# ARCTIC ECONOMIC POTENTIAL

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## THE NEED FOR A COMPREHENSIVE AND RISK-AWARE UNDERSTANDING OF ARCTIC DYNAMICS

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ULKOPOLIITTINEN INSTITUUTTI
UTRIKESPOLITISKA INSTITUTET
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## THE NEED FOR A COMPREHENSIVE AND RISK-AWARE UNDERSTANDING OF ARCTIC DYNAMICS

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- The melting of the Arctic is expected to offer prospects for maritime transport and hydrocarbon exploitation that could potentially create an Arctic economic boom.
- In principle, more accessible Arctic sea routes could offer substantial savings in logistics between Asian, American and European markets when compared to the current global maritime trade routes via the Panama and Suez Canals.
- It is estimated that as much as 13 per cent of undiscovered oil deposits and 30 per cent of undiscovered gas deposits on the globe are located in the Arctic area. These hydrocarbon prospects are further estimated to make the Arctic area a major global energy hub.
- However, the extent and pace of overall Arctic development is still difficult to forecast. There are many uncertainties and challenges in the Arctic environment, infrastructure, technology and global economy that may hinder the expected trajectories.
- What is needed is an informed, comprehensive assessment of the risks and gains related to the development of the Arctic.

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## Introduction

During the Cold War, the Arctic area was an important theatre in the US–Soviet confrontation, mainly due to the area's nuclear deterrent relevance for both super powers. With the end of the Cold War, the Arctic lost most of its geopolitical relevance and dropped off the radar. During the last decade or so, the Arctic has made a flashy comeback and has become highly topical again. In fact, the area has re-emerged as a component of contemporary high politics, highlighted by the publication of numerous national and supranational strategic documents on the Arctic.[1]

This "Arctic boom" is mostly because of the economic opportunities brought about by climate change, which is making the natural resources in the Arctic increasingly accessible. There has even been speculation that this increasing economic relevance might lead to some kind of new "wild west" scenario, where commercial actors are rushing to seize opportunities and states are trying to bolster their sovereignty claims. The media, in particular, have been eager to report on the Arctic developments in a fairly colourful way, dubiously emphasizing the lucrative yet conflictual and even anarchic character of the area.[2]

While the public image of the Arctic is overly "sexed up", it is clear that the Arctic area *is* changing. That said, the Arctic trajectories remain uncertain and a comprehensive understanding of these change dynamics is still in many respects limited. As the Arctic is going to be a significant area of strategic emphasis, it is important that Arctic visions are based on a comprehensive evaluation of Arctic development based on extensive and up-to-date knowledge of Arctic dynamics and associated risks. While there *is* huge potential for economic opportunity in the Arctic, it is not at all clear *how* – to what extent and at what pace – this potentiality will indeed actualize.

The aim of this paper is to critically analyze the key drivers of the contemporary "Arctic boom" and to illustrate existing key challenges that need to be tackled for the Arctic potential to materialize. The paper will provide a brief overview of the challenges in two main economic domains of the Arctic: maritime transport and hydrocarbon extraction. Due to this focus, the paper brackets out for the most part the political processes and dynamics related to the Arctic area and its development.[3]

## The Arctic melts, the money flows

The Arctic[4] is warming up, and as a consequence, the Arctic Ocean is melting at an accelerated pace. The extent of the summer ice has been decreasing about 8 per cent per decade and the thickness of the ice has decreased 40 per cent over recent decades.[5] The extent of the Arctic summer ice cap is now 49 per cent below the 1979–2000 baseline average extent (see Figure 1). The Arctic land areas are now 2 degrees Celsius warmer than in the mid-1960s (see Figure 2).[6]

Scientific research shows that the climate is changing more rapidly in the Arctic than anywhere else

