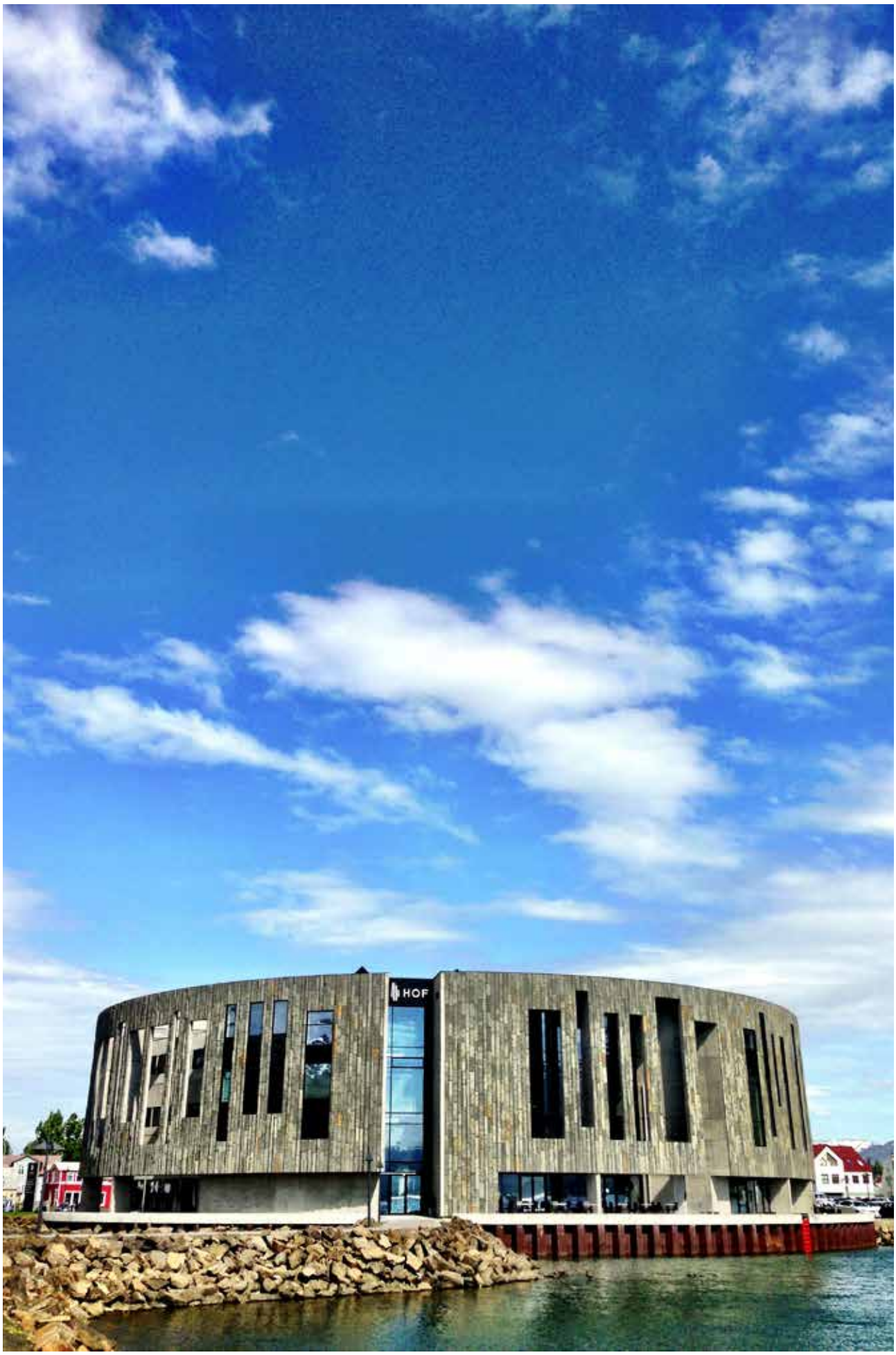
2013 ARCTIC ENERGY SUMMIT

Executive Summary

RICHNESS
RESILIENCE
RESPONSIBILITY

An Endorsed Project of the Arctic Council's SDWG

ArcticEnergySummit.com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Arctic Energy Summit Executive Summary

Energy is a fundamental component of sustainable development and is a crucial element of both human development and economic activity, balanced against protection of the environment and respect for traditional ways of living. The Arctic is full of energy resources – from oil and gas to renewable resources such as wind, solar, hydrokinetic and geothermal – yet peoples of the Arctic pay some of the highest energy prices in the world.

To take advantage of great energy and resource wealth potential, policy makers, community leaders and the private sector must work together to develop resources safely, facilitate access to affordable energy, and develop policies balancing risk mitigation, cultural integrity and economic opportunity. The Arctic is poised to take advantage of a changing market in a changing world; however, it is clear the region faces many daunting obstacles.

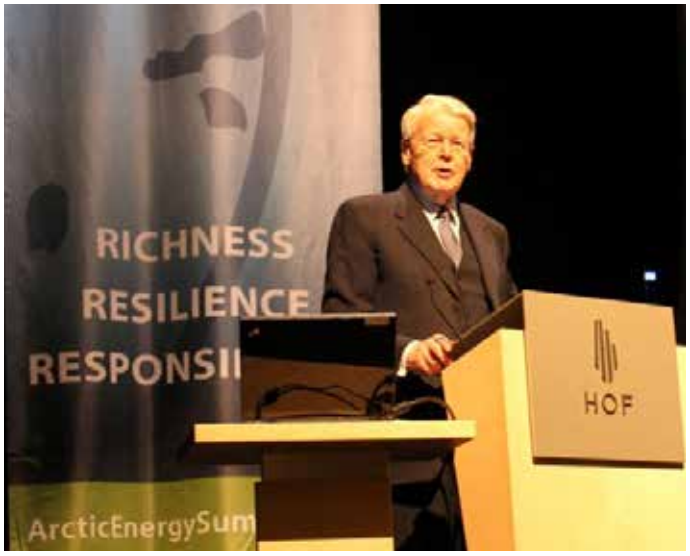
This dilemma provides the context for the Arctic Energy Summit's themes of Richness, Resilience and Responsibility. Moving forward, we must understand the challenges and difficulties associated with developing great energy wealth and seek to ensure this development is done for the benefit of Northern peoples. The Summit's sessions delivered a variety of perspectives and guidance for the future, namely responsible development and utilization of Arctic energy resources have great potential to spur community and economic resilience.

