COLD RUSH: ARCTIC OFFSHORE OIL DEVELOPMENT IN CANADA

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"The shocking speed at which the Arctic sea ice is melting should be a wake-up call to the world that we need to phase out fossil fuels fast. Instead we are witnessing a reckless gold rush in this pristine wilderness as big companies and governments make a grab for the world's last untapped oil and gas reserves,"

- Chair of the Environmental Committee of the European Union (Nilsen, 2012)

Introduction

In the 1970's and 80's, Panarctic Oil and Petro Canada drilled 176 exploratory holes in the Canadian Arctic, spending close to one billion dollars to do so (Venderklippe, 2012). The revenues accrued could not justify the high-costs of the operation and in the 1990's it was discontinued while more profitable avenues for oil extraction, such as the Gulf of Mexico, were pursued instead.

But dramatic changes in the environmental, technological and economic landscape have renewed industry demand in the area. This, along with the Canadian Government's interest to promote natural resource development in Canada, has prompted millions of hectares of Arctic offshore to be auctioned to oil companies wishing to explore for and eventually extract oil from the seabed of the Arctic.

Of the oil companies who have secured licenses, none have yet passed the Arctic Safety Regulations set by the National Energy Board (NEB), the federal regulator on offshore drilling in Canada's Arctic. There has been significant pressure from the oil industry on the NEB to allow more flexibility in its rules, some of which has been allowed, as this paper will detail.

Canada is not alone in its renewed interest in Arctic offshore drilling. Several Arctic countries are at varying stages in their progress and have chosen different ways to regulate the operators in their Arctic regions.

At this point, the billions in investments from private companies and the economic opportunities that countries struggling in recession hope to gain from extraction are far too great to assume that we will see a complete moratorium on Arctic offshore drilling. But, as this paper will demonstrate in a Canadian context, there are steps that the NEB and Canadian Government can take to ensure oil development happens in a sustainable manner.

First, a brief summary will be given as to where the other Arctic nations; Russia, USA, Greenland and Norway are in their progress towards Arctic offshore drilling, to give contrast as to where Canada stands.

Second, this paper will discuss how global warming and other geopolitical economic factors have brought the Arctic to the center stage of the global oil extraction industry.

Third, the unique climactic conditions of the Arctic will be discussed and explained as to how they make the Arctic offshore the most technically challenging and dangerous place to drill for oil in the world. The wide range of environmental and social consequences of having oil commercially extracted in the Arctic offshore will be discussed and a case describing why it simply is not worth it to venture into the Arctic for oil will be offered.

Finally, this paper will make three primary policy recommendations for the NEB and Canadian Government to ensure the sustainable development of oil in the Canadian Arctic:

1. The NEB must keep the strict same-season well-relief policy in its Arctic drilling safety regulations and not accept alternatives that claim to achieve the same outcome.
2. The Canadian Government must increase the financial liability on oil companies operating in the Arctic offshore. The current level now permits a moral hazard for oil companies.

3. The NEB must increase informed, early stage involvement from Inuit populations in the licensing process and allow fair participation and contribution in all levels of decision making regarding Arctic offshore drilling.

Oil in the Arctic

The US Geological Survey (2008) estimated that there are 90 billion barrels of oil within the Arctic Circle, equivalent to roughly 20% of the world's undiscovered oil reserves. 70% of these reserves are located offshore, within the borders of Russia, USA, Greenland, Norway and Canada.

Despite opposition from environmental and indigenous groups, as well as numerous technical failures, each country and almost every major oil company is making significant steps towards being the first to commercially drill for oil in the Arctic offshore. The following gives a brief update of the status of each country, excluding Canada, in their journey to drill in the Arctic offshore.

Russia

Accounting for about half of its GDP, Russia is the largest oil producer of the countries and is the most technologically prepared for offshore Arctic oil drilling with a fleet of twenty icebreakers. Russia's leading energy company, Gazprom, utilized a state-of-the-art, nuclear powered ice breaker for oil and gas exploration in the Russian Arctic and constructed the world's first Arctic-class, ice resistant oil rig, the Prirazlomnoye platform. Arctic news services

(Petterson, 2012; Staalesen, 2012) reported that Greenpeace members scaled the platform in August 2012 while it was stationed in the Pechora Sea, protesting its encroachment on Russian Indigenous Traditional Lands as well as Gazprom's inability to produce an official oil spill response plan. Despite these setbacks, Gazprom plans to commercially transport oil from the rig in the summer of 2013.

USA

Shell Oil has suffered numerous setbacks in its operations north of Alaska, in the Beaufort and Chukchi Seas. The New York Times (Broder & Fountain, 2013) reported that a drilling rig was detached from its tow ship amid bad weather and ran aground on an island in the Gulf of Alaska. This comes just after Shell had to postpone its oil drilling because of damage to a safety mechanism during testing. Environmentalist groups have stressed that accidents such as these are clear indications that oil companies are simply not ready to begin drilling in the Arctic offshore.

But the stakes are just too high for Shell to back out of its operation in Alaska. The New York Times (Broder & Krauss, 2013) reports that Shell has invested 4.5 billion in its offshore oil drilling operation in Alaska, an investment that its board of directors would surely like to see some returns from. Shell plans to be drilling in summer 2013.

Greenland

Home to potentially the largest reserves of undiscovered oil in the Arctic (USGS, 2008), Greenland's path to independence from Denmark is to build its economy through extensive

offshore oil drilling. Cairn Energy, Shell and the state oil company, Nunaoil, have all drilled holes in Baffin Bay, off the west coast of Greenland, but are yet to strike oil.

Kucera (2009) points out that independence would mean eventual removal of Denmark's subsidies to the Greenlandic government, an amount that makes up more than half of their GDP. Greenland has a population of less than sixty thousand and suffers from problems in education, housing and high levels of alcoholism. Removal of the Danish subsidy and replacing it with a heavy reliance on future oil revenues places immense pressure on the Greenland Self Government to make every accommodation to begin offshore drilling.