1 See e.g. http://www.arctic-council.org/index.php/en/about/documents/category/12-arctic-strategies.

2 See e.g. Frank Sejersen (2011) "Climate Change and the Emergence of a New Arctic Region", in *Baltic Rim Economies: Special Issue on the Future of the Arctic*, no. 4, 30 November 2011. http://www.utu.fi/fi/yksikot/tse/yksikot/PEI/BRE/Documents/BREArctic%2030.11.2011.pdf; Katarzyna Zysk (2011) "The Evolving Arctic Security Environment: An Assessment", in Blank, Stephen J. (ed.) *Russia in the Arctic*. Strategic Studies Institute, July 2011. http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubid=1073; Antrim, Caitlyn L. (2011) "The Russian Arctic in the Twenty-First Century", in Kraska, James (ed.) *Arctic Security in an Age of Climate Change*. Cambridge: Cambridge University Press, p. 107.

3 This excludes, for instance, a wider discussion of the UNCLOS treaty and the related processes, the strategic visions of the Arctic states, and the work of the Arctic Council.

4 The Arctic has various definitions. It may refer to the Arctic Ocean, the area above the Arctic Circle, the area above $60^0$N or, most broadly, the area with "Arctic conditions". According to the accepted view, there are eight Arctic states: the United States, Russia, Norway, Canada, Denmark (Greenland), Sweden, Finland and Iceland.

5 Arctic Council (2009) *Arctic Marine Shipping Assessment 2009 Report* (AMSA). http://www.arctic.gov/publications/AMSA_2009_Report_2nd_print.pdf

6 *Arctic Report Card: Update for 2012*. http://www.arctic.noaa.gov/reportcard/index.html.

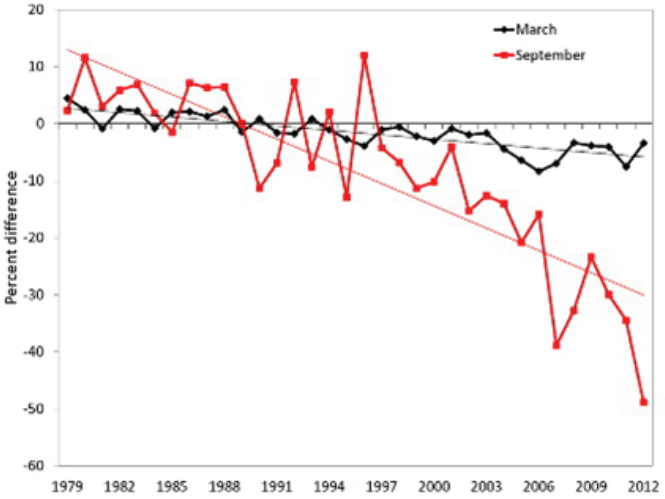


Figure 1: The reduction of Arctic ice extent, 1979–2012. Source: Arctic Report Card, 2012. Used with permission of the US National Oceanic and Atmospheric Administration.

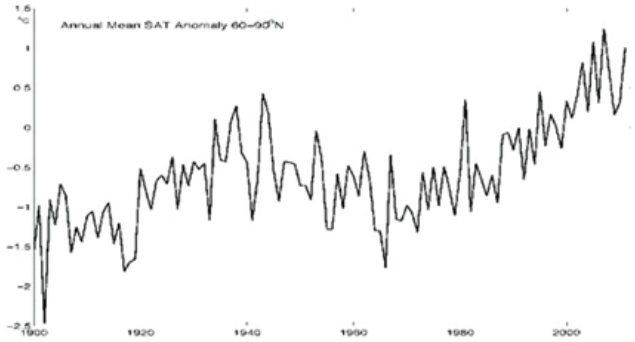


Figure 2: The rise of Arctic land area temperature, 1900–2011. Source: Arctic Report Card, 2012. Used with permission of the US National Oceanic and Atmospheric Administration.

