.com

Climate change or environment related controversies in the Arctic

On 5th September 2013; it was reported that the city of Kiruna in Sweden, was to be moved after LKAB alerted authorities in 2004 that recovering more iron ore from the Kiruna mine meant further excavation, destabilizing the city centre. LKAB's mining caused cracks in the underground.

Norilsk Nickel Main business activities in the Arctic

- Norilsk Nickel operates Norilsk-Talnakh in Northern Russia, the largest nickel-copper-palladium deposits in the world.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Norilsk Nickel has launched comprehensive reconfiguration of the metallurgical capacities, which envisages processing all nickel feedstock of Polar Division at Nadezhda Metallurgical Plant and transfer therefining operations to Kola MMC and Harjavalta. As part of this reconfiguration, the Company also plans to shut down Nickel Plant, which will significantly improve Norilsk's environment, as it emits 400 kt of sulphur dioxide. Talnakh Concentrator upgrade and Nickel Plant shutdown are expected to decrease emissions by 15%.

- In September and October 2015, an EMS surveillance audit was held at the Company's Head Office in Moscow, Polar Division's production sites in Norilsk, and Polar Transportation Branch in Dudinka. The audit confirmed that MMC Norilsk Nickel's EMS complied with ISO 14001 (Compliance Certificate No. RU228136QE-U dated 8 December 2011).

- In 2015, the Company developed and adopted an energy efficiency improvement programme for industrial facilities in the Norilsk District and the Murmansk Region, under which a project was launched to install an automated electricity metering system for commercial purposes.

- The Company mainly procures its electrical energy from a hydropower plant cascade classified as a renewable energy source.

- In 2015, the Company continued its drive to reduce air pollutant emissions by: - replacing electrostatic precipitators at Nadezhda Metallurgical Plant with newer and more advanced filters, and thus reducing the pollutant emissions by 20.6 tpa; - upgrading gas-treatment units at the Cement Plant and thus reducing the solid pollutant emissions by 304.6 tpa. In 2015, total air pollutant emissions did not exceed the statutory limits and met all the applicable requirements.

- In 2015, Kola MMC implemented a number of projects to mitigate its en-



NORILSK NICKEL

Norilsk Nickel

HQ:
Moscow, Russia

Ticker:
MCX: GMKN

Market Cap (EUR million):
24,607

URL:
www.nornik.ru

vironmental impact and clean wastewaters; - cleaned the process tank at Monchegorsk site; - commissioned two new production lines to briquette concentrate at Zapolyarny site, and continued work to bring the briquetting technology up to the required quality standards; - continued work to achieve Maximum Permissible Emission Rates in Smelting Shop.

Climate change or environment related controversies in the Arctic

On 15th September 2016; Norilsk Nickel admitted a spill into the Daldykan due to heavy rains, which caused a filtration dam from Norilsk-Talnakh to flood into the river, turning it bright red.

The Arctic branch of Norilsk Nickel; emitted 1,883,000 tons of air pollution in 2015, most of it sulphur dioxide, which can harm the respiratory system and kill plants and trees.

Norilsk Nickel's 2015; admitted in its public discussions that nickel was over the limit in 20.7% of the samples, and copper in 45.9%.

All samples taken in the Norilka river; showed concentrations of copper, iron and oil products exceeding the threshold limit value, and all samples taken in the Talnakh river showed copper and cobalt concentrations over the limit.

C. Fishery Sector

Espersen

Main business activities in the Arctic

- Espersen is Europe's largest frozen fish processor with production plants and non-production units in Denmark and Russia.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- On 25th May 2016, Espersen and other companies from Norway and Russia agreed to restrain their suppliers from expanding cod fisheries further into the pristine Arctic waters.

Climate change or environment related controversies in the Arctic

N/A

Fiskebåt

Main business activities in the Arctic

- The Norwegian Fishing Vessel Owners Association (in Norwegian: Fiskebåt) is Norway's major organisation for owners of oceangoing fishing vessels and a leading lobby organisation on most fishery related issues.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- On 25th May 2016, Fiskebåt and other companies agreed to restrain their suppliers from expanding cod fisheries further into the pristine Arctic waters.

Climate change or environment related controversies in the Arctic

N/A



Espersen

HQ:
Roenne, Denmark

Ticker:
N/A

Market Cap (EUR million):
N/A

URL: www.espersen.com



Fiskebåt

HQ:
Ålesund, Norway

Ticker:
N/A

Market Cap (EUR million):
N/A

URL:
www.fiskebat.no

Norebo (Karat Group)

Main business activities in the Arctic

- Fishing activities in Russia's Arctic offshore.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

• Norebo's marine biologists research the development of the commercial fish stocks and essential environmental factors. Based on the results of research and the modelling of stock development, scientists arrive at a recommendation for the Total Allowable Catch (TAC) of each fish stock. In the case of fish resources in the North Atlantic (cod, haddock and some others), the scientific data for TAC is analysed by the International Council for the Exploration of the Sea (ICES), which presents its advice for approval to the relevant management bodies.