Norway

As Europe's largest oil producer, Norway has forty years of experience in offshore drilling in the North Sea, but has yet to move into Arctic regions. The petroleum industry has been an integral financier of its expansive welfare state, contributing more than 1.6 trillion dollars to the Norwegian GDP over the last forty years (Stoltz & Bergland, 2013).

After resolving an Arctic border dispute with Russia, the Norwegian Oil Ministry is looking to open new areas for licensing in the Barents Sea, the Arctic, and the Icelandic offshore in 2013. This is not without criticism; the European Parliament has called for a moratorium on Arctic drilling, calling its pursuit "reckless" (Nilsen, 2012).

The Arctic Takes Centre Stage in Offshore Oil Drilling

In recent years, global warming, rising oil prices and the desire for economic independence has brought the Arctic back to the forefront of profitable ventures for oil companies and governments looking to expand their natural resource industries. The following section will explain how this came to be.

Global Warming

The U.S. National Snow and Ice Data Centre (2012) reported that the summers of 2007 and 2012 have been the lowest records of ice coverage in the Canadian Arctic and that climate scientists now believe that by 2030, the Arctic will be free of ice in summer months. The pace of change is exponential because sea ice itself acts as a reflector of the sun's energy, keeping the Arctic cool. Once the ice disappears, the ocean begins to absorb the sun's energy and contributes to further melting of sea ice.

This is devastating for the wildlife in the Arctic and the Northern populations who live off what the land provides in its Arctic state. But for companies interested in oil exploration, decreased ice coverage means the world's most technically challenging environment becomes more accessible.

Because of the vast ice coverage in the winter months, offshore drilling in the Arctic is limited to roughly three summer months, when the sea ice is broken up enough to allow vessel navigation and rig placement. As sea ice continues to disappear in coming years, the summer drilling season will inevitably extend and waterways such as the Northwest Passage will become commercial

shipping routes, allowing infrastructure for offshore oil rigs to expand throughout the Canadian and Alaskan Arctic.

It is difficult to ignore the irony of exploiting the Arctic for more of the substance that will contribute to its further decline. Increased amounts of greenhouse gases in the atmosphere, a by-product of the burning of fossil fuels, are a primary contributor to global warming. Global warming itself, is allowing mankind to extract fossil fuels from places we could not access preceding this warmer climate, enabling mankind to continue to burn more fossil fuels and accelerate the global warming process. The gains incurred are short sighted and put little long term value on the current state of the Arctic.

Price of Crude Oil

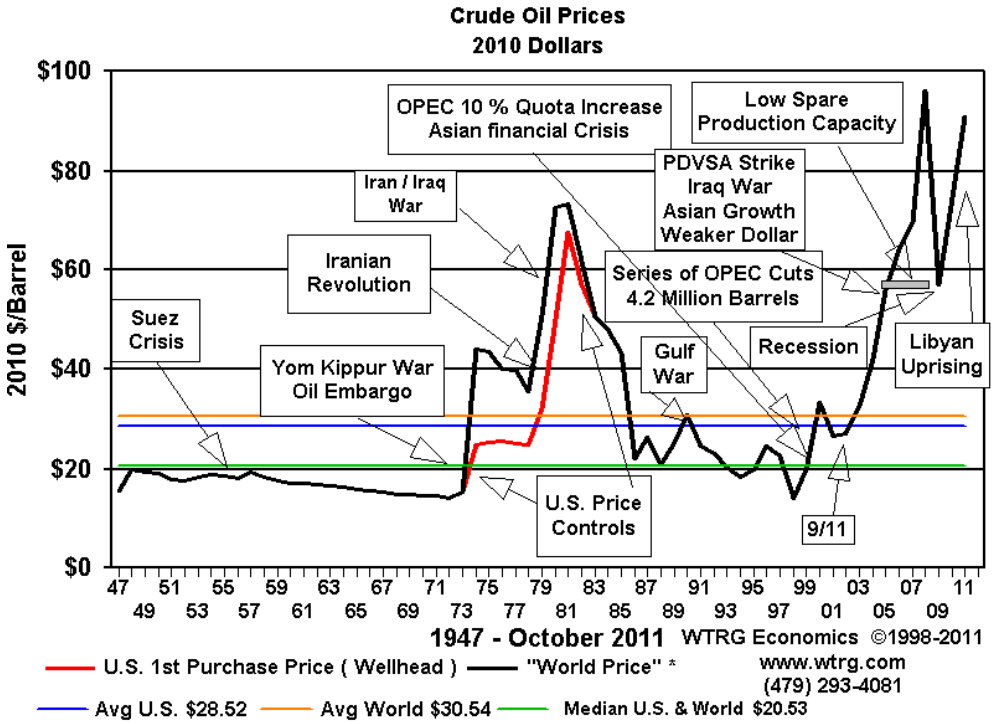
Oil accounts for more than one third of the energy sources used on the planet (Rubin, 2012). As the world's economies grow, they need greater amounts of oil. The fundamental rules of supply and demand dictate that as demand grows for a commodity, the price will increase until the supply increases to accommodate demand.

A higher oil price allows oil companies to incur greater costs in the extraction of oil. This, along with development of new technologies to make extraction easier, is why we see operations such as the tar sands in Alberta, which were once deemed too costly to be profitable, become major worldwide oil producers.

The relatively stable political climate is another reason for increased interest in Arctic oil extraction. As seen in Table 1, events such as wars or political uprisings can disrupt an oil supply and spike the world price upwards in a dramatic fashion. When oil prices spike upward, it can

drive an economy into recession, decreasing the demand for oil and eventually dropping the price, producing the yo-yo-like pattern seen in Table 1. It then understandable that a desire for a stable political climate in an oil producing nation is palpable in creating a steady crude oil price for growing economies to rely on.

Table 1



The Arctic is not without conflict; the very purpose of this paper is to bring to light the hazards that offshore drilling will present there. There is significant opposition to arctic drilling from environmental groups and if there were to be one major oil drilling disaster in the Arctic, it would likely disrupt production for all Arctic drilling operations and be cause for serious re-evaluation of practices.

