AN INSURANCE PERSPECTIVE ON ARCTIC OPPORTUNITIES AND RISKS:

Hydrocarbon exploration & shipping

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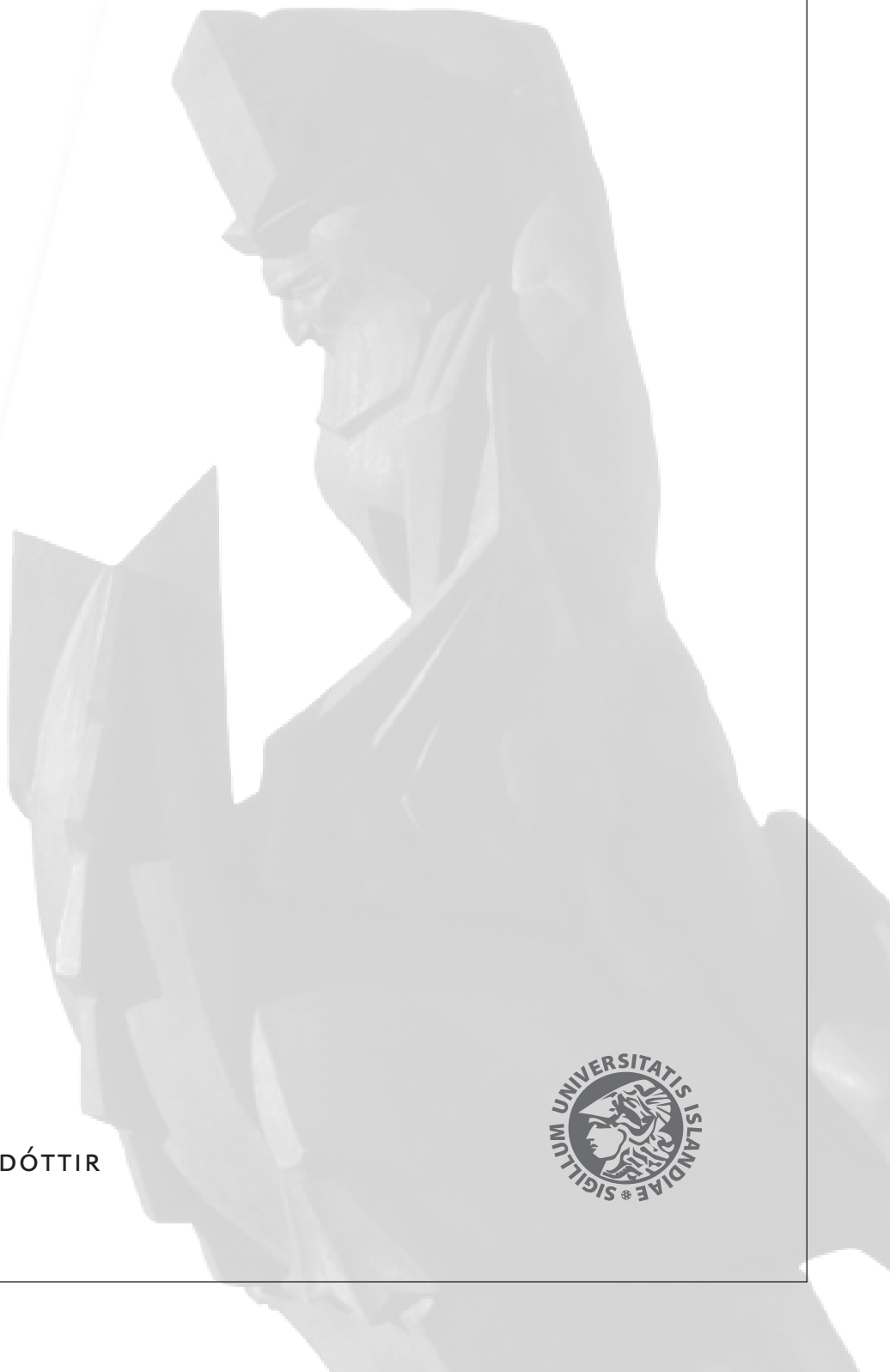
THE CENTRE FOR ARTIC POLICY STUDIES

WORKING PAPERS



AN INSURANCE PERSPECTIVE ON ARCTIC OPPORTUNITIES AND RISKS: HYDROCARBON EXPLORATION AND SHIPPING

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ABSTRACT

The transformation of the Arctic environment through increased melting of sea ice opens up considerable opportunities for economic development in the region. Prior to this paper, only limited academic research has been conducted on the corporate risks involved, and almost all has been from a purely economic perspective. Although opportunities to utilise abundant hydrocarbon and mineral resources may lead to potentially lucrative economic returns, the benefits of Arctic commerce must be reconciled with the many economic, social and environmental risks to its many stakeholders. This literature review paper seeks a balanced appraisal by discussing both the opportunities and risks in the Arctic from the viewpoint of the insurance sector; it focuses on the need for companies to respond to emerging risks through the adoption of robust risk management frameworks. The findings suggest that currently the main risk management mechanism adopted by hydrocarbon explorers is self-insurance, and that this reflects the widespread failure of the insurance industry either to price the risks at all, or to offer affordable cover. The commercial affordability of insurance in the Arctic depends on the enforcement of strong regulatory standards applicable to all sovereign states conducting commerce in the Arctic. The forthcoming entry into force of an international Polar Code for shipping standards is one essential step forward, provided it is fully enforced. Up to now, the Arctic Council's lack of enforcement power has diminished its effectiveness in such contexts, leaving it largely as a forum for scientific research and intergovernmental discussion.