The 2013 Arctic Energy Summit produced interactive, meaningful cross-governance engagement and cross-sectorial communication among participants. The findings resulted in practical recommendations for the Arctic Council, particularly the Sustainable Development Working Group (SDWG). The proceedings from the Arctic Energy Summit serve as an action plan to address knowledge gaps and research questions; propose practical project ideas; and find solutions to challenges. The recommended program of action includes the following recommendations:

1. Examine impacts of (national, regional, micro) grid connectivity to social and economic development;
2. Inventory government fiscal support for non-renewable and renewable energy;
3. Study impact benefit arrangements of local communities and resource development projects;
4. Produce a guide to the lessons learned from policies that facilitate renewable energy adoption;
5. Consider methods for developing a dedicated financial vehicle (e.g.; Arctic Development Bank or Arctic Resilience Fund) to support renewable energy, local development, and community resilience;
6. Support development of a scenarios planning Arctic Risk Map assessment showing potential origin, probability, and consequences;
7. Assess and map renewable energy sources, which can be overlaid on existing oil and gas mapping:
   a) Development of an energy development and distribution roadmap;
8. Review the energy regulatory regimes impact on social, economic and cultural development;
9. Evaluate stake/rights-holder engagement and effective consultation practices;
10. Develop a best practices guide for northern energy efficiency (engineering, architecture and design).

Arctic Energy Summit – Proceedings

Welcome by President Ólafur Ragnar Grímsson, Iceland



A vast majority of the common wealth in the Arctic is commonly-owned. Because of this, we must protect the environment while simultaneously working towards economic and community prosperity. Although the Arctic has recently become a multinational global issue, Arctic nations and peoples come to this discussion with a long history and a rich perspective.

The indigenous people know this territory better than any elected officials. When governmental entities assemble to discuss Arctic policy and development, they must realize the utilization of Arctic resources will not occur without coming into conflict and subsequent dialogue with the indigenous people who call the Arctic home.

According to the media, Arctic energy is really synonymous with oil and gas. The Arctic should be the region other countries look to when exploring clean energy and development. The Arctic is already a model of clean energy development and use. Alaskans, for example, have the opportunity to make Alaska the first state in the Union to power communities solely on clean energy. Greenland is also in a unique position because it can choose whether to be part of the Northern clean energy movement or the European clean energy movement.

We can use the Arctic's unique energy resources to transform our power into a model for other countries. It is a practical, natural, and realistic vision.

An Integrated Approach to Energy and Sustainable Development in the National Interest

"For Arctic nations, the aim is, a 'high North, low tension'.

Nations respond to and cultivate domestic values, interests and issues. This concept is no different when it comes to Arctic energy utilization and development. At the same time, it is important to realize the trickle effect international cooperation and sharing of best practices have on domestic policy. The Arctic is a model of cooperation, but more importantly the Arctic has potential to be a model in its use and development of sustainable energy resources.

Core elements to Arctic policy exist in all eight Arctic nations. To begin with, there is a consistent vision of a stable and prosperous Arctic; defined by healthy ecosystems, dynamic economies, sustainable communities and vibrant cultures. There is also a fairly widespread consensus on security, cooperation, and the determination to balance development and the health of ecosystems. With responsible energy development, Arctic nations can safeguard environmental and other forms of security in the region.

Of considerable interest, however, is what benefit development will bring to societies, the direct and meaningful engagement of stakeholders in decision-making, and to what extent risk is managed in the exploitation of Arctic energy resources. Furthermore, national governments have a role in strengthening public confidence as well as spreading awareness of change and activity increases.

Iceland is working to establish a state-owned oil company which will provide licenses for oil and gas companies and ensure extraction is utilized for all people. This is a long term project, and the sector still must develop a regulatory system and framework, while preparing the bureaucracy for what may come in the following years. Iceland's oil prospects will also have to consider the risk involved, including with risk to state investment.

U.S. energy development must be environmentally sustainable and respect open market principles, while taking into account indigenous communities and traditional knowledge. There is a collective interest in sustainable development, subsistence and respect for the local cultures. The U.S. strategy includes (1) Coordination to improve certainty; (2) Direct cooperation with stakeholders; (3) Science based decision-making; (4) Adaptive approaches by ongoing research and activities; (5) Region-wide planning; and (6) Focus on human impacts in the region. With respect to these, it is important that the Arctic Council not add on unnecessary levels of bureaucracy. The mandate in the Arctic is to improve how governments and stakeholders work together to assure sustainable development without unnecessary problems that can accompany burdensome regulatory interference.

Canada believes energy is a fundamental element in developing a sustainable Arctic. Increased oil and gas development could result in possible negative impacts on the fragile environment and people who live there due to the growth of local populations and an increased risk of oil spills and shipping activity. Consultation with communities shows they recognize the role of energy and how it can help economic development. With this in mind, safety and environmental protection are at the forefront in protecting Canadian communities.

It is important to deal will public perceptions and ensure governments are prepared to address challenges while maintaining public confidence. The themes of the Arctic Energy Summit are in line with Canada's vision: A stable region with economic growth and vibrant communities living in healthy ecosystems.

*RP3 process under EPPR important cross-cutting theme for SDWG to be involved in.

Opportunities come with major projects in the form of generating lower costs, while also improving the energy self-sufficiency of communities. Local communities must be connected to the grid in order to access renewable energy. Increased economic development and opportunity can truly aid communities when this happens.

*Grid connectivity – impact on community and economic development

Nations are overwhelmingly concerned for indigenous communities of the North and recognize solutions must work for communities that are at the forefront and most interested in bringing the right solutions in preparedness, prevention and response.

The Academic Sector

The Academic sector is critical for assessing policy, technology and applied research, while contributing to science-based decision-making. Research organizations have a role in conducting baseline assessments and mapping and must be supported by federal and state agencies, as well as private industry. Industry success rests on good data and technology, however, this sector is challenged to share both. The academic sector can help facilitate the sharing of data and technology between public and private entities.

In particular, local universities are essential. They are well placed to understand Arctic climate, equipment and operations, communications, field work, and local relationships-- including those with indigenous peoples. This is an often overlooked and underutilized strength of local universities. Arctic governments and industry groups should work to ensure universities are adequately funded.