But Canada, US, Russia, Greenland and Norway are countries that enjoy relative political stability and a suitable business climate for oil companies. To be sure, no one can predict what a

windfall of oil revenues could do to a country with a lack of political infrastructure like Greenland or with the quasi-dictatorship of Russia. But when compared to countries stricken with conflict such as Libya, Iraq or Nigeria, the Arctic countries offer what appears to be a suitable venue for oil extraction.

This paper suggests that if you are faced with either operating in the most extreme war-torn conditions that mankind can create or the most extreme environmental conditions that mother earth can create, rather than choosing the lesser of the two extremes, another line of work might be a better option.

The Most Dangerous Place in the World to Drill

Despite being in just the beginning stages of Arctic oil drilling, we have witnessed a sufficient number of incidents and close calls to suggest that oil companies do not yet have the technology or expertise to operate in the extreme weather conditions of the Arctic.

Shell's 4.5 billion dollar operation in the Gulf of Alaska has seen near collisions of icebergs and oil rigs, operation-halting damages to safety equipment during testing and most recently the grounding of an oil rig being towed during a storm in the Alaskan shipping lanes. Pending a review of safety procedures by the Environmental Protection Agency, Shell still plans to forge on and commercially export oil from the Arctic.

Months of winter darkness, heavy fog and sudden weather changes bringing on gale-force winds and storms are frequent climactic conditions in the Arctic. In the summer, heaving ice floes in high winds can crush vessels with little warning. Robert Meneley, a geologist who worked in the

Canadian Arctic for Panarctic Oils in the 70's and 80's says a warmer climate in the most northern parts of the Arctic isn't going to make things easier: "Even in the 1970s it wasn't safe to go out offshore and shoot seismic surveys. The ice was just too mobile. It's even more mobile now" (Jaremko, 2008).

Indeed, the "ice free summers" that the climatologists are predicting in the Arctic are a bit of a misnomer. Ebinger & Zambatekis (2009) explain that the longer standing multi-year ice is receding in the Arctic but the uncharted "younger" ice is now freely floating and much more difficult to navigate.

Oil Blowouts

The Deepwater Horizon operation, classified as an Ultra-Deepwater rig, drilled 10,685 meters into the seabed setting the record for the world's deepest oil and gas well in history (Transocean, 2013). While drilling an exploratory well, a blowout occurred that shot a series of explosions and gaseous firestorms out of the top of the rig. Eleven people died and the rig eventually sank to the ocean floor while thousands of barrels of oil gushed from the exposed well, causing one of the worst oil-related environmental catastrophes to date.

Blowouts most often occur in the initial stages of oil extraction, when drilling the exploratory wells of a reserve. Because hydrocarbons are lighter than water and under immense pressure, when the reservoir is tapped, the oil shoots upward in a geyser like fashion. A blowout is not uncommon; there have been forty-nine notable offshore oil blowouts since 1955, with Deepwater Horizon being the largest (Oil Rig Disasters, 2013). Modern oil drilling technology has developed blowout preventers which can typically "kill" blowouts before they begin, but as

demonstrated in the Deepwater Horizon operation, there are still uncertainties in any drilling environment, let alone one as unpredictable as the Arctic.

Because the first exploratory wells drilled into a reservoir run the greatest risk of a blowout, it is imperative that this does not occur in the first attempts to drill into Arctic offshore reservoirs, which are classified as Ultra-Deepwater, similar to Deepwater Horizon (Porta & Bankes, 2011).

After several failed attempts, the Deepwater Horizon blowout was temporarily capped; then a relief well was drilled in two months time to allow the pressure from the reservoir to escape, finally killing the blowout. A relief well is the most effective way to kill a blowout, but is also time consuming and costly. Canada's NEB policy on mandatory same season relief wells has prompted heavy dispute from offshore license holders. This is discussed further in the Policy Recommendations section.

Arctic Oil Spill Response

"If a major spill were to occur in Arctic waters, cleanup crews would have to spend, on average, three to five days of each week simply standing by, watching helplessly as the blowout or spill continued to foul fragile Arctic ecosystems."

- Rob Powell, Director, Mackenzie River Basin Program, WWF

The Deepwater Horizon disaster spilled roughly 4.9 billion barrels of oil into the Gulf of Mexico, spreading over an area between 6500 and 180,000 square kilometers in the process (Hoch, 2010). Despite a world-class effort utilising skimmer ships, floating containment booms, anchored barriers, sand-filled barricades and chemical dispersants, the spill ravaged the marine and coastal

landscape, killing thousands of animals and mammals and sacrificing the livelihood of fishermen and other citizens who rely on the coastal environment for a living (Tangley, 2010).

Cleaning up an oil spill is a difficult enough task in the best of conditions, but once applied to the harsh environment of the Arctic, the problems compound. Unpredictability in how the oil will react in an Arctic environment, the inapplicability of conventional oil spill cleanup methods, extreme weather conditions hampering response teams and an infrastructure incapable of supporting a large scale cleanup effort make the Arctic an extremely inhospitable region for an oil spill cleanup.

Spilling Oil in the Arctic

In an interview with the Guardian (Vidal, 2012), Peter Wadhams, a polar ice ocean physicist from the University of Cambridge, describes how oil can spread differently in the Arctic than it would in more temperate climates.

First, oil in colder temperatures will have a longer duration before dissolving than it would in non-arctic regions, leaving the toxic substance more time to poison a greater number of living organisms and environments. Compare this with the warm climate of the Gulf of Mexico, where nearly three years after the Deepwater Horizon incident, effects are still being seen with double the yearly mortality rates of whales and dolphins, bans on commercial shrimp fishing still in place due to toxicity rates and traces of oil on the sea floor still present.

Second, oil can freeze to or become trapped under passing ice floes. This makes visually tracking an oil spill much more difficult and allows for the possibility of ice floes to carry oil hundreds of

miles away and not release it into the ocean until spring thaw. Wind patterns, another method used to track the movement of an oil spill, are significantly more volatile in Arctic regions as well, contributing to the unpredictability of the dispersion of the spill.