BACKGROUND AND POLITICAL SETTING

Encompassing the territories of eight sovereign nations, the Arctic region – defined in this paper as the area to the north of the Arctic Circle, see Figure 1 – includes a vast ocean with seasonally varying ice cover, surrounded by treeless permafrost. Despite a cold, harsh climate, the region is home to a variety of resilient flora and fauna, as well as sizable stocks of largely unexploited natural resources. The search for energy resources and the use of the Arctic for shipping, and historically also for other

purposes such as whaling and mining, are not new developments (Avango, Hacquebord and Wrakberg, 2014), although the increase in scale of activity has been much more recent. The first Arctic exploration for oil was instigated by Lenin in Russia during the 1920s, although it took until the late 1950s and early 1960s for hydrocarbon development to commence in earnest in the Komi Republic region in Northwestern Russia (Christensen, Nilsson, and Wormbs, 2013), with other oil and gas developments occurring soon after in Canada and Alaska (Arctic Portal, 2015). Arctic shipping for whaling purposes was commonplace from the 17th century onwards (Avango, Hacquebord and Wrakberg, 2014), but only more recent advances in ice-breaking technology have increased the number of viable routes available to commercial vessels (AMSA, 2009). Our literature review has turned up no information on whether pre-21st century explorations in the Arctic benefited from either commercial or state-backed insurance.

The coming strategic and commercial importance of the Arctic region was predicted back in 1921 by Vilhjalmur Stefansson, an Arctic explorer (Stefansson, 1921); but within the next ten to twenty years it is expected to escalate dramatically due to increased destination traffic, mainly related to tourism, mining and oil and gas exploration (Holthus, Clarkin & Lorentzen, 2013; Lajeunesse, 2012). The factor of climate change increasingly renders the fragile environment more accessible for fossil fuel and mineral exploitation, and tourist numbers are growing (Stewart et. al., 2013). The Arctic is warming much faster than mid-latitude localities, as evidenced by increased temperatures, snow melt, and loss of summer sea ice (AMAP, 2012; IPCC, 2013a; Overland et al., 2014). To prepare for these changes, which involve many different opportunities and risks, countries such as Canada have been urged to undertake strategic actions by authors like Lajeunesse (2012, p. 521), who sees a need for steps ranging from "hydrographic mapping, search and rescue resources, navigational aids and icebreaking and forecasting services to surveillance and law enforcement capabilities". Additionally, it is suggested that regulation and policy need to take into account environmental sustainability (Ingenfeld, 2010; Lajeunesse, 2012; Neumann & Hossain, 2014), so that maritime areas are managed in a politically satisfactory manner for all eight Arctic states. Policies and regulations must respond to

economic opportunities in the Arctic region, yet take into consideration that the Arctic is not one but several ecosystems, all of which are highly complex and sensitive to hazards and risks. Furthermore, the changing region is also an area of multiple uses for many stakeholders, ranging from reindeer husbandry and seal hunting to forestry, mining, wind-power production, oil and gas exploration, and tourism (Berkman & Vylegzhanin, 2013).

In order to address cross-regional issues regarding the Arctic, the Arctic Council, which is an intergovernmental forum, was formed in 1996 on the basis of the Ottawa Declaration. The aim of this high-level intergovernmental council is to promote "cooperation, coordination and interaction among the Arctic States", by involving "the Arctic Indigenous communities and other Arctic inhabitants on common Arctic issues; in particular, issues of sustainable development and environmental protection in the Arctic" (Arctic Council, 2011b). The member states of the Arctic Council are eight, including Canada, Denmark (including the Faroe Islands and Greenland), Finland, Iceland, Norway, Russia, Sweden and the United States. Additionally, the Arctic Indigenous Peoples are represented by six international organizations which have permanent participant status within the Arctic Council (Arctic Council, 2011a).

The Arctic Council is today considered to be the most relevant political institution in the Arctic region. It functions through a variety of scientific working groups and task forces, which strive to gather information concerning the environmental sustainability of the region and the risks of unfolding emergencies (Arctic Council, 2011a; Haftendorn, 2013). The expert working groups, each operating in accordance with a specific mandate, are the Arctic Contaminants Action Program (ACAP), Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF), Emergency Prevention, Preparedness and Response (EPPR), Protection of the Arctic Marine Environment (PAME), and Sustainable Development Working Group (SDWG) (Arctic Council, 2011f).