on the globe. The combination of Arctic warming and melting ice creates the so-called "albedo effect" where the Arctic warms at an ever-accelerating pace when more and more dark surfaces (ground, ocean) replace the white ice and snow coverage. These dark surfaces absorb more sunlight during the summer, which makes the ocean and air warmer, which again results in more ice melting. This effect, combined with other environmental changes – such as changes in cloud and wind patterns as well as in moisture and heat movements – creates a complex process known as "Arctic amplification", which makes the Arctic ice melt down faster and faster.[7] Some estimates suggest that the entire Arctic Ocean could be ice-free during late summer/early autumn in the near future, most probably by 2040 but possibly even as soon as 2015.[8]

This melting of the Arctic has two generally highlighted economic consequences. First, the *Arctic sea routes are becoming more easily accessible for maritime transport*. In addition to retreating ice coverage, the amount of multi-year ice – i.e. thick ice that has survived at least one summer melting season – in central parts of the Arctic Ocean has also been declining dramatically.[9] This trend is significant since younger ice cannot fully strengthen itself during the winter, resulting in an ever-smaller and thinner ice cap during the summer, which is also easier for ships to break. These changes in ice patterns could mean the emergence of trans-Arctic shipping with considerable savings in logistical expenses in cargo transport between East-Asia and Northern Europe. The Arctic is becoming more accessible for human activities not only due to climate change, but also as a result of technological innovation, including advances in ship, communication, satellite, drilling, and navigation technology.

Second, the melting Arctic is seen *to reveal substantial new sources of hydrocarbons and minerals*. According to the 2008 US Geographical Survey, as much as 13 per cent of undiscovered oil deposits and 30 per cent of undiscovered gas deposits on the globe are located in the Arctic area.[10] This is assumed to mean that the new hydrocarbon prospects will make the Arctic area a major global energy hub that will boost the Arctic economy significantly.

### Maritime trade flows in the Arctic

The melting Arctic Ocean has three main routes for the potentially increasing maritime transport. The Northeast Passage (NEP), also known as the

7 *The Economist*, The Melting North: Special Report, June 16th 2012, p. 4. http://www.economist.com/node/21556798.

8 See e.g. Polyak, Leonid et al. (2010) "History of Sea Ice in the Arctic", *Quaternary Science Reviews* 29: 1757–1778; Kerr, Richard A. (2012) "Ice-Free Arctic Sea May Be Years, Not Decades, Away", *Science* 337 (6102): 1591. For more on Arctic ice reduction, see U.S. National Snow and Ice Data Center, http://nsidc.org/arcticseaicenews/.

9 Polyak et al. (2010), 1758–1760.

10 USGS (2008a) Assessment of Undiscovered Oil and Gas in the Arctic; see http://www.usgs.gov/newsroom/article.asp?ID=1980&from=rss_home.


Figure 3: Arctic sea routes.
Data from The Arctic Institute.

Northern Sea Route, which runs along the Russian Arctic coastline between the Barents Sea and the Bering Strait; the Northwest Passage (NWP) on North America's Arctic coastline from the Beaufort Sea to Baffin Bay; and a Transpolar Sea Route (TSR) that runs straight through the Arctic Ocean (see Figure 3).

Climate forecasts indicate that the route most likely to be open for commercial use during summertime is the NEP. In fact, it has actually been more or less open annually during the late summer since 2005 with some year-round traffic, most notably between the Yamal region and the city of Murmansk in Russia. The forecast for the NWP is commercially less optimistic. This is because the NWP goes through the Canadian archipelago, which is significantly more ice-covered and more closed also during the summer months, at least in the mid-term. As for the TSR, although the route may have significant potential in the future (e.g. Chinese transport) and the multi-year ice has been noted to be decreasing, the route is still destined to have more severe ice conditions than the NEP, at least in the short- and mid-term.[11]

11 AMSA (2009), pp. 5, 84-86, 89-90.

In principle, Arctic sea routes could offer substantial savings in logistics between Asian, American and European markets when compared to the current global maritime trade routes via the Panama and Suez Canals. For example, the travel time between Rotterdam and Shanghai may be reduced from an average 30 days down to 14 days, and the distance by roughly 5000 kilometres when compared to the traditional trading route via the Suez Canal.[12] This, in addition to the political instability in many geographical areas (e.g. the Strait of Hormuz, the Horn of Africa) in the near vicinity of the traditional global maritime flows, is seen to make the opening Arctic maritime routes a more appealing option for commercial operators.