• Norebo states that it monitors the obligations of suppliers under national and international fisheries regulations. This is in addition to the voluntary undertakings of Ocean Trawlers and their suppliers given as part of the certification to the Sustainable Fishery Standard and the Chain of Custody Standard of the Marine Stewardship Council (MSC).

• Traceability - Norebo and the suppliers keep detailed records of every catch: its date and time, quantity, vessel, location and subsequent quality reports. Traceability data relating to landing, storage and delivery to customers is also kept and is fully compliant with high standards and is certified to the MSC Chain of Custody Standard.

• On 25th May 2016, Norebo and other companies agreed to restrain their suppliers from expanding cod fisheries further into the pristine Arctic waters.

Climate change or environment related controversies in the Arctic

N/A



Norebo (Karat Group)

HQ:
Murmansk, Russia

Ticker:
N/A

Market Cap (EUR million):
N/A

URL:
www.norebo.ru/en

Royal Greenland

Main business activities in the Arctic

- Royal Greenland is a fishing company with operations in the North Atlantic and the Arctic Ocean.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Royal Greenland engages in co-operation at various levels in order to ensure long-term sustainability for the fisheries in the North Atlantic and the Arctic Ocean – this goes for both sustainable fishery as well as the environment.
- Through Sustainable fisheries Greenland, Royal Greenland is supporting a Ph.D. study on seabed habitats and ecosystems in collaboration with the Greenland Institute of Natural Resources.

Climate change or environment related controversies in the Arctic

N/A

Leroy Seafood Group

Main business activities in the Arctic

- Austevoll Seafood is a seafood company operating in Norway.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Austevoll Seafood states that it supports and engages in environmental standards for sustainable and well regulated fisheries based on sustainable resources.
- Austevoll Seafood states that it is focused on reducing waste to an absolute minimum, and also on constantly reducing emissions, both from fleet and production facilities.

Climate change or environment related controversies in the Arctic

N/A



Leroy Seafood Group

HQ: Bergen, Norway

Ticker: LSG.OL

Market Cap (NOK million): 24,150

URL: www.leroyseafood.com

Austevoll Seafood

Main business activities in the Arctic

- Austevoll Seafood is a seafood company operating in Norway.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Austevoll Seafood states that it supports and engages in environmental standards for sustainable and well regulated fisheries based on sustainable resources.
- Austevoll Seafood states that it is focused on reducing waste to an absolute minimum, and also on constantly reducing emissions, both from fleet and production facilities.

Climate change or environment related controversies in the Arctic

N/A

Clearwater Seafoods

Main business activities in the Arctic

- Clearwater Seafoods has operations in Canada and European Arctic. It fishes and sells Arctic Surf clam.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Clearwater declares its commitment to sustainability, environmental impact and good management practices by maintaining Marine Stewardship Council certification ("MSC") in all harvested species within North America.

Climate change or environment related controversies in the Arctic

N/A



Austevoll Seafood

HQ: Storebø, Norway

Ticker: OTCMKTS: ASTVF

Market Cap (NOK million): 13,024

URL: www.austevollseafood.com



Clearwater Seafoods

HQ: Bedford, Canada

Ticker: CLR:CN

Market Cap (EUR million): 657.89

URL: www.clearwater.ca/en

D. Other sectors

Rosatom

Main business activities in the Arctic

- Rosatom is a state-owned nuclear company and is the biggest electricity producer in Russia. Its activities in the Arctic include navigating ships along the Northern Sea Route with the help of nuclear icebreakers; providing power supply to the Arctic region from the Bilibino nuclear power plant; addressing issues related to Russia's nuclear defence legacy in the region; dismantling and utilising radioisotope thermoelectric generators; and monitoring radiation levels in the area.

- Rosatom built the first floating nuclear power plant for use in the Arctic, planned to begin its production in 2019.

- Its subsidiary, FSUE Atomflot, deals with the production and operation of icebreakers and is operating six projects in the Arctic area related to nonferrous and precious metals, oil, coal and gas.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

- Public consultations on the 2015 draft report were held in Murmansk as part of the 9th Regional Dialogue Forum 'Nuclear Energy in the Arctic: Environmental Protection and Safety'.

- Rosatom's environmental policy implementation is to cut down the amount of atmospheric releases and effluents, to minimise production and consumption waste, and first of all the waste of hazard classes I and II. The Corporation systematically puts into operation advanced atmospheric air cleaning systems, commissions new water treatment plants for waste waters and rain discharges, introduces water re-cycling systems.

- Since 2014 Rosatom's key organizations have been certified for their compliance with ISO 14001 requirements with regular re-certification audits.

Climate change or environment related controversies in the Arctic

N/A



ROSATOM

Rosatom State Atomic Energy Corporation

HQ: Moscow, Russia

Ticker: N/A

Market Cap (EUR million): N/A

URL: www.rosatom.ru/en

Murmansk Shipping Company

Main business activities in the Arctic

- Murmansk Shipping Company (MSC) is the biggest cargo transport company in the Russian Arctic sector with a fleet of 27 vessels.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

N/A

Climate change or environment related controversies in the Arctic

N/A

Woodward Group

Main business activities in the Arctic

- Woodward Group is a cargo transport company operating in the Canadian Arctic.