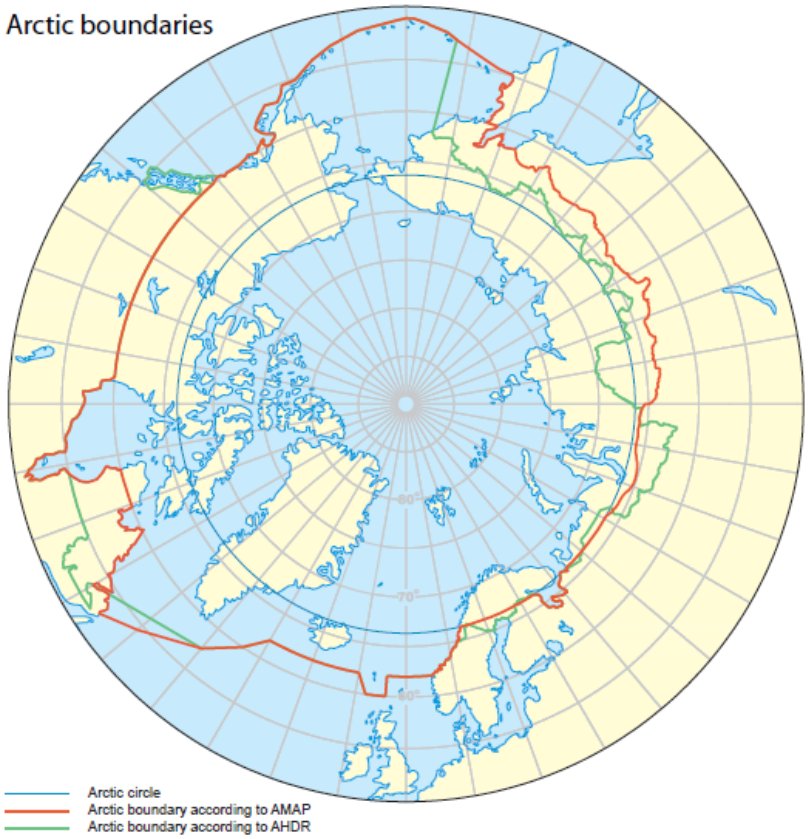

FIGURE 1. ARCTIC BOUNDARIES (DALLMANN, 2011).

Although it is an important policy-shaping forum for the circumpolar north, as Bailes (2013, p. 5) states, "there are powers that the Arctic Council lacks and some issues (e.g. defence) that it does not even discuss. The picture is further complicated by questions about which actors should be involved and who has the right to 'manage' the Arctic now and henceforth." However, despite these limitations, the first two legally binding international agreements have recently been concluded as the result of Arctic Council initiatives. The Arctic Search and Rescue (SAR) Agreement, "negotiated under the auspices of the Arctic Council", was signed on May 12, 2011, in Nuuk, Greenland (Arctic Council, 2011c, 2011e), and an agreement on response to major oil-spills at sea followed in 2013 (Arctic Council, 2013a). The Arctic region is also governed in a

cooperative way through the United Nations Convention on the Law of the Sea (UNCLOS) (Nielsson, 2014), which serves as a "basis for resolving issues of sovereignty and jurisdiction in the Arctic" (Centre for Arctic Policy Studies, 2013, pp. 5-6). Furthermore, the "mandatory Polar Code for ships operating in Arctic and Antarctic waters", recently negotiated at the International Maritime Organization (IMO), is expected to enter into force in January 2017. It "covers the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in waters surrounding the two poles" (Hellenic Shipping News Worldwide, 2014). It is claimed that signing the SAR agreement has resulted in the expectation that the Arctic Council may become "a platform for negotiating functional legally binding agreements", casting its role primarily as an institution that prepares rather than formally enacting decisions (Haftendorn, 2013). However, it has been suggested by Carl Bildt, Sweden's Minister for Foreign Affairs, that the role of the Arctic Council should be not just to analyse the challenges of the region but also to address them directly (Bildt, 2012).

Searching the Arctic Council electronic archive yields only two documents which include discussions of insurance. One online document is from 2014, entitled 'Interview with co-chairs of Task Force on Oil Pollution Prevention' (Arctic Council, 2014b) and the other is from 2012, entitled 'PAME Working Group Meeting in Stockholm' (Arctic Council, 2012). According to the former document, important legislation was passed in Russia in 2012. The legislation places strict obligations on operators wanting to undertake fossil fuel exploration and production projects, both on the internal seas' waters and on the Russian continental shelf. More specifically, the legislation requires the following from operators (Arctic Council, 2014b):

- Have an oil spill prevention plan.
- Ensure that search and rescue services are available.
- Have adequate insurance and bank guarantees to cover costs to clean up a spill.
- Have a state environmental impact assessment.

- Develop systems for environmental monitoring and detection of oil spills.
- Implement communications and warning systems.
- Demonstrate capacity for clean-up and disposal of oil and waste.

How the Russian authorities will enforce the legislation is not addressed in the Arctic Council briefings. The second document from the Protection of the Arctic Marine Environment (PAME) working group mentions, among other things, that during this meeting the shipping insurance industry gave a presentation on the setting of insurance premiums for cruise ships sailing in the Arctic. Apart from these documents, it seems that insurance - as a means to mitigate risks in the Arctic - has not been a high priority for the Arctic Council so far. More emphasis has been placed on developing high standards for businesses operating in the region in terms of environmental sustainability, respect for local interests, and safety (Arctic Council, 2014a), although no legally binding agreement or standards have been negotiated or signed. Nevertheless, the International Organization for Standardization (ISO) has developed an environmental standard, the ISO 19906:2010, for petroleum and natural gas industries. The standard "specifies requirements and provides recommendations and guidance for the design, construction, transportation, installation and removal of offshore structures, related to the activities of the petroleum and natural gas industries in arctic and cold regions" (ISO, n.d.). This standard has been used in the so-called Barents Sea 2020 project, although it has some shortcomings in relation to floating structures, leading to current suggestions for amendments (DNV, 2012). It is also recognised in the third phase report of the project that health, safety and environmental (HSE) industry standards for Arctic conditions are needed, since the physical environment is very challenging, including very low temperatures, ice, icing, long distance travel, and darkness (DNV, 2010).