Although the Arctic routes have witnessed an increase in traffic during the last five years, easier access to the Arctic passages will not inevitably result in trans-Arctic trade flows becoming a major competitor for the more "traditional" trading routes. There are big challenges to tackle before the maritime passages in the High North become globally significant. This is due to multi-dimensionally harsh operating conditions in the Arctic that make Arctic maritime operations challenging and costly.

In addition to the cold climate and physical obstacles generated by ice, Arctic waters are also considerably shallow due to broad continental shelves. For example, the depth of the NEP varies between 10 and 100 metres, which is considerably less than in other major transport routes.[13] This geographical fact alone puts limitations on the size of vessels capable of operating in Arctic routes. Smaller vessels mean smaller cargo-carrying capability, which in turn means sub-optimal economies of scale and high logistic unit costs. The cold Arctic climate also puts extra stress on a ship's machinery and operability[14], and limits the products suitable for containership transportation in the first place.

In addition, melting ice will result in a larger amount of drifting ice, making the operating conditions dangerous. This is especially hazardous during the dark Arctic winter nights which prevail half the year. Moreover, the Arctic area is still an "unknown frontier" in many respects. Current hydrographic charts, for example, remain insufficient for safe maritime activity.[15]

This hazardous environment means that ships operating in the Arctic waters must be adequately reinforced to be able to operate safely in these waters, making them more expensive to build and also economically less beneficial to operate in other waters besides the Arctic Ocean, due to heavier vessel weight, for example. A significant increase in Arctic traffic would require a correspondingly significant increase in ice-strengthened Polar Class[16] carrier vessels or, alternatively, Arctic vessels would need to count on ice-breakers for navigational and ice-management assistance, even during the summer season. This would put limitations on the use of the Arctic passages because of the scarce ice-breaking capabilities and relatively high ice-management fees. For instance, the ice-breaker escort cost at the NEP can amount to $150,000 per day. One must also note that building a modern ice-breaker is highly expensive (up to $1bn) and time-consuming (up to 10 years).[17]

Importantly, even though the Arctic Ocean might be reasonably ice-free during a few summer months, the Arctic *winter ice* is not expected to disappear – at least not during this century. This means that Arctic shipping, even at the NEP, is not going to be possible around the year other than with ice-strengthened Polar Class ships and/

12 Hahl, Martti (2013) "What's Next in the Arctic?", in *Baltic Rim Economies: Special Issue on the Future of the Arctic*, no. 2, 27 March 2013, p. 3. http://www.utu.fi/fi/yksikot/tse/yksikot/PEI/BRE/Documents/2013/BRE%202-2013%20web.pdf.

13 See e.g. AMSA (2009), p. 23.

14 For an informative discussion of the challenges facing surface warships operating at high latitudes, see e.g. Kraska, James (2011) "The New Arctic Geography and U.S. Strategy", in Kraska, James (ed.) *Arctic Security in an Age of Climate Change*. Cambridge: Cambridge University Press, pp. 263-64.

15 AMSA (2009), p. 16.

16 On the Polar Class requirements by the International Association of Classification Societies, see http://www.iacs.org.uk/document/public/Publications/Unified_requirements/PDF/UR_I_pdf410.pdf.