Responding to the Spill

Not only will oil in an Arctic setting last longer, travel further and be more difficult to track, but utilising the conventional methods for oil spills will be increasingly difficult. The World Wildlife Fund, commissioned by the NEB in reviewing the Arctic drilling safety regulations for Canada, estimated that hazardous environmental conditions would place severe limitations on the conventional methods for oil spill cleanup in a number of ways:

- Burning the oil slicks, a primary method, is impossible in winds higher than 36km/h.
- Chemical dispersants, used to break up the spill are ineffective in waves higher than 3 meters
- Extended periods of fog prevent aircraft operation, essential in directing a response and dropping dispersants.
- Booms and skimmers, which trap and remove oil, are marginally effective in water that is ten percent or more covered in ice.

Taking these limitations and applying them to twenty years worth of data on climactic conditions in the Beaufort Sea and the Davis Strait, the report suggests that in June, the most favorable season in the Arctic, a spill response effort would be impossible twenty and twenty-seven percent of the time, respectively. In November, it would be impossible sixty-five and eighty

percent of the time, respectively. Between December and May, recovery efforts would not be possible at all.

The US Geological Survey (2012) has also advised that significant research has to done on the efficacy of dispersants in an Arctic setting, as the colder water may make it less effective.

Infrastructure

When weather does permit an oil spill response to take place, it will be yet another hurdle to accommodate such a large scale effort in the desolate infrastructure of the Arctic.

During the 86 days of the Deepwater Horizon spill, thousands of vessels were being deployed daily from the well developed system of ports, roads and airports along the coast of the Gulf of Mexico. Emergency personnel, spill experts, government officials and media filled the coastal towns of Louisiana.

In Arctic areas like the Chukchi Sea near Alaska, where Shell is drilling, Coast Guards can be as far as one thousand miles away and the nearest towns and ports lack the lodging, deep sea ports, runways and icebreaking ships to handle a large scale emergency response effort (Heath, 2012).

Thad Allen, the Coast Guard Admiral who led the response for the Deepwater Horizon spill and Fran Ulmer, former lieutenant governor of Alaska both stress in Zeitvogel (2011) that the construction of this kind of infrastructure is imperative for responsible oil development to progress in the Arctic and that if the private sector or government isn't willing to develop it, then drilling should not take place. "At this point the lack of a forward operating base would be a significant impediment not only to oil spill response but to search and rescue," said Allen.

Considering a typical Arctic drilling season would last about 95 days before the ice cover became too dense to operate in, a spill late in the season would run the risk of being frozen over for the entire winter. Even worse, if it took 86 days to contain the Deepwater Horizon blowout in a region with favorable climactic conditions and superior infrastructure, how could an operator expect to kill a blowout in the inhospitable climate of the Arctic in less than 95 days, when the blowout would become frozen over? A hole in the Arctic seabed spewing oil for an entire winter underneath the frozen ocean is a nightmare scenario that would surely do irreversible damage to the unique and fragile ecosystem of the Arctic.

The Arctic Council

As the ice floes melt and human interests increase in the Arctic, awareness among the Arctic nations for the need of diplomatic council on Arctic issues has also increased. The Ottawa Declaration of 1996 brought together Canada, USA, Denmark, Finland, Iceland, Russia and Sweden to establish the Arctic Council as "a high level intergovernmental forum to provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of 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, 2013)

An essential component and permanent member of the Arctic Council is the Inuit Circumpolar Council (ICC), which represents over 150,000 Inuit residents from Canada, USA, Russia and Greenland. The ICC's principal goals are to "strengthen unity among Inuit of the circumpolar region; promote Inuit rights and interests on an international level; develop and encourage long-

term policies that safeguard the Arctic environment; and seek full and active partnership in the political, economic, and social development of circumpolar regions." (ICC, 2013) The ICC agrees with development of the oil and gas industry in the Arctic, as long as it is done in a culturally and environmentally sustainable fashion.

The Arctic Council has recognized that with increased human activity in the Arctic, the potential for accidents also increases. A treaty was signed in 2012 to agree on the coordination with one another in rescue efforts in the event of oil spills, sinking cruise ships, plane crashes or other major disasters.

The ICC supports this treaty but has its doubts in its execution, as Jimmy Stotts, the President of the ICC told CBC News (2011) "We're still waiting for somebody to prove to us that they can clean up an oil spill in the Arctic Ocean."

The Arctic Council is an essential step for development in the Arctic, as pooling resources together in a desolate infrastructure will undoubtedly reap external benefits. But, it is clear that further research has to be done on how to avoid an oil spill and what the effects of one would be in the Arctic before one can say that this will be the solution to a major oil spill in the Arctic.

Environmental and Social Impacts

An Oil Spill in the Arctic

As mentioned earlier, the cold water temperature, presence of sea ice and hazardous environmental obstacles of the Arctic allow an oil spill to persist there for a longer period of time than it would in more temperate climates.

The longer oil is present, the greater chance it has of coming into contact with the sensitive marine environment of the Arctic. Oceans North Canada (2013) explains that this can happen in a number of ways: If absorbed or ingested, its toxic properties can contaminate and kill wildlife; it can diminish the thermal properties of wildlife's feathers or fur, causing hypothermia and death; and if significant populations of wildlife or other resources are decimated in manners such as these, it can adversely affect other species that rely on them as prey and nourishment, causing a feedback loop of further decimation.

The largest oil spill to occur in near-arctic conditions was the Exxon Valdez spill of 1989, which killed an estimated 250,000 sea birds, 22 killer whales, 2800 sea otters, 300 harbor seals and thousands of fish (Oceans North Canada, 2013). Researchers have found oil present at the floor of Prince William Sound, where the spill took place and believe it is receding at "a rate of between zero and four percent a year and will likely persist for decades and perhaps even centuries" (Oceans North Canada, 2013). The Exxon Valdez spill has acted as the base study for which most data on oil spills are analyzed, but does not have similar enough climactic conditions or had enough time to provide clear enough insights into how oil in the Arctic will manifest itself.