Commercial operations in the Arctic are replete with environmental risks that are expected to grow considerably over time. Given the Arctic Council's apparent lack of focus thus far on the role of insurance, this paper sets out to provide an initial

assessment of the role that the insurance industry and insurance policies might play in addressing economic and environmental risks in the Arctic region. The remainder of the paper is structured as follows: It starts by discussing the literature review methods employed, and proceeds to discuss the stakeholders, economic development and opportunities, economic development and risks, risk management, and ethical views, before concluding on the nature of economic development in the Arctic from an insurance perspective.

METHODS

Academic databases were searched to find documents of relevance to this literature review paper - see table 1 - with the aim of understanding the insurer's perspective on opportunities and risks related to economic development in the Arctic region.

The search string included the Arctic region and insurance. This identified only a few papers of relevance, and 5 out of 6 found through EBSCO host related to the same topic, the sponsorship by the Catlin Group Limited of a research expedition to the North Pole (Hansen, 2009).

TABLE 1: OUTCOMES FROM ACADEMIC DATABASE REVIEW

ACADEMIC DATABASES	NUMBER OF PAPER FOUND	RELEVANT PAPERS
Engineering Village	0	0
EBSCOhost; Academic Search Premier and Business Source Premier	7	6
Web of Science; Document types – articles	2	0

Due to the limited academic literature that exists, a snowball technique (Creswell, 2007) was used, whereby one paper or report is selected and its contents then used to find other relevant documents.

The only major review found relating to the Arctic region and insurance was a report published by Lloyd's of London in 2012: *Arctic Opening: Opportunity and Risk in the High North* (Emmerson & Lahn, 2012). It has indeed been claimed that Lloyd's is "the first major business organisation to raise its voice about huge potential environmental damage from oil drilling in the Arctic" (Kollewe & Macalister, 2012). A few other recent reports were found to be of use, including a recently published report from Marsh Ltd. (2014) entitled *Arctic Shipping: Navigating the Risks and Opportunities* and a Greenpeace et al. (2014) report entitled *Frozen Future: Shell's Ongoing Gamble in the US Arctic*.

STAKEHOLDERS

There is no single state with sovereignty over the Arctic. However, it is essential that it be governed in a sustainable and responsible manner by balancing nature preservation, economic (The Institute of International Affairs, 2014), and social interests. Today, around four million people live within the Arctic Circle (Arctic Council, 2011d). Of those, roughly 10% are indigenous people (Arctic Council, 2011d).

The Arctic Council has taken a central role in addressing issues concerning the region, as discussed in the Background section of this paper. As explained there, the eight member states of the Council are Canada, Denmark, including Greenland and the Faroe Islands, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States of America (Arctic Council, 2011a), and Figure 1 shows the Arctic Circle boundaries. Additionally, the Arctic Council brings together various other stakeholders and representatives, including indigenous peoples (Haftendorn, 2013) who are particularly affected by climate change impacts and the related economic opportunities for oil, gas and mineral exploration companies. Other stakeholders showing interest in the development of the Arctic region are non-Arctic states and

organisations (Arctic Council, 2011a; Haftendorn, 2013; The Institute of International Affairs, 2014), researchers and non-governmental organizations (NGOs). These stakeholders all have different views and interests when it comes to economic development in the region, depending on where they live, how they will be affected by economic, social and environmental impacts and what their roles are. Not surprisingly, their interests are not always compatible.

Among the critical questions raised by stakeholders are: "who is responsible if something goes wrong, how will the responsibility be divided between private and public actors and how can those with indirect interests voice their concerns to make sure their interests are taken account of?" (The Institute of International Affairs, 2014). Insurance is a highly relevant factor in any eventual answer.

ECONOMIC DEVELOPMENT AND OPPORTUNITIES

The Intergovernmental Panel on Climate Change (IPCC) and the Arctic Council's own climate change assessment work are consistent in their findings, describing very substantial warming of the Arctic since the mid-20th century (Arctic Council, 2013b; IPCC, 2013b). In the latest IPCC report it is stated with high confidence that the "Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent", and that it is very likely that anthropogenic influences have contributed to the loss of Arctic sea ice since 1979 (IPCC, 2013b, p. 9). Furthermore, the IPCC report (2013b, p. 20) states with very high confidence that the "Arctic region will warm more rapidly than the global mean, and mean warming over land will be larger than over the ocean".

According to the Lloyd's of London report previously mentioned, these environmental changes driven by climate change and global warming are a prerequisite for utilising the economic potential of abundant natural resources in the Arctic region (Emmerson & Lahn, 2012). The report states that substantial investment is likely to take place

during the coming decade, possibly reaching or exceeding US$100bn; but it also cautions that there may be trade-offs between the interests of different industries – for instance, fisheries and offshore oil and gas projects. Another issue, recently highlighted by the slump in oil prices, is that the economic development in the region depends greatly on market conditions and notably on the supply and demand of natural resources on a global scale. It further depends upon various types of technological improvements, the feasibility of exploration in increasingly unstable Arctic conditions, the likelihood of discovering large oil and gas fields, and the recoverability of the discovered resources.