17 Lloyd's (2012) *Arctic Opening: Opportunity and Risk in the High North*. London: Chatham House, p. 29. http://www.lloyds.com/~/media/Files/News%20and%20Insight/360%20Risk%20Insight/Arctic_Risk_Report_20120412.pdf.

or with ice-breaker assistance.[18] This means that year-round transport in the prevailing conditions is not economically feasible and Arctic maritime activities will remain highly seasonal. Moreover, it's extremely difficult to predict when the passages will actually be open since the ice coverage varies from year to year.[19] Importantly, the unpredictable nature of the Arctic operational environment means that the Arctic routes may not be suitable for so-called "just-in-time logistics" – a common feature of today's global supply chains. Instead, the Arctic routes have the biggest potential in the transportation of bulk cargo (resources) as opposed to containers that require punctuality in delivery.[20]

The Arctic also has severe gaps in the infrastructure necessary for safe passage. The Arctic routes continue to lack search and rescue capabilities, ice-management capabilities, salvage points, harbours, communication infrastructure and even experienced staff to operate in icy waters.[21] Arctic-specific insurance is also limited by the relatively low amount of traffic, and insurance premiums may remain high due to difficult operating conditions and levels of risk management by shipping companies.[22] What this means is that while the Arctic routes are shorter in distance and more and more frequently used, their feasibility and lucrativeness remains uncertain, at least for the foreseeable future. In some cases, they might be slower due to unexpected ice conditions, or entail larger fuel costs due to the need for greater propulsion power.[23] In short, the potential in the Arctic transport routes might be difficult to realize in full.

Traditionally, the Arctic has seen a certain amount of maritime activity. These activities, however, have been mostly regional and related to the re-supply of communities in the scarcely populated Arctic area and the exploitation and export of raw goods (oil, gas, minerals, fish) out of the Arctic. The majority of these intra-Arctic transport activities have taken place along the Norwegian coast, around Iceland, Greenland and the Faroe Islands, in the Bering and the Barents Sea, the latter having the largest concentration of Arctic maritime traffic.[24] These activities have taken place almost entirely in areas which are already ice-free, either seasonally or year round.

Despite optimistic strategic visions[25] as well as some notable commercial trans-Arctic passages since 2009[26], there is no guarantee that trans-Arctic shipping activity will boom in the near future. That said, Arctic maritime activities will increase with the rise in economic activities in the region, primarily related to energy export, mining, tourism and the fishing industry. The NEP, or parts of it, along the Russian coast has the greatest potential for commercial and therefore operational activity as well.

With the world's most powerful ice-breaking fleet and long historical experience in Arctic conditions, Russia would gain from the suggested increase in NEP use. Russia has stated its vision to comprehensively develop its Arctic capabilities and infrastructure, especially in order to secure its energy exports: a major part of Russian export income comes from hydrocarbons. The Arctic area plays an important role in this since it generates around 20 per cent of the county's gross domestic product (GDP) and twenty-five per cent of the nation's total exports.[27] This makes the Arctic a strategic imperative for Russia. In this respect, the NEP is a viable alternative for

18 Russia currently requires ice-breaker escorts for maritime transport in the NEP.

19 AMSA (2009), pp. 160, 24-25.

20 Brigham, Lawson W. (2011) "The Challenges and Security Issues of Arctic Marine Transport", in Kraska, James (ed.) *Arctic Security in an Age of Climate Change*. Cambridge: Cambridge University Press, p. 29.

21 Ibid., p. 27.

22 Lloyd's (2012), pp. 49-51.

23 However, the travel speed in ice-free conditions in Arctic passages is typically slower than in other seas due to geographical reasons, a fact that might actually save on fuel costs.

24 AMSA (2009), pp. 73-74.

25 See e.g. 'China Starts Commercial Use of Northern Sea Route', *Barents Observer*, March 14, 2013.

26 See e.g. Brigham, Lawson W. (2013) "Arctic Marine Transport Driven by Natural Resource Development", in *Baltic Rim Economies: Special Issue on the Future of the Arctic*, no. 2, 27 March 2013, p. 14.