Perhaps most importantly, the academic sector can help Arctic nations address outstanding questions, which include:

- How much of the energy resources in the region should stay or be available for export? How can a balance be struck to achieve sustainability?
- Impacts of development decisions on the Arctic: because it is a region that is relatively untouched, many anthropogenic influences will be exaggerated
- Models and scenarios involving water, climate, food and energy

The University of the Arctic is a large and young coalition of Arctic universities that can help facilitate R&D

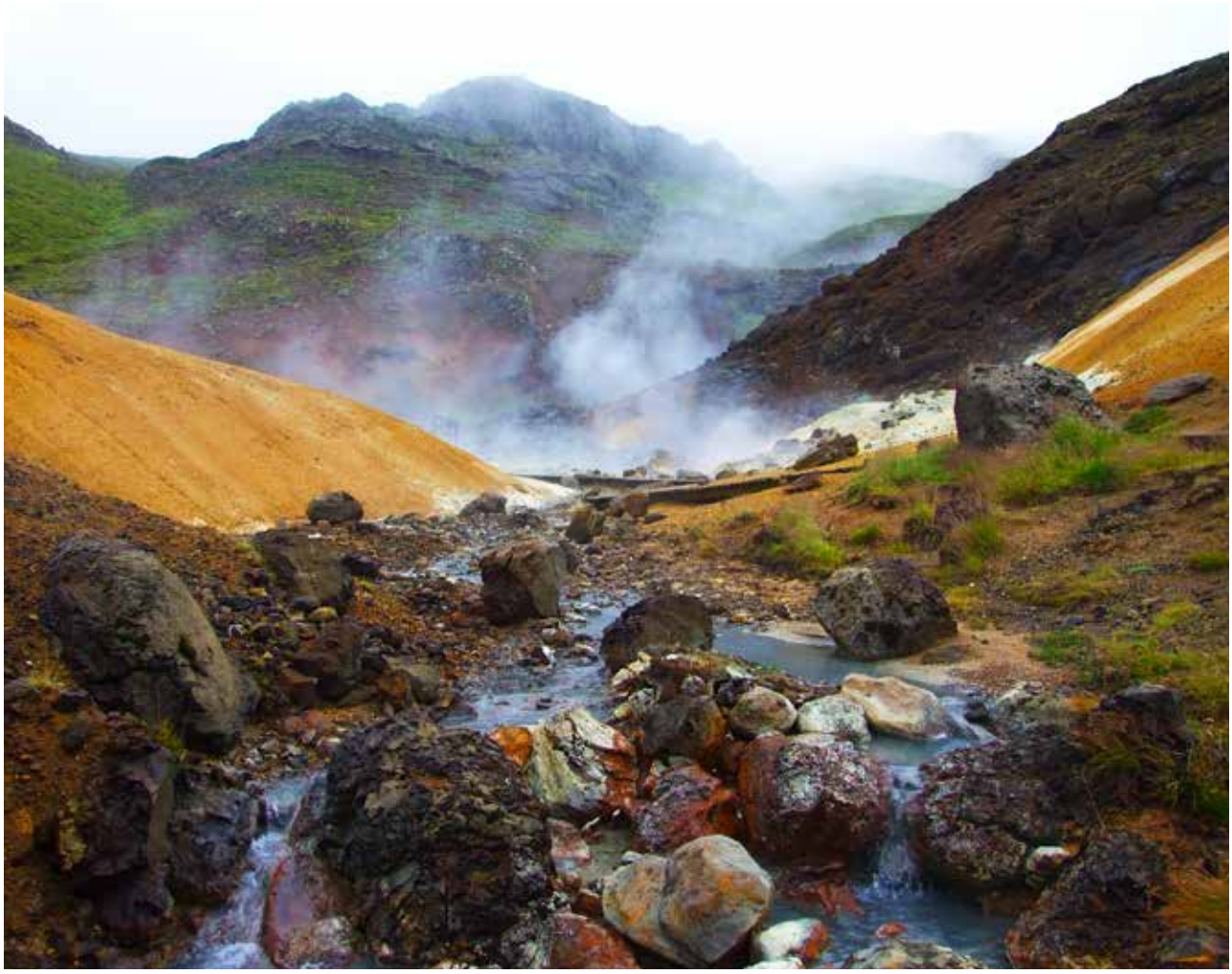
across the Arctic. It can feed educational opportunities between universities, develop common thematic areas, provide an arena for collaboration, and act as an independent thought leader.

Many Universities are pulling in large amounts of data and using them to assist with decision-making processes at the national level. Cooperation with public agencies is one method to build data sets as a means to decrease uncertainty and help nations manage risk.

Research Questions for Emerging Academics

"Young researchers should approach the Arctic with dramatic curiosity."

- Ensure that local stakeholders are engaged in development of research questions
- Better connect a research agenda to policy outcomes and decision-making
- Examine community and regional economic development strategies
- Remaining need for baseline assessments – need to understand what we're starting with
- Continued and increasing need to understand effects of climate change on Arctic ecosystems and peoples
- Utilize local and traditional knowledge in policy approaches
- Explore adaptive strategies for northern communities
- Address Land use and ownership, namely indigenous rights and their capacity to negotiate with industry
- Develop Societal well-being that includes employment and care for community and family



Arctic Energy Resources: Legal and Political Developments

Iceland

The role of Iceland's National Energy Authority, Orkustofnun, is to act as the public administrator of the energy sector and provide specialist services to the government. Orkustofnun issues power plan licenses, regulates the national grid, administers the fuel sector (encouraging the transition to low carbon fuels), and hosts the United Nations University Geothermal Training Programme.

For Iceland, ownership of resources is connected to ownership of land. A large part of the highlands and country are owned by state and municipalities, which ensure to a large extent that resources will be publically controlled. Energy resources cannot be sold from the state or municipalities to private companies, but an energy company can apply for a license to develop a project (whether it's a power plant or oil extraction). That process is managed through the Master Framework Plan. This framework allows a proponent to apply, go through an environmental assessment, receive a resource contract and utilization license, and receive consent from the land owner. Permitting happens within the bounds of time and bureaucracy.