The Lloyd's report (Emmerson & Lahn, 2012) states that the main industries deriving benefit from economic development in the Arctic will be oil and gas explorers, mining companies, shipping industries and fishing operators (see table 2). It has been suggested that companies in the oil and gas industry are betting on weak climate change legislation, so that fossil fuels can be burned way into the future, or that the development of Carbon Capture and Storage (CCS) technology used to trap carbon dioxide will become a commercially viable proposition (Hope, 2014).

TABLE 2. ECONOMIC OPPORTUNITIES IN THE ARCTIC REGION.

KEY INDUSTRIES IDENTIFIED	OPPORTUNITIES
Oil and gas	*Exploitation of fossil-fuel energy resources, including onshore and offshore projects in shallow and deep water*
On-land mining / mineral resources	*Exploitation of resources, e.g. gold, platinum, uranium, iron ore and diamond*
Fisheries	*Increased fishing productivity*
Shipping and logistics	*Shorter distances, cost savings in terms of time (days at sea) and fuel, saving of tolls*
Tourism	*Development of tourism in remote areas, increased frequency of cruises*
OTHER ACTIVITIES	**OPPORTUNITIES**
Wind and hydro power production	*Exploitation of wind and water resources*
Expertise	*Need for specialised knowledge, e.g. on risk management and safety issues*
Development of new technology	*Need for special technology withstanding Arctic conditions*
Insurance solutions	*New markets for specialised insurance solutions* *Rising insurance capacity*
Biological materials	*Harnessing biological materials*
Scientific research	*Rising need for scientific research*

(King, 2014; Marsh Ltd., 2014; Reuters, 2013; The Institute of International Affairs, 2014)

The first commercial shipping transit through the North-West Passage (NWP) took place in October 2013, when a bulk carrier carrying coal sailed from Vancouver to Finland (Marsh Ltd., 2014). According to a report by Marsh Ltd., the voyage took a week less than if the vessel had sailed via the Panama Canal. The financial savings were US$ 80,000, based on lower fuel costs and savings from tolls, although it should be noted that these are currently likely to be more than offset by the costs of ice-breaker escort ships.

During the period 1993-1999 a multi-national, five-year, interdisciplinary research project was carried out focusing on the sailing conditions along the Northern Sea Route (NSR) over Russia. The project was called the INSROP project and had four sub-programmes: Economy and Commerciality, Environmental Impacts, Ice and Navigation, and Political, Legal and Security. The objective of the INSROP project was to plot the past, present and future potential international usage of NSR. Among key findings, two categories of navigational parameters were considered to be of major importance if the NSR was to become a viable commercial route: natural (climatic conditions, ice, shoals, darkness, etc.) and societal categories (cultural, legal, military, political and social) (Ostreng et al., 1999).

Since the INSROP project was carried out, new estimates of the probability of discovering of oil, gas and mineral resources have further influenced the demand for sailing in the Arctic region. In 2013 a total of 71 vessels sailed, with an escort, through the Northern Sea Route, compared to 45 vessels in 2012 (Marsh Ltd., 2014). The difference in number, according to Marsh Ltd., reflects burgeoning demand, but also the fact that the summer of 2012 was not particularly warm, which affected the sailing conditions. The Northern Sea Route Information Offices claims that 46 (a 1 vessel difference compared to the Marsh Ltd. figures), 71 and 53 vessels made the transit in 2012, 2013 and 2014 respectively (NSRIO, 2013; NSRIO, 2014; NSRIO, 2015).

Mining companies have, according to the Lloyd's report (Emmerson & Lahn, 2012), been increasing their investment owing to the emergence of coastal areas in Greenland, making it easier to access resources such as gold, platinum and rare metals. Other sectors – see table 2 – may also benefit economically from those

changes, including developers of new technologies, specialised ship-design and building (Emmerson & Lahn, 2012; Marsh Ltd., 2014), and insuranceers. Indeed, it has been claimed that insurers have become more interested and involved in the region (King, 2014). This is for instance evident in the sponsorship by the Catlin Group Limited of a research expedition to the North Pole in recent years, where three million Arctic ice measurements were taken in order to better understand the potential impacts of climate change on the global insurance industry and their policyholders, and also in search of market opportunities for the company by boosting its brand (Hansen, 2009; Veysey, 2009). The data from the expedition serves as information for underwriters, in risk management and for claims handling (Hansen, 2009). Additionally, there is need for further scientific research, for instance in mapping of the seabed (Emmerson & Lahn, 2012).

ECONOMIC DEVELOPMENT AND RISKS

The extreme climate and the uncertain, harsh and dangerous conditions in the Arctic region are challenging for those operating there (Lajeunesse, 2012). They create hazards such as violent storms, fog restricting visibility, and floating ice which, despite safety precautions, exposes vessels to incidents such as ice damage and the breakdown of machinery. Furthermore, these conditions are challenges for crews as few of them have skills and experience to deal with such conditions, increasing the risks of human error; and if incidents occur it is difficult to obtain emergency assistance via coastguards and search and rescue teams (Marsh Ltd., 2014). These problems are compounded by weak infrastructure, including often far-distant port facilities, lack of seabed mapping, very cold weather and darkness. This means, according to the Lloyd's report (Emmerson & Lahn, 2012, p. 35), that "worst case scenarios may be worse in the Arctic because the ability to manage an evolving situation is limited by environmental conditions and the lack of appropriate infrastructure". It has been recognised that initially small incidents can rapidly escalate if assistance is far away or simply unavailable due to the harsh conditions, leading to likely catastrophic consequences (Marsh Ltd., 2014) for humans and the environment. Communication

in some areas of the Arctic region can also be challenging (Hope, 2014), because necessary technology (for instance, magnetic compasses, radio, satellite communication etc.) may be lacking, not reliable, or not working due to the climatic conditions (Marsh Ltd., 2014). These difficult conditions apply to many industries, including oil and gas explorers and cruise ships; thus, all companies operating in the Arctic region need to consider how they will ensure access to emergency services when disasters occur (Hope, 2014).