27 Zysk, Katarzyna (2011) "Military Aspects of Russia's Arctic Policy: Hard Power and Natural Resources", in Kraska, James (ed.) *Arctic Security in an Age of Climate Change*. Cambridge: Cambridge University Press, p. 95; Järvenpää, Pauli & Ries, Tomas (2011) "The Rise of the Arctic on the Global Stage", in Kraska, James (ed.) *Arctic Security in an Age of Climate Change*. Cambridge: Cambridge University Press, p. 138.


Figure 4: Main oil and gas prospects in the Arctic. Data from the U.S. Energy Information Administration.

transporting liquefied natural gas (LNG) and other resources to Europe, and maybe also to Asia in the future.

To conclude, it will take a considerable amount of investment in Arctic capabilities and infrastructure as well as major changes in the security and economic rationale of "traditional" global trade dynamics for the Arctic maritime routes to become a significant option for global maritime trade flows. However, it is likely that increasing economic activities in the High North will increase Arctic maritime flows, but to a large extent only in certain key regions in the foreseeable future. Trans-Arctic transport is more of a possibility for tomorrow than a reality of today.

### Resource exploitation in the Arctic

The Arctic area is rich in natural resources. The growing potential for an Arctic economic boom is not so much dependent on the possibly increasing trans-Arctic transport, but more related to the global demand for Arctic natural resources, including natural gas and oil.[28]

The exploitation of non-renewable energy sources in the Arctic is by no means a new phenomenon, as activities in Alaska and in the Russian Arctic have been going on for decades. These activities are set to multiply when the Arctic becomes more accessible and when the technologies for energy extraction improve, making development projects increasingly feasible and financially attractive for economic operators. The 2008 U.S. Geological Survey shows that the potential for Arctic energy source exploitation is huge. According to 2009 figures, over 60 large oil and natural gas fields have been discovered in the Arctic, and the number has been growing (see Figure 4).[29]

The International Energy Agency has estimated that roughly 75 per cent of world energy consumption

28 The Arctic also has a significant amount of mining activity, but we have omitted this from our discussion.

29 Ernst & Young (2013) *Arctic Oil and Gas*, p. 2. http://www.ey.com/Publication/vwLUAssets/Arctic_oil_and_gas/$FILE/Arctic_oil_and_gas.pdf.

will still be reliant on fossil fuels in 2035.[30] This fact, combined with the security of energy supply considerations (related primarily to the Middle-East region), has increased the political interest in Arctic energy reserves. While still somewhat uncertain, the general assumption is that most of the new Arctic energy prospects are to be found on the continental shelves close to the shorelines of the Arctic coastal states. Russia's coast is expected to be more gas-prone, with the Norwegian and American Arctic coast being more oil-prone.[31]

But as was the case with maritime transport, the potential for Arctic energy exploitation is not easy to cash in on. Conducting oil and gas development projects in the Arctic is complex. To begin with, their feasibility depends to a large extent on the global supply and demand dynamics, namely on the energy price and security of supply considerations.

An enlightening example of the contingency of Arctic energy exploitation is the case of the Shtokman gas field project. Situated in the Barents Sea, about 550 kilometres offshore, this Russian-led gas-field megaproject was initially designed to supply liquefied natural gas (LNG) to the US market. However, the project has been delayed, and perhaps even jeopardized, by various contingent factors, ranging from rifting icebergs and taxation issues in Russia to recent technological breakthroughs in shale gas extraction technology.[32] The increase in North-American shale gas exploitation has saturated the US gas markets – there is even talk of US energy independence by 2020 – and consequently blocked the export of Shtokman LNG to the US.[33]

From an economic perspective, the basic principle is that the selling price must exceed a certain relatively high threshold for Arctic oil and gas extraction to be profitable. One estimate suggests that the cost of producing a barrel of Arctic oil is somewhere between $35 and $100, while the cost of producing a barrel of Middle-Eastern oil could be as low as $5.[34] The oil price in the global market has been – and is expected to stay – at a rather high level (currently $94.53 (WTI) per barrel[35]), which makes Arctic oil development possible, despite the high production costs.