Noise in the Arctic

With so much focus on the ultimate disaster of an oil spill occurring, it is important to remember that the increased presence of the commercial activities associated with drilling alone will disturb the Arctic environment.

Performed by oil and gas companies prior to drilling, seismic surveys involve sending high pressure sonic waves to the ocean floor. The response that bounces back gives an indication as to the presence of oil or gas below the ocean floor. These sonic waves introduce extreme noise into the otherwise quiet Arctic underwater acoustic environment, with a potential for causing long-term behavior and migratory changes in underwater mammals.

A study by Heid-Jorgensen, Hansen, Westdal, Reeves, & Mosbech (2013) found reason to causally link the death of roughly one-thousand Narwhal whales in 2008 and one-hundred in 2009-2010 to seismic testing being done in the path of their yearly migration route in Canada and Northwest Greenland. It is believed that the extreme noise from the seismic surveys in the migratory route delayed the Narwhal from leaving their summering waters until they were "lethally entrapped" by the rapidly forming ice of the fall and winter seasons.

Seismic surveys are not the only source of anthropogenic noise being introduced into the pristine waters of the Arctic. Noise from intensified shipping, icebreaking, drilling and other activities can have the similar effects on the marine environment as it did the Narwhal.

Northern Populations

Threats such as these not only put the environment and wildlife of the Arctic at risk, they also threaten the livelihood of thousands of Inuit people in the Arctic that maintain a traditional land-based dependence for food, clothing and income.

Land claim agreements between the Inuit and the Canadian Government give the Inuit governance and co-management authorities on oil and gas decision making processes to ensure sustainable northern development and wildlife preservation for future generations of Inuit people (Porta & Bankes, 2011).

Despite this, the nominations for offshore licensing areas proposed by industry and the auction process carried out by the Canadian Government do not include a formal mechanism for Inuit consultations. Porta and Bankes (2011) explain that because an environmental assessment of the area up for auction is not initiated until actual exploration by the auction winning operator begins, Inuit do not have access to the data and analyses on the impacts to the proposed areas until this time.

Consequently, Inuit views are often brought up after the operator has invested millions in license acquisition and oil and gas exploration activities (Porta & Bankes, 2011). This is poor practice as it does not take Inuit land claim governance seriously and generates avoidable conflict between industry and the Inuit.

Is it worth it?

The long history of affluence attained in the extraction of oil is an easy reference for a proponent looking to sway government opinion on regulation. Common rhetoric in these circles is the idea that carbon emissions do in fact contribute to global warming, but the damages from global warming are less imperative than the need for economic recovery in these times of recession. Therefore a windfall from oil extraction will help the economy, which in turn will allow investments to flow into new technology that can address long run issues like global warming.

However, it is becoming empirically, arithmetically and factually clear that the damages from global warming in the near future will impair any economic recovery beyond what the boons from oil extraction would hope to provide. The Stern Review (2007), to date the most rigorous and well-regarded independent economic analysis of the damages of climate change, finds that inaction in greenhouse gas reduction will, in the next ten to twenty years, begin to incur economic costs of anywhere between 5-20% of global GDP per year. That means in 2012 the global economy would have lost between 4 and 16 trillion dollars in a single year (CIA, 2012). Investors expect to see returns from Arctic oil in roughly the same time frame, but clearly not of the magnitude to outweigh costs such as these.

Conversely, the cost of abating carbon emissions is estimated to be around 1% of global GDP (Stern, 2007), a much smaller price than the alternative, but time sensitive in its effectiveness. Indeed, the long run benefit from incurring abatement costs now is difficult for governments to see when other, more seemingly pertinent issues are at hand.

This lack of foresight abroad has culminated into numerous failed attempts on the international stage to agree on a climate change action plan. The only success found in these attempts was an

agreement in the 2009 Copenhagen Accord which stated that the Earth's temperature should not increase by more than 2°C, as this would cause catastrophic damage worldwide (UNFCCC, 2009).

While no action was mandated to avoid this critical point, scientists have estimated that the theoretical "wiggle room" mankind has before reaching this upper limit is the emission level of 565 more gigatons of carbon into the atmosphere. Anything beyond that will increase the Earth's temperature by more than 2°C. This estimation of 565 gigatons is unsettling when taking into account the proven reserves of coal, oil and gas in the Earth equates to 2795 gigatons of carbon emitted into the atmosphere, five times the limit of the Copenhagen Accord (McKibben, 2012).

These 2795 gigatons of carbon emissions also equate to roughly 27 trillion dollars in assets for the companies who own them (McKibben, 2012). These are the economic boons that oil producers are willing to fight tooth and nail for and hail as the economic liberator of our troubled times.

If the leaders of the world are serious about maintaining the 2°C rule, then they need to be serious about how much oil is extracted from the Earth. The 565 gigatons of emissions can be easily attained by extracting from the reserves of oil in the Albertan and Venezuelan tar sands (McKibben, 2012), they need not be found in new reserves. If extractions beyond this point will enable the incursion of damages to the Earth in catastrophic proportions - beyond the 27 trillion dollars in assets the oil companies hold underground – then there is no rational incentive for governments to pursue new oil extraction ventures anywhere, let alone in the pristine environment of the Arctic. It simply isn't worth it.

What was stated in the introduction of this paper is a sad realization in light of the above facts: that the magnitude of investment from private companies is too large to realistically see a complete moratorium on Arctic offshore drilling. The political will is too weak to ignore it. But in Canada, where Arctic oil is perhaps the least furthest along, the Government's policies will dictate how and if the extraction unfolds.

Policy Recommendations for Oil Drilling in Canada's Arctic

Maintain Same-Season Well-Relief Policy

After the BP Deepwater Horizon oil well blowout incident in 2010, the NEB underwent a complete review of its Arctic drilling safety regulations and maintained its same-season well-relief regulations on offshore drilling, a hotly debated issue amongst oil industry lobbyists and the NEB. The policy meant that before drilling in the Arctic offshore, operators would have to demonstrate that they could drill a relief well and cap a blowout within the same drilling season.