It has also been argued that the environmental consequences of disasters in the Arctic may be worse than in other regions, mainly due to the fragility of the ecosystems. This means that companies responsible for environmental disasters are exposed to political risks, as well as significant risk of damage to their reputation (Emmerson & Lahn, 2012), suggesting one factor that may serve to restrain rather than increase future shipping in the Arctic (Reuters, 2013).

Arctic commercial shipping is so far mainly limited to shipping escorted by ice-breakers (Reuters, 2013), which incurs significant cost (Marsh Ltd., 2014). Furthermore, insurance premiums are around 150-300% higher than in ice-free waters (Lajeunesse, 2012), or not available at all as the "risks haven't been figured out enough to price insurance correctly" (Reuters, 2013). Additional risks for fossil fuel companies relate to possible climate change legislation which reinforces the perception of a 'carbon bubble' in the stock market, whereby assets are priced on the basis of the assumption that discovered resources will be exploited in the future (Mackenzie, 2013). It is also claimed that investors are becoming more and more skeptical about the allocation of capital to high-risk, high-cost projects (Greenpeace et al., 2014), which place shareholder capital at risk (Greenpeace et al., 2014; Macalister, 2014a), while at the same time investments in renewable energy solutions are accelerating (Evans-Pritchard, 2014). As an example, "the Norwegian state oil group, Statoil, has indicated that rising costs might encourage it to pull out of future work in the Arctic waters of Greenland" (Macalister, 2014a). Environmental non-governmental organisations (ENGOs) and environmental campaign groups, such as 350.org (350.org, 2010), Platform (Macalister, 2014a), the WWF (WWF, 2012) and Greenpeace (Greenpeace, 2014), are all placing pressure on investors, companies and political leaders not to take part in Arctic projects. Platform, for example, has been placing

pressure on institutional investors (Macalister, 2014a) to divest from hydrocarbon investments.

ENGOs have also raised concern about the capabilities, preparedness and financial capacity of companies such as Shell to deal with major incidents. Furthermore, ENGOs claim that Arctic projects are subject to litigation and strong opposition by indigenous people in Alaska, local government and conservation organisations (Greenpeace et al., 2014). In the case of oil spills, companies such as Shell would face immeasurable damage to their credit ratings, share prices, reputations and ability to acquire exploration and production licenses. This has already been the case for BP plc (formerly named British Petroleum) after the Deepwater Horizon disaster in 2010 (Greenpeace et al., 2014). Self-insurance has been deemed far too low and insufficient to cover such financial liabilities, ensuring that the costs of a claim could only be covered via the swift fire-sale of another asset (Greenpeace et al., 2014). In terms of the classical strategies for dealing with risks, which are to 1) avoid, 2) accept (retain), 3) reduce, or 4) share (transfer) the risk (Gibbs & DeLoach, 2006), it is only the residual risk that may be distributed through risk management mechanisms such as insurance (Jóhannsdóttir, Wallace & Jones, 2012), even assuming that such insurance solutions are available and affordable. The first option for companies is to avoid the risk, e.g. by means of loss prevention, and then retain parts of the risk, e.g. through self-insurance.

Supporting the ENGOs claims about the risk of allocating capital to Arctic projects is Shell's decision to withdraw from its scheduled drilling program in the Alaskan Arctic (Macalister, 2014b). Shell's decision came in the wake of a US$ 200m write-off of costs associated with the Kulluk drilling rig, which stranded in 2012 (Macalister, 2014b), and also a US court ruling saying that the US Department of the Interior had failed to consider – when Shell got permission to drill – all environmental impacts of exploration in the Chukchi and Beaufort seas (Macalister, 2014a, 2014b). Companies have specified uncertain regulatory standards as a reason for postponing hydrocarbon exploration (Greenpeace et al., 2014). ENGOs have also been adding to the risky nature of commercial operations by targeting tankers directly, as was the case with a Greenpeace protest in Rotterdam aimed at a fully-loaded tanker's arrival from Pechora Sea (Almeida, 2014).

Another risk factor for companies operating in the Arctic region arises from uncertain politics. As the legislative régime across the eight sovereign Arctic states is not unified, it can be complicated and time-consuming to gain approval for projects from the various regulatory authorities (Macalister, 2014a). Given that several states have jurisdiction over different Arctic areas, and Arctic projects are typically large with several companies involved, it becomes complicated to decide who is liable and under which liability regime, thus increasing the probability of court determinations (Emmerson & Lahn, 2012). Examples of Arctic risks and risk types are summarized and presented in more detail in table 3.

TABLE 3. ARCTIC RISKS AND RISK TYPES.