In contrast to oil, natural gas has traditionally been sourced and priced regionally. For instance, the price of natural gas in Japan is several times higher than in the US.[36] However, new developments in Arctic-related LNG tanker technology – for instance, double-hulled Polar class vessels capable of breaking ice stern first where necessary[37] – will make the transport of Arctic natural gas more independent of the existing pipelines, more flexible, and more global.

Arctic oil and natural gas extraction involves serious technical problems and requires huge investments, especially related to the offshore projects. Perhaps most importantly, actors in the energy sector have to mitigate the risk of environmental accidents. The Arctic environment is fragile and hard to restore in the event of accidents. Oil spill management in the icy environment of the Arctic is technologically difficult, if not nigh on impossible. The liability issues

30 International Energy Agency (2012) *World Energy Outlook* 2012, p. 51. http://www.worldenergyoutlook.org/publications/weo-2012/.

31 USGS (2008b) "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle". http://pubs.usgs.gov/fs/2008/3049/fs2008-3049.pdf.

32 See e.g. 'Gazprom Postpones Development of Shtokman Field', *Wall Street Journal*, August 30, 2012. http://online.wsj.com/article/SB10000872396390444949149045776207 33220528246.html; 'Roadmap for Shtokman development', *Barents Observer*, April 3, 2013. http://barentsobserver.com/en/energy/2013/04/roadmap-shtokman-development-03-04.

33 See Vihma, Antto (2013) "The Shale Gas Boom: The Global Implications of the Rise of Unconventional Fossil Energy". FIIA Briefing Paper 122. http://www.fiia.fi/en/publication/319/the_shale_gas_boom/.

34 Lloyd's (2012), p. 23.

35 The above-mentioned oil price is that of April 4, 2013. See http://www.bloomberg.com/energy/.

36 IEA (2012), p. 2. On natural gas pricing more generally, see e.g. Melling, Anthony J. (2010) *Natural Gas Pricing and its Future: Europe as the Battleground.* Washington: Carnegie Endowment. http://www.carnegieendowment.org/files/gas_pricing_europe.pdf.

37 On these "double-acting" ships, see http://www.akerarctic.fi/publications/pdf/Poac01xNewDAS.pdf.

related to a potential environmental catastrophe pose major obstacles to resource extraction and hinder the development of potential projects. British Petroleum, for example, agreed to $4.5bn in fines and other penalties related to a deep-water oil spill in the Gulf of Mexico in 2010. The total costs of the recovery will exceed this significantly.[38]

Arctic development projects also tend to have long lead times, namely the time between the initial discovery and the actual production phase might be a decade (or more) long. This lead time might include unpredictable global or regional developments, such as changes in energy supply and demand and environmental accidents, which might have negative effects on the planned projects, either postponing or even cancelling them altogether. As such, committing to these long-term development projects is difficult because of the great uncertainty surrounding the Arctic area development.

Economically speaking, there is a big difference between the economic viability of onshore and offshore drilling, and the proximity of the development projects to the existing infrastructure (harbours, pipelines) is a significant factor when pondering the economic viability of a project. Onshore or close-to-shore drilling near the existing infrastructure might be highly viable, but offshore projects require high global energy prices in order to be lucrative because of the high production and investment costs.[39] Moreover, it is worth noting that when the temperature rises and the Arctic permafrost melts, maintaining the existing infrastructure once built on the permafrost of the coastal areas may also need additional investments as the infrastructure's "bedrock" crumbles. In addition, reduced ice coverage brings with it stronger ocean waves which, in turn, pose difficulties not only to maritime traffic, but also to coastal infrastructure by increasing coastal erosion.[40]

## Conclusion: Economic hope and Arctic tragedy?

The Arctic is not a new "wild west". While it provides strategic assets over which economic and political competition exists, the Arctic remains one of the most peaceful areas on the globe, characterized to date by bilateral negotiations (e.g. Russia and Norway), multilateral co-operation and governance (e.g. UNCLOS, the Arctic Council) and public-private joint ventures (e.g. in hydrocarbon extraction).