The Electricity Act of 2003 diminished the role of the Icelandic state and a free market was encouraged develop electricity production. Electricity regulation provides a competitive environment. Electricity consumption is unique because the actual community and companies only consume about 20% of it - the other 80% is used by Energy Intensive Industries, such as the aluminum smelters.

Iceland is looking at pursuing oil and gas exploration by potentially producing offshore oil and gas northeast of Iceland (bordered with Norway territory; which has already been negotiated). Iceland is modeling the legal and regulatory framework of Norway, but with the understanding Iceland cannot take as big a role in early prospecting. For those who exploit oil and gas in Iceland, energy costs are higher but the tax is lower. It is worth highlighting that before the launch of its licensing rounds, there was an extensive study on environmental conditions published in 2007. All information is published and available online.

Norway

In Norway an initiative was funded to explore possible actions in the Barents Sea (2007). The Barents Sea is a prolific area of increasing interest. Technology needs to be further developed and cooperation is critical. The challenges (and potential pollution) transcend borders, necessitating Arctic nations working together and sharing information. Norwegian producers have generally had good experience in offshore projects, but onshore cold climate experience has only occurred in Russia. Russian onshore cold climate experience in conjunction with Norwegian offshore experience would potentially create a powerful collaboration.

Operations in the Barents Sea should be as safe – or safer – than what has happened in the North Sea. If North Sea operations are replicated for the Arctic, there will be a higher risk. This is not due to accidents occurring more frequently, but due to a more devastating impact if and when they occur. Probability of risk can be lessened by driving the likelihood of accidents down. Arctic nations should focus on standards and technology that bring down the likelihood of accidents so as to make it an acceptable operation.

Circumpolar knowledge-sharing must include:

- Experience and results from international standards' cooperation in Barents 2020
- Review of national/local regulatory process, as seen by regulator of host country
- Discuss safety regulatory approaches in light of Barents 2020, safety regulatory approaches of the North Sea and other issues of relevance

Regulatory regimes can be described as either 1) Performance – free use of any and all standards (national or foreign) that helps meet a specific goal and 2) Prescriptive – detailed requirements for how things will be done. There has been greater effort to improve safety approaches. Less regulation and regulations that are goal-based DO NOT damage safety performance; the Norwegian performance-based system has proven this. As part of the current discussion, it is important to realize there is a safety-based well control philosophy in

place. This includes automatic activation, with the possibility for manual override, and pre-defined safety-based activation (economics and liability influenced an override).

Some of the fields in the Arctic will definitely be safe enough to develop if governments and industry conduct rigorous risk management, utilize the best technology and practices, and collaborate across the public and private sectors.

Russia

In Russia oil Arctic oil and gas development encompasses the past, present and future. 20% of Russia's GDP is generated in the Russian Arctic, mainly from oil and gas. Russia has proved to be an important source of knowledge when consulting with partners and Arctic Council Soon, the first oil extracted from the ice-covered continental shelf will take place. This is the first act of human kind entering into the realm of Arctic

The Oil Spill Response instrument has become a major priority of Russia's. The Agreement is aimed at developing a step-by-step and multilateral industrial safety system in the High North with the main goal of the Agreement to strengthen mutual assistance. It commits states to establish national systems; furnishes procedures for mandatory notification and reimbursement; established measures for information exchange, exercises, etc.; defines particular procedures; developed a mechanism for regular meetings of parties, including (if appropriate) within the framework of the Arctic Council; and allow necessary flexibility.

Arctic Council

The Arctic Council Kiruna Declaration established a Task Force to develop an Arctic Council Action Plan on oil pollution prevention. Outcomes will be available at the next Ministerial meeting. The Arctic Council has created concrete guidelines, assessments, and operational guidelines on oil spill preparedness.

The EPPR Working Group has also focused on the RP3. It has recommended cataloging all applicable oil and gas standards for Arctic activities and facilitating oil spill prevention research and regulatory cooperation. It is worth noting that there have been other calls for standardization, as well as global best practices. Another approach may be to include regional or "neighborhood" standardization to better understand what is appropriate for each region.

The PAME Working Group has two ongoing health-based (performance-based) projects which promote a safety culture. PAME's Arctic Ocean Review is assessing all relevant international agreements for eight areas: indigenous peoples and cultures, shipping, marine living resources, offshore oil and gas, marine pollution, ecosystem-based management, and Arctic science. Recommendations from the AOR Oil and Gas section have called for standardization; harmonization (while respecting diverse circumstances); engagement (industry and local communities); and interaction (information exchange, monitoring).

There is great opportunity to share Arctic experiences through different types of undertakings and incentives to share that will produce economic outputs that industry is also interested in.

Dialogue

It is necessary to depoliticize the question of whether the development of energy resources in the Arctic can be done in a sustainable and responsible way. Experience in Alaska, Canada, Iceland, Norway and Russia proves there are long-time efforts underway to develop energy resources. Those experiences have provided negative externalities – which should be learned from – but there are enormous positive externalities. Evaluation of these efforts must be honest about both, and next steps include a step-wise approach. Hydrocarbon use will continue and is acknowledged to have an effect t on the environment. Four major elements are needed: 1) national responsibility 2) social/corporate responsibility 3) cooperation based on capacity and capability and 4) calculation of a long-term view on the issue.

This topic is fairly complex and different experiences and lessons cannot be generalized. Examining specific case studies should look at standards and emphasize research and cooperation focusing on major companies in addition to other areas. Other missing elements include:

- Let the economic interests finance and establish what needs to be done and let the industry pay and investigate what technology is needed; it is not something for rest of society to take up.
- No such thing as zero-risk; it's a fantasy in the Arctic there is no risk. The point is to get facts to understand risks so they can be managed and the public can understand the type of risk.
- The oil and gas industry and other industries should be brought together and into this process, because they have better understanding about potential risks and risk mitigation.

Small Technical Solutions

Feasibility study of wind to hydrogen system for Arctic remote locations – Grimsey Island case study

The goal of this study is to evaluate feasibility of wind turbines combined with hydrogen energy storage in Arctic regions. HOMER Energy Microgrid Power Design software is used to perform energy balance simulations and optimize the size of system components. Statistical data about energy consumption and wind resource on the Grimsey Island is used as a case study.

This project responds to estimated electricity prices of 0.65 $/kWh for Arctic remote communities; An acknowledgement forecasts oil prices are not optimistic and is an overall challenge to decreasing the price of energy in the Arctic. Wind-Hydrogen Systems are increasingly used as a means to deliver affordable and stable energy prices. There are projects in Utsira, Norway; Ramea, Canada; and Unst, Scotland.