The oil companies argued the policy was impractical, infeasible and would keep drilling operators out of the Canadian Arctic for the foreseeable future. If a blowout were to occur late in the season, it would be nearly impossible to drill a relief well before the drilling season lapsed. Because wells are generally 500 million dollars or more to drill, it was not cost-effective to have a relief well ready for each primary well.

This was good news for the people wishing to preserve Canada's Arctic from the potential pitfalls of oil drilling, but did not support the oil industry or the Canadian Government's intention for resource development in the North.

Initially, the NEB insisted that this was the price that companies would have to pay if they wanted to drill in such an environmentally sensitive area. But after intense scrutiny from oil companies who held licenses in the Canadian Arctic, the NEB allowed operators to depart from the rule if they had an alternative method that would "meet or exceed the intended outcome of the policy" (McCarthy, 2012). The NEB has stressed that the ability to cap a blowout in the same season is paramount and that increased blowout prevention will not replace this condition, as several oil companies have argued for (Stade, 2010).

Currently, no license holders in the Canadian Arctic have demonstrated an alternative method that satisfies these criteria. Chevron is developing what they call an "advanced well kill system" that can cut through the pipe of a drill and cap the well and Conoco is engineering a system that caps the blowout from the sea floor. It will be up to the discretion of the NEB in determining if these techniques will be acceptable alternatives.

Environmental groups WWF Canada and Ecojustice pointed out in their NEB submissions (McCarthy, 2012) and we have seen in the failed attempts at capping Deepwater Horizon, that none of these techniques or their improvements have been proven to be 100% effective. The potential for a blowout to occur throughout an entire winter still remains.

The NEB must remain steadfast on their same-season well relief policy, as it is currently the only method that will effectively kill a blowout within a season. The potential for error from new

alternatives to relief wells remain too high in the volatile Arctic environment, as disasters have occurred in more docile places.

Rick Steiner, a marine specialist who tracked the Exxon Valdez spill, asserts that if the Deepwater Horizon platform had a relief well in place, the blowout would have lasted a matter of days instead months. In the Arctic, this could be the difference between a blowout lasting a few days or an entire winter.

Develop Arctic Standard Technologies for Oil Spill Cleanup

The ineffectiveness of standard oil spill cleanup technologies in Arctic conditions is staggering. New methods need to be developed that can effectively cleanup an oil spill in the hazardous weather conditions of the Arctic.

Before approval to drill, the NEB must require oil companies to demonstrate methods that effectively cleanup oil spills in seas with ice coverage and hazardous weather conditions. Giving an oil company permission to drill without an effective method for cleanup is irresponsible and not sustainable in any manner.

Increase Liability Cap on Drilling Operators

If things do go wrong and an oil spill occurs in Canada's Arctic waters, implementing all the previously mentioned techniques, however ineffective as they may be, will cost millions, or even billions of dollars, depending on the severity of the spill. Having Canada's final frontier of Arctic

pristine destroyed by a cataclysmic oil spill is bad enough; leaving Canadian taxpayers to foot the bill of its cleanup would be adding insult to injury.

Currently, there is no cap on liability for offshore drilling if the operator is at fault or found of some degree of negligence. But if the spill were to occur as a result of an act of nature or non-negligence on the part of the operator, then the operator is responsible for a maximum of $40 million, anything beyond that is paid for by the Canadian Government (National Energy Board, 2013).

Considering the unpredictable hazards of the Arctic that this paper has described, the probability of an act of nature causing a major accident, even when the operator is exercising due diligence, is quite high. Moreover, if the cap on liability of such an event is a mere $40 million, a fraction of the $1 billion BP has spent on securing licenses in the Beaufort Sea (Sambasvisam, 2012), then this poses a significant moral hazard for oil companies in preventing such an accident from happening.

It should be noted that the negative publicity an oil company would receive in the event of an Arctic oil spill would likely be enough incentive to do everything in their capacity to avoid a spill. In fact, it has prompted the French oil company Total AS to stay out of drilling in the Arctic all together, saying the risk was too high and "a leak in the Arctic would do too much damage to the image of the company" (Chazan, 2012).

But, clever marketing strategies can overcome the worst of tragedies. Twenty years after the Exxon Valdez spill, one of the most environmentally damaging in history, Exxon Mobil still remains one of the biggest oil companies in the world and even had the audacity to successfully appeal the US Supreme Court to reduce the damages they faced from $5 billion to $500 million

(Associated Press, 2011). After the spill, the company renamed its fleet of oil tankers so that they would not bear the company name.

BP was found to be at fault for the Deepwater Horizon spill and has spent upwards of $40 billion on its cleanup. Subsequent to this, the UK increased its liability to $250 million, the US Congress is debating on increasing it from $75 million to $250 million or $10 Billion and Greenland and Norway have decided to have no cap at all on offshore drilling liabilities. (Mcleod, 2013).

The argument against higher liability caps is that it will stifle competition and only attract the major oil companies that can provide proof of such financial capacities (Sambasvisam, 2012). But, if operators are going to be putting the environment at such great risk, the last thing we want to see is a company who cannot pay the bill and declare bankruptcy upon the event of an oil spill.

Therefore it is imperative that the Canadian Government increases its absolute liability on offshore drilling in the Arctic to the international standards being set by the UK, Greenland and Norway. Otherwise, a moral hazard presents itself and the Canadian Government bears the risk to pay for a massive cleanup effort.

Ensure fair representation of Inuit populations

When the nomination process for areas to be put on auction for license occurs, an environmental impact assessment should be carried out before the area goes to auction. This allows the government and the Inuit populations of the Arctic to be well informed of the impacts of oil drilling in those areas. Having the impact assessment take place after the bid is secured is a

regressive practice, as Inuit consultation is then taken as an afterthought to the operator's development plan.