Indicative of the Arctic economic potential, recent and relatively cautious estimates suggest that the Arctic area could witness investments ranging from $100bn[41] up to €225bn[42] during the next decade, mostly related to the exploitation of non-renewable energy sources and related infrastructure construction. Although significant challenges remain in order for the trans-Arctic transport routes to be realized, Arctic maritime transport is going to increase due to the increasing hydrocarbon and mining activities, primarily regionally but even trans-continentally over time. This probably offers substantial commercial possibilities for the energy industry, ship and infrastructure builders and ice-management service providers.

However, the potential and overall Arctic development is still difficult to forecast. The Arctic has many potential trajectories and uncertainties. These include at least the following: changes in future hydrocarbon demand and price; developments in global trade dynamics; the future of traditional maritime routes; potential environmental catastrophes; global effects of climate change; technological development; domestic political dynamics (e.g. in Russia); the future of Arctic multilateral governance; the reduction of knowledge gaps (e.g. hydrographic mapping, weather forecasts); future infrastructure development; trade-offs between different economic activities (e.g. fishing, tourism, oil, gas); and development in operational and environmental risk mitigation.

38 'BP Will Plead Guilty and Pay Over $4 Billion', *New York Times*, November 15, 2012. http://www.nytimes.com/2012/11/16/business/global/16iht-bp16.html?pagewanted=all.

39 Lloyd's (2012), p. 9.

40 Lloyd's (2012), pp. 16–17.

41 Lloyd's (2012), p. 6.

42 Synberg, Kari (2013) "Russia and the Arctic", in *Baltic Rim Economies: Special Issue on the Future of the Arctic*, no. 2, 27 March 2013, p. 5. http://www.utu.fi/fi/yksikot/tse/yksikot/PEI/BRE/Documents/2013/BRE%202-2013%20web.pdf.

It is vital to note that even if the Arctic prospects were not fully realized, there would still be substantial investments. Nevertheless, because of the above-mentioned – and still other – uncertainties, what is needed is a comprehensive and risk-aware assessment of the Arctic dynamics as a basis for future investment decisions. In other words, what is needed is a "de-hyped" evaluation of Arctic potentiality.

While the Arctic economic potential might be overly "sexed up" and "hyped", there is perhaps one even more unnerving and often overlooked element in the Arctic economic discourse. This is the neglect of the magnitude of the effects of global climate change that amounts to a *de facto* acceptance of climate change as the fate of humankind. This means that the potential economic opportunities of the Arctic not only *stem from*, but when realized also *contribute to*, changes in global climate, and they are hard – if not impossible – to reconcile with the goal of sustainable global socio-economic development.

It is certainly true that the Arctic area offers short-term economic potential in the form of hydrocarbons (and related maritime transport). It is also true that there exist some mid-term prospects in the Arctic for renewable energy in the form of hydro, solar and wind power. Yet, all of these pale in comparison to the complex, short and long-term environmental threats of oil and natural gas exploitation (and maritime activity). In short, the more we economically exploit the Arctic, the more we contribute to the deterioration of the globe and the Arctic itself.

The global goal should be to lower the emission of greenhouse gases, not to exploit and stay dependent on the fossil fuels that advance global warming. This goal is in sharp contrast with the economic vision and the rationale of the Arctic boom. If the economic benefits of the Arctic were to be exploited fully, climate change would have most likely reached the "point of no return". The worst-case scenario could involve, but not be limited to, substantial sea-level increase and flooding of populated coastal areas due to the melting of Greenland as well as the release of methane – a super greenhouse gas – from the melting Arctic permafrost. If this is the case, the tragedy of the Arctic seems to be that its economic potential will materialize only in the context of a deteriorating globe, or in fact assuming it.

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