This study produced a road map for renewable electricity generation with a gradual integration of wind-hydrogen infrastructure into a wind-diesel system. Hydrogen is used for seasonal energy storage, and the project can be introduced gradually, by first adding wind turbines to the existing diesel generator.

Russian Tidal Power Development in the Arctic Coastal Zone

This paper overviews tidal power development in the Russian Arctic including the Mezenskaya scheme in the Mezen Bay of the White Sea, the design of the Severnaya tidal power plant in the Dolgaya Bay on the Kola peninsula, and presents examples from the Kislogubskaya (Murmansk) pilot tidal power plant built in 1968 on the Arctic shore in the Barents Sea.

The project examined the reliability of different tidal power options - barrage, lagoon, and tidal stream. The barrage impounds the tide and then water released through a turbine to generate electricity. The scheme of the orthogonal turbine has a diameter of 5m, turbine shaft and generator for the Kislogubskaya TP (improves efficiency and economics). The location of the dykes, a powerhouse, concrete dam and rock fill dam on the Mezen Barrage IX is important.

Shore ice and large blocks of grounded ice and turrets can present numerous problems during the tidal low water. The main environmental problem is the method of construction and managing the decrease of water discharge. Also, the formation of the ice cover region in the basin connected with fresh water during summer and winter period affects salinity. Decreasing water discharge in a saline environment is important to limit any disturbance. Floating dam units are part of new dam construction.

Alternative Power and Energy Options for Arctic Infrastructure: A Case Study of CFS Alert

This summary paper describes ongoing work to investigate and assess alternative power and energy options needed to sustain operations and personnel at CFS Alert with an aim to reduce costs and environmental impacts. The site is comprised of approximately one hundred buildings, utilizing cogeneration diesel-generators for electricity and heat. A key activity of this study is to understand the baseline energy-use through the measurement of energy flows (electrical and thermal and the development of validated building energy models using TRNSYS v17, which have been used to identify various energy saving measures (e.g. building envelope improvements, efficient lighting and controls). Additionally, assessments of renewable energy technologies such as solar PV, wind, deep-well geothermal, and hydropower technologies and the use of sea-water heat pumps are also being investigated.

Diesel cogeneration units provide heat and electricity to the remote site. The goal of the project was to develop a strategy to reduce the use of diesel for electrical power and thermal energy based on baseline energy use. To do this, the project team worked to assess the viability of wind/solar/deep-well geothermal// hydro (tidal current); sea-water heat pump technologies/etc. An energy audit was conducted through site visits (building inspections, infrared camera inspections/blower door tests) and energy monitoring.

The objectives are targeted towards achieving reduced operational costs and environmental impacts by developing and validating energy models that can be used to identify potential savings in fuel. Solar and wind appear to be viable options while tidal current technologies are less developed. For these technologies to be viable, however, there has to be buy-in and a responsibility of how to use energy at the local level.

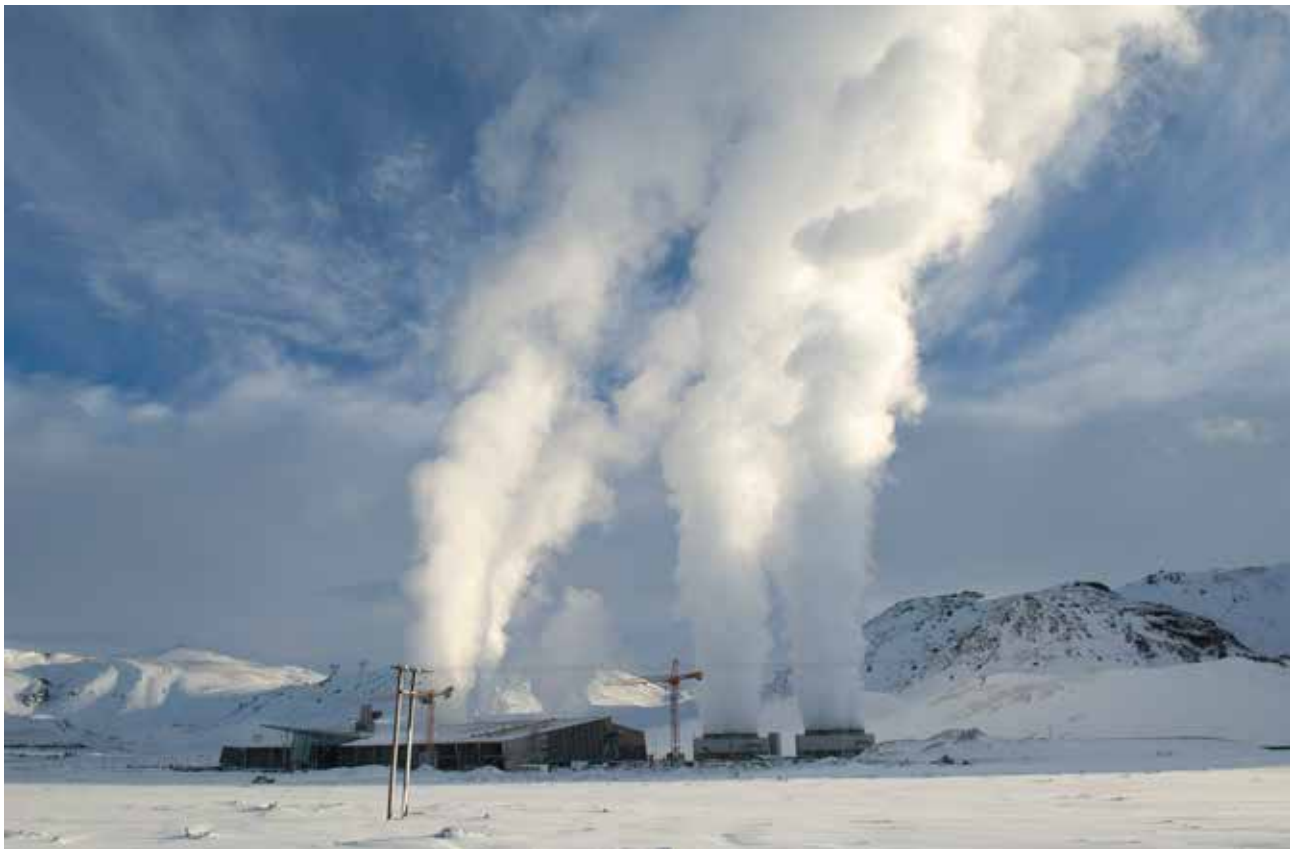
From Resupply to Self-Reliance—A Public-Private Partnership to Produce Geothermal Power in Alaska