ARCTIC RISKS	RISK TYPES
Operational risk factors	Geographic remoteness and isolation
	Lack of infrastructure
	Lack of SAR and clean-up capabilities
	Electronic communications and navigation challenges
	Lack of, and inavailability of, technology to deal with disasters
	Shortage of experienced crews to sail Arctic routes, human errors
	Refitting costs to prepare vessels for Arctic conditions
	Substantial additional costs to operate a safe, responsible business
	Costs of insurance coverage, terms and conditions, costs of ice-breaker escort, self-insurance cost
Reputation risk	Controversial projects, bad publicity, public campaigns, ENGOs' actions, public opinion, institutional investors' decisions
Regulatory, liability and litigation risks	Domestic politics, geopolitical issues and legal requirements according to different jurisdictions
	Number of companies involved in incidents, who is liable, under which liability regime, possible court cases
	Legal actions by conservation groups, green groups, indigenous Alaskan groups and court rulings
	Lag time to secure permits and their cost
	Different regulatory regimes, standards and government capacity
	Strict environmental regulations
Climate conditions	Storms and high winds, cold, darkness, fog, icing and icebergs
Risks to the environment	Oil spills and pollutants to the environment
	Physical damage to the sea and seabed during drilling
	Invasive species related to shipping
	Ocean acidification

(Emmerson & Lahn, 2012; Greenpeace et al., 2014; Hope, 2014; Macalister, 2014a, 2014b; Marsh Ltd., 2014; Reuters, 2013)

RISK MANAGEMENT

The discussion above suggests that the Arctic is a complicated risk environment for businesses to operate in. This means that risk factors need to be considered by all relevant actors and stakeholders when deciding whether and how to develop economic opportunities in the Arctic. If commercial projects are not well managed, they are highly likely to have a negative impact on local societies and vulnerable ecosystems in the Arctic. Businesses seizing upon the opportunities must therefore "be able to manage substantial, and unique, risks which exist in the region", and critical questions need to be asked by regulators – including those granting exploration/production licenses – about whether the companies have crisis response plans to deal with issues such as leaking wells, oil spills, rescue of people, and adequate funds to pay for these and other consequences (Emmerson & Lahn, 2012, p. 5).

According to the Lloyd's report (Emmerson & Lahn, 2012), risk management is critical for operations taking place in the Arctic region, as it will help the businesses, authorities and communities to manage uncertainties and mitigate risks. A cooperative and sustainable approach to the challenges involved may minimize potential damage while gaining economic returns (The Institute of International Affairs, 2014). A key parameter of the risk management approach is "more and better knowledge, transparency, and improved communication" (Bjerager, 2013); yet in Arctic governance and risk management, a crucial issue is the lack of baseline scientific knowledge about the natural environment (Emmerson & Lahn, 2012).

Owning to limited search and rescue capabilities in the Arctic, it is critical for health and safety regulators to place great emphasis on reducing the likelihood of incidents, prevent occurrence of accidents, and develop systems that can deal with emergencies (Bjerager, 2013). Therefore, a prominent model for an effective safety regime is a performance-based system, based on an understanding of the risks involved, risk assessment, risk prevention and mitigation (Bjerager, 2013).

Up to the present time most insurance companies have deemed the Arctic too risky a market to cover, meaning that self-insurance and adequate contingency funds are of great importance in forming a credible risk management strategy. A high level of

uncertainty, lack of reliable data, multiple risks and a lack of historical loss records (Reuters, 2013), for instance in Arctic sailing, have made it hard for underwriters to assess risks comprehensively and establish premiums with certainty and clarity (Marsh Ltd., 2014). Companies seeking protection, such as ship-owners, are therefore likely to face tough conditions from insurers, such as increased deductibles for ice and/or ice-related damage, and requirements to carry spare parts on board and undertake extensive surveys of vessels (Marsh Ltd., 2014). Yet another concern for insurers, according to the Marsh Ltd. (2014) report, is the relative inexperience of ship officers and crew, as limited knowledge of the Arctic environment contributes to possible human errors.

Insurance terms and conditions also depend on insurance types. For instance, hull insurance only insures ships, while protection and indemnity (P&I) insurance includes the removal of wrecks, pollution, salvage, injury to crew, hospitalisation and more (Marsh Ltd., 2014). This means that the complexity of underwriting is greater in cases of P&I insurance than in cases of hull insurance, and additional costs are involved for possible search and rescue demands due to Arctic conditions. Moreover, insurers world-wide are already alert to the need to identify companies that may be held liable for contributing to climate change, meaning that the liability risk might become transferred to their own business via insurance policies and exposure to potential claims (Hansen, 2009). Whether this is of importance to insurers in an Arctic context is yet to be seen.

The Lloyd's report (Emmerson & Lahn, 2012) claims that the businesses operating successfully in the Arctic region will be those that take seriously their responsibility towards local communities and the environment, and which work with various stakeholders to manage their operations in a sustainable manner, aware of the risks and taking measures to mitigate them. These will be companies with comprehensive and rigorous risk management frameworks, enabling them to manage their own risk, use technologies and services most appropriate to Arctic conditions, and comply with all current and emerging legislative standards, such as the new Polar Shipping Code. Table 4 considers the various measures the companies can undertake to minimise their exposure to risk, all of which need to occur alongside the imposition of robust regulatory standards based on precautionary principles. Under customary

international law, countries are obliged to undertake necessary measures to prevent significant trans-boundary environmental harm. In terms of procedures, this necessitates international co-operation to assess risks, an especially vital point in the Arctic with its extreme vulnerability. At the national level of governance, the need to coordinate relevant sectors and interests has often been managed through the creation of management plans, such as the Norwegian Management Plan for the Barents Sea, which integrates fisheries protection measures alongside the interests of oil and gas explorers (NME, 2011). When backed by international consultation and cross-cutting legislation, such plans could lead to the identification and protection of particularly sensitive regions across the Arctic region.