Having an environmental impact assessment occurring during the nomination period and allowing a formal mechanism for well-informed Inuit representation and input into the nomination process, allows the voice of the Inuit population to be better represented in choosing areas for offshore oil and gas drilling. Since the Inuit of the Arctic stand to lose the most in the event of an oil spill disaster, it is imperative that they are a key component in the development of the oil and gas industry in the Arctic.

Conclusion

There is a lot to gain and even more to lose in the development of the oil and gas industry in the Canadian Arctic. This paper has given a history of how this gold rush for oil in the Arctic came to be and provided description of some of the scenarios that could occur with such development. It is clear that the oil industry does not yet possess the technology to successfully clean up an oil spill or contain a blowout in the best of conditions, no less the hazardous environment of the Canadian Arctic.

In the recession that the global economy currently faces, a new industry like Arctic oil is touted to governments as the economic liberator. It represents the creation of thousands of jobs, revenues and development in areas which Arctic countries are keen to assert their sovereignty over.

But, this paper has shown that the windfall of revenues from oil extraction can no longer be used as an argument against the damages of global warming. The 2°C threshold allows 20% of the current proven global oil reserves to be extracted and emitted. Anything beyond that will incur catastrophic damages to the Earth from which any potential benefits from oil will not overcome.

And so the eternal battle between helping a crippling economy and saving a declining environment rages on. While the two are not mutually exclusive and in fact directly correlated with one another, the short sighted vision of some politicians will ensure the complete destruction of both.

The Governor of Alaska, Sean Parnell makes his stance quite unambiguous, calling EPA safety reviews and appeals for better infrastructure in the Arctic as the "federal government dragging its feet, killing jobs and making us even more reliant on oil from the Middle East and elsewhere" (Zeitvogel, 2011).

The policy recommendations in this paper hinge on the inability of the oil industry to safely extract oil from the seabed. The NEB must maintain its same-season well relief policy, as any other alternative risks the possibility of another “unforeseen” catastrophe to occur. This policy could cripple the oil industry in Canada’s Arctic, but an event like an oil spill would cripple the tangible, irreversible features of the Arctic that cannot simply evoke a new marketing strategy or change its name to get past the damages it has sustained.

There have been enough offshore oil disasters in the most benign environments on Earth; there is no need to introduce these activities into the most inhospitable environments which are among the most pristine and untouched on Earth.

References

Arctic Council (2013). About the Arctic Council. *Arctic Council*. Retrieved from http://www.arctic-council.org/index.php/en/about

Associated Press (2011, March 8). Exxon Mobil wins ruling in Alaska oil spill case. *The Seattle Times.* Retrieved from http://seattletimes.com/html/nationworld/2014432776_apusexxonvaldez.html?prmid=related_stories_section

Broder, J.M. & Fountain, H. (2013, January 1) Breakaway oil rig runs aground in Gulf of Alaska. *The New York Times.* Retrieved from http://www.nytimes.com/2013/01/02/business/energy-environment/breakaway-oil-rig-runs-aground-in-gulf-of-alaska.html

Broder, J.M. & Krauss, C. (2013, January 8). Arctic drilling to be reviewed in light of accidents. *The New York Times.* Retrieved from http://www.nytimes.com/2013/01/09/us/arctic-drilling-to-be-reviewed-in-light-of-accidents.html?_r=0

CBC News (2011, May 12). Arctic Council leaders sign rescue treaty. *CBC News.* Retrieved from http://www.cbc.ca/news/canada/north/story/2011/05/12/arctic-council-greenland.html

Central Intelligence Agency (2013). The World Factbook. *Central Intelligence Agency.* Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html

Chazan, Guy (2012, September 25). Total warns against Arctic oil drilling, says spill risk too high. *The Globe and Mail.* Retrieved from http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/total-warns-against-arctic-oil-drilling-says-spill-risk-is-too-high/article4568334/

Ebinger, C.K. & Zambetakis, Evie (2009) The geopolitics of Arctic melt. *International Affairs.* 85: 6. 2009 Blackwell Publishing Ltd.

Heath, Julia (2012, February 15). Preventing a Blowout in the Arctic. *Foreign Policy in Focus.* Retrieved from http://www.fpif.org/articles/preventing_a_blowout_in_the_arctic

Heid-Jorgensen, M.P., Hansen, R.G., Westdal, K., Reeves, R.R., & Mosbech, A. (2013) Narwhals and Seismic Exploration: Is seismic noise increasing the risk of ice entrapments? *Biological Conservation.* 158 (2013) 50-54

Hoch, Maureen (2010, August 2). "New Estimate Puts Gulf Oil Leak at 205 Million Gallons". *PBS NewsHour* (MacNeil/Lehrer Productions). Retrieved from

http://www.pbs.org/newshour/rundown/2010/08/new-estimate-puts-oil-leak-at-49-million-barrels.html.

Inuit Circumpolar Council (ICC) (2013) About ICC. *Inuit Circumpolar Council (Canada).* Retrieved from http://inuitcircumpolar.com/index.php?auto_slide=&ID=16&Lang=En&Parent_ID=&current_slide_num=

Jaremko, Gordon (2008, April 24) Arctic fantasies need reality check. *The Edmonton Journal*. Retrieved from http://www.canada.com/edmontonjournal/news/business/story.html?id=bfda2108-bf06-4a53-9c45-20b5eb36a34a&k=63243

Kucera, Joshua (2009, November). Oil on Ice. *The Atlantic.* Retrieved from http://www.theatlantic.com/magazine/archive/2009/11/oil-on-ice/307716/

Macleod, Paul (2013, February 7) Oil spill protection called good. *The Chronicle Herald.* Retrieved from http://thechronicleherald.ca/novascotia/661471-oil-spill-protection-called-good

McCarthy, Shawn (2012, September 6). NEB set to allow alternative to relief-well rule in Arctic. *The Globe and Mail.* Retrieved from http://m.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/neb-set-to-allow-alternative-for-relief-well-rule-in-arctic/article554429/?service=mobile