Pilgrim Hot Springs is located approximately 50 kilometers from Nome, Alaska, and is currently being developed as a geothermal energy source. In early 2012, Nome received international attention when a Russian tanker resupplied the Arctic community with an emergency mid-winter fuel delivery. Coincidentally, the University of Alaska Fairbanks conducted significant research in the summer of 2012 regarding the suitability of the Pilgrim Hot Springs as a geothermal resource. A private developer is currently working with the landowners (a group of local Native organizations) and the City of Nome's utility system, embarking on a public private partnership to provide sustainable, affordable local power to the region. The collaboration offers a model for linking funding and resources in a way that can yield benefits to both investors and local residents.

The goal of the project is to solve energy dependence on expensive and imported fuel. This vision is consistent with values and a vision of energy self-sufficiency. Most importantly for local communities, the project has

the potential to produce affordable energy, thereby reducing utility bills, and expanding business and job opportunities. From a social perspective, there is an important consideration of local control.

Current research builds on efforts undertaken in the 1970s and 1980s. Stress tests currently underway will determine the capability of the wells to produce energy. The cost of the completed project will be approximately $40 million dollars and it will produce at least 2mW of geothermal energy, with a transmission line to Nome, delivering sustainable energy for the future.



Development of the North, for the People of the North

Public Sector (Canada)

It is often said that the Arctic is rich in resources (human, mineral, natural, etc.); these present both an opportunity and a challenge that is true on a circum-Arctic and national scale. One of the biggest questions facing Arctic decision-making is "How to engage Northerners and indigenous peoples in petroleum extraction?"

Canada has separated licensing responsibility from regulation responsibility; specifically, this is related to northern offshore areas of Nunavut and the Northwest Territories. Regulating oil operations is the responsibility of the National Energy Board, which ensures operations are safe and secure for human and environmental safety

The potential of oil exploration in Baffin Bay has generated great interest in the region and makes for a interesting case study. The region is sparsely populated and boarders the territory of Nunavut; the small and dispersed communities have little or no experience with oil and gas activities. Nunavut is covered by a comprehensive land claims act ensuring the rights and responsibilities to land claimants in the region (this extends 12 NM off shore). Additionally, aboriginal people can seek to extend rights beyond that 12 NM limit if there's cause. People who live here are primarily Inuit and have a strong desire to protect the region's resources and maintain a traditional way of living. There is also a strong interest to be meaningfully involved in decision-making.

The question remains of how to develop informed recommendations. The region is open to licensing of oil and gas regulation, which must take into account aboriginal organizations. It is proposed (though still in its infancy) to have conversations with stakeholders and those across federal and territorial government and Inuit organizations to engage in the development of strategic and environmental assessment of the region. A strategic assessment must actually be made. There should be the flexibility and potential to make this a broader initiative that engages the people of the North by building ownership of stakeholders in different ways:

- Develop understanding of richness that exists – undertake cross-cultural exchange (conduct scientific review of petroleum and natural resources, but believe there is a strong Inuit knowledge that can contribute to understanding of the region)
- Build capacity to be able to have this conversation – communities have no modern experience of oil and gas exploration but a strong passion for these resources; need to be able to develop within the communities an understanding of what it means to issue rights in the region surrounding this exploration (takes decades and checks and balances); oil and gas 101 needs to be brought to communities and Inuit knowledge 101 to others
- These two things will allow us to consider whether it's the appropriate time to issue license in the region and how to do that

While the risks are evident the benefits include training and jobs in the region. Communities should have a role in determining benefits at the local level. It is an Arctic nation's responsibility to engage stakeholders at federal, territorial and community level, all well building resilience within the system and being able to adapt to change.

Industry (ExxonMobil - US)

It is important for Arctic nations to understand the global energy outlook and how population trends impacting energy use (e.g.; tremendous growths in Asia and Africa). Additionally, energy use and the mix in fuel sources will increase over time as we move forward. This understanding has to be coupled with an awareness of the high cost of supply for Arctic hydrocarbons, which is driven by:

- Arctic technology development
- Extended season drilling capability
- Specialized well control, spill prevention, and oil spill response capabilities
- Subsea facilities to minimize surface-piercing structures
- Deep trenching capabilities

Industry focuses on workforce development, supplier development and strategic community investment when addressing issues of indigenous and local stakeholder engagement. It is incredibly important to incorporate indigenous and traditional knowledge in project planning, design, execution, and ongoing operations by ensuring open consultation with local communities.

Industry is keenly aware of the need to protect the Arctic environment, particularly in regards to local food systems. Industry must pay vigilant attention to food systems, namely the distribution and habitat of marine mammals (i.e.; walrus, whale, seals and polar bears). The private sector can bring new and innovative research to the table in order to track these issues. For example, by taking water samples in areas where there is less information and utilizing e-DNA analysis, industry is better prepared to understand the types of organisms present an area, while comparing it with catch data.

Academic/Nongovernmental (Iceland)

Perception, cooperation and risk are some of many terms that are used when talking about interconnected Arctic issues. It is clear that Arctic peoples are living in a dynamic transitional period with uncertain

pathways and impacts not specific to the Arctic. The implications are multidimensional and include impacts on infrastructure and access to potentially scarce resources. Transitions are rapid and have potential to be surprising. Arctic social systems must adequately adapt to changes in natural systems.

Adaptability to these changes and resilience at regional, national and local levels is key to managing this process. A focus is required to also develop systems that are not vulnerable (must be resilient), while recognizing that disturbance has the potential in a resilient community to develop new avenues for development. Local communities must have the capacity to maintain and operate these systems.

Rapid change can exert pressure on existing populations and infrastructure. This creates a degree local anxiety, increasing the potential for higher rates of social problems. Northern peoples must analyze power structures as a prerequisite for development. A thorough analysis and clarification of responsibility should be done in advance. Communities should clarify objectives and consider pathways carefully in each situation, while reconciling often contradictory objectives and multi-stakeholder cooperation. Cooperation can be challenged by different understandings and ways of perceiving the world around us, language and symbols, translation and identity.