Climate change or carbon emission reduction related initiatives within and beyond the Arctic

N/A

Climate change or environment related controversies in the Arctic

On 1st September 2010; a tanker owned by Woodward Group, carrying 2.47 million gallons of diesel fuel remained stuck for two weeks in the Northwest Passage in the Canadian Arctic. The incident caused concerns about commercial vessels using new Arctic routes.



Murmansk Shipping Company (MSC)

HQ: Murmansk, Russia

Ticker: N/A

Market Cap (EUR million): N/A

URL: www.msco.ru/en



Woodward Group

HQ: Happy Valley- Goose Bay, Canada

Ticker: N/A

Market Cap (EUR million): N/A

URL: www.woodward-group.com

3. List of Key NGOs Concerned about Climate Change in the Arctic

World Wildlife Fund

Main initiatives or activities towards combating climate change in the Arctic

- Renewable Energy Solutions - Diesel fuel is the primary energy source for Arctic communities — a dependency that has high logistical and financial costs, negatively impacts the environment, and also hinders the self-sufficiency of Northern communities. WWF-Canada will work to build capacity for low-impact renewable energy, such as wind, solar and hydro-power.
- Sustainable Arctic Fisheries - Often, mining or oil and gas extraction is portrayed as the only solution to Northern poverty. One sector that holds promise for stable, long-term employment is commercial fishing. WWF-Canada will work with communities to build sustainable fisheries, as well as monitor legislation and policy to ensure long-term sustainability of Arctic fisheries.
- Protecting Habitat in the Beaufort Sea - WWF is working with local communities to prevent risky oil and gas development, protect habitat using science and traditional knowledge, and build cross-border collaboration between Inuvialuit (Canada) and Inupiat (Alaska).
- Northwest Passage - This Canadian Arctic region is a priority for WWF-Canada and overlaps with the last ice area, the Eastern section of

the Arctic Archipelago where summer sea-ice habitat will resist the longest while the planet warms. WWF will work with local people, as well as federal and territorial governments to secure protected areas and conservation management. WWF will also focus on shipping and extractive industries to promote safe, sustainable Arctic development. WWF will also model the potential impact of oil spills on wildlife and local communities to inform decision-making

- Lancaster Sound: Lancaster Sound, known as Tallurutiup Tariunga to the Inuit, is a unique Arctic ecosystem known around the world for its rich biodiversity and abundant marine life. An important refuge for marine mammals and fish, the region is also an important food source for neighbouring communities, which include Pond Inlet and Arctic Bay. WWF-Canada supports Inuit action for a Lancaster Sound protected area and have launched an interactive map to raise awareness of the importance of the region.

- North Water Polynya: WWF will support efforts of Canadian and Greenlandic Inuit communities are calling for a bilateral commission to consult on the protection and future use of this polynya.



World Wildlife Fund (WWF)

HQ: Toronto, Canada

URL: www.wwf.ca



Greenpeace

HQ: Amsterdam, Netherlands

URL: www.greenpeace.org

Greenpeace

Main initiatives or activities towards combating climate change in the Arctic

- Save the Arctic movement - Greenpeace is campaigning for a protected sanctuary in international waters around the North Pole as part of a network of protected areas across the Arctic Ocean. Save The Arctic movement asks world leaders to create a global sanctuary in the uninhabited area around the North Pole, and to ban oil drilling and destructive fishing in Arctic waters.
- Greenpeace organized several protests against oil and gas companies operating in the Arctic, at their headquarters or offshore, to fight against oil drilling activities in the area.

Friends of the Earth

Main initiatives or activities towards combating climate change in the Arctic

- Friends of the Earth was involved in several campaigns to protest and raise concern against oil drilling and environmental issues in the Arctic.
- Friends of the Earth is working to help develop a robust, comprehensive Polar Code at the International Maritime Organization -- including a subsequent phase for non-SOLAS vessels (e.g., fishing vessels) -- as well as craft navigational measures, such as recom-

mended routes, for the U.S. Arctic that will minimize risk of environmental harm and adverse impact to coastal residents, including native people.

- It has developed infographic details on how the use of heavy fuel oil increases the impact of oil spills and produces harmful air and climate pollutants. Friends of the Earth, in collaboration with other environmental NGO partners, have produced and submitted over 30 documents, to the IMO on topics relevant to the Code since 2009.

Sierra Club

Main initiatives or activities towards combating climate change in the Arctic

- Sierra Club is involved in a campaign to protect America's Arctic, Alaska's coastal Plain and the Western Arctic against the oil industry.



Friends of the Earth

Friends of the Earth

HQ:
Amsterdam, Netherlands

URL: www.greenpeace.org



Sierra Club

HQ:
Oakland, USA

URL: www.sierraclub.org

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Nordea