McDiamid, Margo (2013, January 30). Polluters to face greater liability for offshore oil spills. *CBC News.* Retrieved http://www.cbc.ca/news/politics/story/2013/01/30/pol-offshore-drilling-oil-spills-liability-cap.html

McKibben, Bill (2012, July 24). Global Warming's Terrifying New Math. *Rolling Stone.* Retrieved from http://readersupportednews.org/opinion2/271-38/12588-focus-global-warmings-terrifying-new-math

National Energy Board (2013, February 15). Arctic Offshore Drilling Review – Question and Answer. *National Energy Board.* Retrieved from http://www.neb-one.gc.ca/clf-nsi/rthnb/pplctnsbfrthnb/rctcffshrdrllngrvw/rctcffshrdrllngrvwq1-eng.html

Nilsen, Thomas (2012, September 20) MPs seek Arctic drilling moratorium. *Barents Observer.* Retrieved from http://barentsobserver.com/en/energy/mps-seek-arctic-drilling-moratorium-20-09

Oceans North Canada (2013). Arctic Oil Spill Effects. *Protecting life in the Arctic.* Retrieved from http://oceansnorth.org/oil-spills

Oil Rig Disasters (2013) Offshore Blowouts. Retrieved from http://home.versatel.nl/the_sims/rig/i-blowout.htm

Petterson, Trude (2012, August 24). Greenpeace occupying Prirazlomnoye platform. *Barents Observer*. Retrieved from http://barentsobserver.com/en/arctic/greenpeace-occupying-prirazlomnaya-platform-24-08

Porta, L. & Bankes, N. (2011) Becoming Arctic Ready: Policy Recommendations for Reforming Canada's Approach to Regulating Offshore Oil and Gas in the Arctic. *Pew Environment Group*. Retrieved from http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/PewOilGasReport_web.pdf

Riannon, John (2011, September 8) WWF report shows limited response possible to Arctic oil spill. *WWF Canada*. Retrieved from http://www.wwf.ca/?9984/WWF-report-shows-limited-response-possible-to-Arctic-oil-spill

Rubin, Jeff (2012, September 23). How high oil prices will permanently cap economic growth. *Bloomberg*. Retrieved from http://www.bloomberg.com/news/2012-09-23/how-high-oil-prices-will-permanently-cap-economic-growth.html

Sambasivam, Bud (2012, December 9) Hey taxpayers, guess who foots the bill for Arctic oil spills? *The Huffington Post*. Retrieved from http://www.huffingtonpost.ca/bud-sambasivam/canadians-pay-oil-spill_b_1869416.html

Snow, Nick (2012, December 12). Watching Government: Norway's Arctic Approach. *Oil and Gas Journal*. Retrieved from http://www.ogj.com/articles/print/vol-110/issue-12/general-interest/watching-government-norway-s-arctic.html

Staalesen, Atle (2012, September 19). At Prirazlomnoye, more scandals but no oil. *Barents Observer*. Retrieve from http://barentsobserver.com/en/energy/prirazlomnoye-more-scandals-no-oil-19-09

Stade, Kirsten (2010, June 3). BP bucked Canada's same season well relief policy. *Public Employees for Environmental Responsibility*. Retrieved from http://www.peer.org/news/news-releases/2010/06/03/bp-bucked-canada%E2%80%99s-same-season-relief-well-policy-/

Stern, Nicholas (2007). The Economics of Climate Change: The Stern Review. Cambridge University Press, 2007.

Stoltz, A.C. & Berglund, N. (2013, January 9). Arctic drilling dispute heats up. *Views and News from Norway*. Retrieved from http://www.newsinenglish.no/2013/01/09/arctic-drilling-dispute-heats-up/

Tangley, Laura (2010, April 30). "Bird Habitats Threatened by Oil Spill". *National Wildlife* (National Wildlife Federation). Retrieved from http://www.nwf.org/News-and-Magazines/National-Wildlife/Birds/Archives/2010/Oil-Spill-Birds.aspx.

Transocean (2013) Deepwater Horizon drills world's deepest oil and gas well. *Transocean Website*. Retrieved from http://www.deepwater.com/fw/main/IDeepwater-Horizon-i-Drills-Worlds-Deepest-Oil-and-Gas-Well-419C151.html

United Nations Framework Convention on Climate Change (2009) Report of the Conference of the Parties on it 15th session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part Two: Action taken by the Conference of the Parties at its 15th session. *United Nation Office at Geneva.* Retrieved from http://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600005735

U.S. Geological Survey (2008). Circum-Arctic resource appraisal: Estimates of undiscovered oil and gas north of the Arctic Circle. *US Department of the Interior*. Retrieved from http://pubs.usgs.gov/fs/2008/3049/

U.S. National Snow and Ice Data Centre (2012). Arctic sea ice news and analysis. *National Snow and Ice Data Centre*. Retrieved from http://nsidc.org/arcticseaicenews/

Vanderklippe, Nathan (2012, May 16). Reviving Arctic oil rush, Ottawa to auction rights in massive area. *The Globe and Mail.* Retrieved from http://www.theglobeandmail.com/news/politics/reviving-arctic-oil-rush-ottawa-to-auction-rights-in-massive-area/article4184419/

Vidal, John (2012, September 17). Arctic expert predicts collapse of sea ice within 4 years. *The Guardian*. Retrieved from http://www.guardian.co.uk/environment/2012/sep/17/arctic-collapse-sea-ice

Watson, Traci (2013, January 11). In Kulluk's wake, Deeper Debate Roils on Arctic Drilling. *National Geographic News.* Retrieved from http://news.nationalgeographic.com/news/2013/130112-in-kulluks-wake-deeper-debate-roils-on-arctic-drilling/

Zeitvogel, Karin (2011, February 7) US not ready for Arctic drilling, says officials. *American Free Press.* Retrieved from http://www.google.com/hostednews/afp/article/ALeqM5ig_Sox25wAcsxe6kAUZDBQW2rkCQ?docId=CNG.30a945d880fb0c467a82e584423dac3f.21