Perception is a key to cooperation, reconciliation and resilience. It can be influenced by cognitive, cultural and environmental factors, usually shaped by learning, memory and expectation. Individuals are influenced by a multitude of factors and their perception is important when evaluating benefits and risks. Bringing all the risk related elements together will require incredible dialogue and cooperation. Arctic peoples face problems that are unstructured, complex, irregular, interactive, and adaptive.

"A society's pattern of vulnerability is a core element of disaster" – Anthony Oliver-Smith, Catastrophe and Culture, 2001

Indigenous (Russian, Sa'ami)

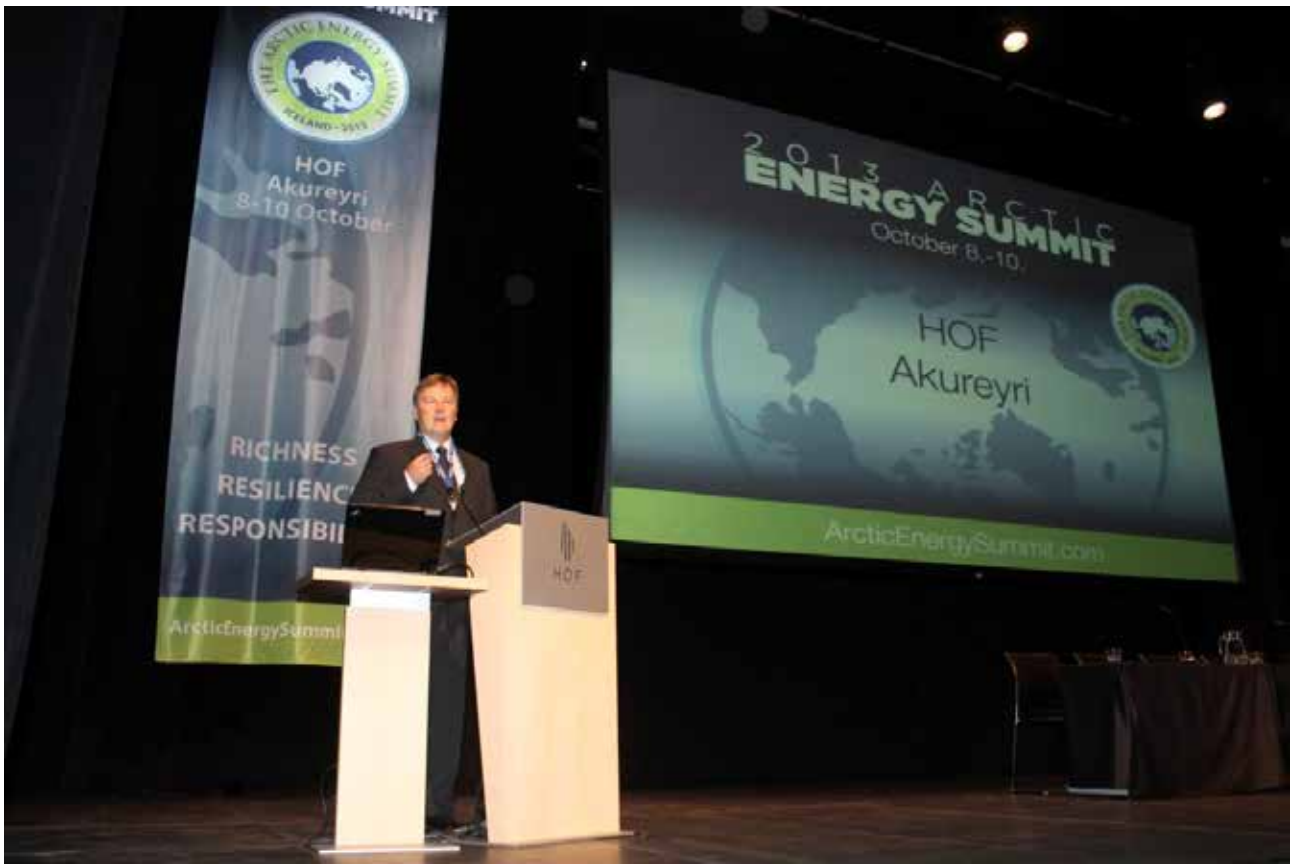
Questions about change in the Arctic and development have existed for decades and are ingrained in northern peoples' knowledge and experience. The Arctic habitats are particularly sensitive to change and disruption. It is generally understood that if a habitat is destroyed it can rebuild itself, though in the Arctic it takes more time or will never happen.

When exploring and developing Arctic resources, it is imperative governments and industries consider the uniqueness of the region and plan for long term multigenerational sustainability. Users of Arctic energy resources are inherently responsible for the careful management of the region and ensuring intergenerational equity. "Let all of us be reasonable in our use."

Dialogue

A major dilemma is the unequal relationship between local communities and industry when addressing sensitive issues. There is significantly more cooperation and interest in working together than conflict, however, a small community will rarely have the financial resources and capacity of resource development groups. The nature of the relationship assumes good intent and establishes mechanisms for cooperation. The leading principle should be to involve stakeholders early the project development processes, as means to develop training and capacity-building.

When Arctic communities are faced with resource development, many conflicting points of view arise. There is often a divide between those who value traditional lifestyles and those who prioritize economic development. The challenge in these instances is not allowing one view to dominate and ensuring the use and distribution of resources remains accessible to all in the community. Building capacity in Arctic communities requires a long term commitment and meaningful engagement with all stakeholders. Energy development in the Arctic can be viewed much like a puzzle where stakeholders represent a piece of the puzzle. Project proponents and governments must engage regularly with all communities. It is a time consuming process, but results in a more informed dialogue while building skills and knowledge (capacity).



There is a strong sense of urgency for many peoples and policy makers in regards to timelines in a rapidly changing Arctic environment. While there is a perceived notion northern nations are behind in planning, in reality most energy development projects will take place over a long timeframe. This allows nations adequate time to plan and apply lessons learned.