TABLE 4. BUSINESS MANAGEMENT OF ARCTIC RISKS.

ARCTIC RISKS	RISK MANAGEMENT
Baseline knowledge	More and better knowledge, reliable data, Arctic research
Risk management	Consistent environmental monitoring
	Self-insurance and adequate funds
	Underwriting and insurance capacity to deal with Arctic conditions, risks and technology, premiums, terms and conditions
	Search and rescue capabilities, emergency systems
	Robust risk management frameworks and processes
	Comprehensive and rigorous risk management
Sharing of knowledge	Transparency and improved communication
Cooperation	Sharing of knowledge and expertise, both best practice examples and worst case scenarios
	Performance-based system as a part of safety regime; risk identification, risk assessment, risk prevention and mitigation
Training	Preparation for working and operating in Arctic conditions
Technology	Technologies and services most appropriate to Arctic conditions

(Bjerager, 2013; DNV, 2012; Emmerson & Lahn, 2012; The Institute of International Affairs, 2014)

ETHICAL VIEWS

We found ethical considerations for oil and gas projects taking place in the Arctic and contributing to climate change to be hardly mentioned in the literature, with a few notable exceptions. Richard Ward, CEO of Lloyd's, stated in the company's report (Emmerson & Lahn, 2012, p. 5): "How, for example, will developments in hydrocarbon exploration and extraction align with commitments to reduce global gas emissions and the need to increase our use of renewable energy?" Additionally mentioned was the global commitment via the Copenhagen Accord in 2009 (UNFCCC, 2009) to limit increases in global temperature to 2°C above pre-industrial levels, which necessitates that fossil fuels in the Arctic should stay in the ground (Hope, 2014). Conversely, it is argued that drilling for oil will help to steer the global community away from a renewable energy future (Macalister, 2014a).

CONCLUSIONS

The ever-increasing rates of sea ice thawing in the Arctic have opened up numerous economic opportunities, but also risks, across the region. In recent years, climate change has led to a number of commercial shipping vessels undertaking the previously un-navigable Northern Sea Route, albeit accompanied by ice-breakers. Significant fuel and toll cost reductions motivate the increased usage of the passageway, but the risks are very high. The harsh climate, lack of support facilities and general absence of port infrastructure are compounded by the potentially immense environmental impacts of any oil spill. Similar risks afflict the oil, gas, and minerals industries seeking to explore and exploit new production fields across the Arctic region.

From an insurance industry perspective, providing insurance coverage to companies operating in the Arctic's unrelenting environment is very complicated, and premiums frequently remain incalculable. Insurance companies are only beginning to assimilate the risks of Arctic business, with actuarial models needing to factor in the extreme

risks associated with this remote wilderness. Self-insurance is one risk management mechanism that has been adopted by hydrocarbon explorers, involving a company setting aside a lump sum of money to deal with any possible disaster, including an environmental catastrophe. However, the allocation of a contingency sum of money is unlikely to have been calculated based on any type of actuarial model of risk for the Arctic region, and thus has the potential to underestimate significantly the eventual costs of any disaster.

The effective management of commercial activities in the Arctic demands the adoption of a precautionary approach to regulation. The main role of the Arctic Council has been to mediate between the sometimes disparate interests of the Arctic states and the rights of indigenous peoples. Despite the recent advancement of the Arctic Search and Rescue Agreement, there has so far been no international treaty in force to regulate Arctic shipping operations. Under the current rules, any vessel venturing into the high Arctic has to agree on a separate policy with its insurer for the unique conditions associated with each journey. The IMO's Polar Shipping Code, agreed in November 2014 and expected to be in force by 2017 (Mathiesen, 2014), is likely to prove one major step forward in standardising international shipping rules regarding safety, pollution, certification, and monitoring. In order to lead to effective risk management, however, it is essential that such regulations be furnished with the necessary international institutional support. An absence of active institutional frameworks to oversee and monitor their implementation and application is likely to result in the Polar Code becoming viewed as a mere soft-law instrument. However, if a consistent and overarching monitoring regime can be established across all Arctic states and other nations conducting commerce in the region, there is the real potential for improved safety and ultimately lower commercial insurance premiums for operators.

This paper has reviewed the main risks and opportunities associated with Arctic commerce, devoting special attention to the risks and to mitigation approaches that could be adopted in order to minimise the likelihood of an environmental disaster. It has highlighted the barely emergent and inadequate nature of an insurance/reinsurance regime for all types of operators in the Arctic. As an exploratory introduction to the topic, it casts light, among other things, on the need for further

empirical research. Future avenues for such enquiry might involve initial quantitative studies of commercial insurance premiums for companies operating in the Arctic compared to elsewhere, examining in more detail the scope, availability, and affordability of coverage.

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