In Iceland, public interest in Arctic issues has not been overwhelming. Icelandic politicians and scientists have attempted to engender gradual awareness among the general public. Unfortunately, what has spurred this interest has been potential for maritime transport and extraction of oil. This message must be tempered by a more holistic array of issues encompassing all economic, cultural, environmental, and social aspects of Arctic development. –At the same time, Arctic nations will have to manage and maintain public interest due to the long-term horizon of so many development issues.

One major challenge is the anxiety that occurs when development exploration takes place, especially in relation to subsistence-oriented communities. It is especially important these communities have significant roles in the planning process in order to best protect traditional lifestyles. Promoting trust, in this case, involves talking about “worst-case scenarios” in addition to mitigation and response planning, technology and effort.

Most resources in the Arctic are owned by governments (offshore). The assumption under most national laws is the rights to receive the benefits from offshore resources belong to the nations that have claim to the territory as well as to the companies who develop them. Engaging the people of these communities is especially important, because ultimately these local communities will bear the brunt of the risks associated with development. This could require a fundamental change to the legal concept of the division of the right to receive the substantial rewards of Arctic development. Federal governments have responsibility for licensing and licensing processes involve indigenous and sub-national stakeholder involvement, so there are opportunities for input into the final decision. If there is not support for the risk/benefit equation or balance, then it is unlikely licenses would be issues.

Managing, Mitigating and Communicating Risk (Workshop)

The Arctic is rich with abundant resources and the accompanying dilemmas stemming from development, and there is a complex web of issues to understand and navigate. The term risk becomes important when

evaluating and balancing rewards and risks (loss vs. gain). The discussion is not just about the safety of people working in the Arctic, but should additionally include the larger picture— namely local community and global impacts.

Activity in the Arctic is increasing and along with increased activity come greater associated risks. The drivers of risk include accident prevention and mitigating consequences of development related accidents. There is a high level of uncertainty in the data related to Arctic development. This is coupled with a high degree of public attention and anxiety. Ultimately, the Arctic is an area in which industry has little operating experience.

Risk involves the human dimension (both in terms of potential and mitigation), as well as the environmental, and development of both risk tolerance criteria. A cost benefit analyses could provide guidance for addressing new issues to be considered and managed. Perceptions of risk must link back to a scientific understanding of risk potential.

Actually, the difference between statistical harm and perceived risk is important to reflect upon. Something considered unknown and uncontrollable is perceived by the public as a greater risk than something more familiar and for which a methodology exists to address (i.e.; terrorist attack vs. cancer).

Creating Solutions in a Resource Rich Environment

Arctic Ocean Heat Utilization

The Arctic Ocean is a huge source of heat and currently provides a natural heat balance and buffer against the Arctic region's annual temperature oscillations and long-term climate changes. In the foreseeable future it is likely that the inhabitants of the Arctic region will utilize heat from the ocean for its potential benefits, such as heating houses and providing new and improved industrial opportunities, including agriculture. Most of the Arctic coastal interface is currently not seasonally ice free, providing huge technological challenges for heat extraction. However, the ice free western coasts of Greenland; the shores of Iceland, Norway and Russia; the ice-free land interfaces of the Barents and Bering Seas; along with several North American shores on both sides provide opportunities to extract heat in large quantities from liquid oceans. This article discusses the potential and technical feasibility of heat extraction using heat pumps from the ice-free coasts of Iceland, Greenland and Norway, while comparing conditions at existing installations of ocean heat pumps located in warmer seas.

The basic premise for the project is to extract heat from low temperature sources using renewable electricity. This can be implemented in small or large scale facilities (remote or grid connected). The benefits are that heat pumps save a large portion of the electricity otherwise used for direct heating. There is no financial risk in source identification (compared, for example, to geothermal exploration). Heat pumps are a known technology, using environmentally safe equipment (including working fluids). If electricity is to be used for heating, it is often more cost-efficient to install a combined electricity and heat pump facility compared to electricity alone.

Alaska Renewable Schools-Burning Wood into Educational Dollars

In Alaska the price of heating oil has risen dramatically over the last five years. Additionally, most Alaskan communities lack a sufficient tax base for school districts to levy form and have little recourse to recover rising costs associated with increased energy prices. A half dozen districts in Interior/Arctic and Southeast/ rainforest Alaska have successfully switched to burning wood which has resulted in cutting fuel costs by at least fifty percent, and in some cases up toward seventy-five percent.

Transportable Nuclear Plants Based on Floating Power Units T

This paper discusses the possibility to use floating power units as nuclear energy sources for the Arctic region and formulates the requirements for such sources. Floating power units are compared with stationary (fixed) nuclear power plants (NPPs). The paper presents basic conceptual provisions relative to powering the

Arctic on the basis of floating NPP units and addresses the environmental issues associated with fossil and nuclear power. It also validates the safety of floating nuclear units and presents the possible line of further development. The issue of regulatory support with regard to small nuclear power plants based on floating units is also addressed.

Russia is building "Mobile Floating Nuclear Power Plants," which are meant to mitigate contamination of the Arctic by organic and inorganic substances caused by burning fossil fuels. A floating power plant is similar to a nuclear ship and equipped with modern nuclear reactors. They require no large capital construction on their operation site and no site rehabilitation. Future nuclear units will enable total elimination of all onsite operations involving nuclear fuel. The size of the plants under consideration is 17 mW. Waste heat would be injected into ocean.

Energy, Sustainable Development and Traditional Ways of Living

Alaska (Aleut)

The high cost of energy in northern communities makes it challenging to survive and thrive. Northern peoples have proven quite adaptable and have worked to find innovative solutions. Energy has the potential to be the most fundamental crossroads between business and the lives of individual people, however, with resource development also comes the potential for conflict. Today it is important to look beyond the past and easily drafted failures as a new era begins with increased interest in the North. A new paradigm needs to be developed that successfully identifies successful partnerships which will benefit communities and peoples of the North.

Alaska (Inupiat)

Prior to modern activity, the indigenous people used oil and other resources from the land for heat and light. The Inupiat of the Arctic region have been involved in energy development for many years; energy has been the driving force for exploration, expedition and science.

Today, Alaska's Inuit are "one spirit living in two cultures." Indigenous people in Alaska choose to live off the land and sea, while also seeking to be full participants in how energy is extracted and used. Inupiat people are involved in discussing regulations and licensing and provide essential traditional knowledge as a means to preserve their culture. Energy development has been incredibly beneficial for indigenous peoples and communities.

Energy should be developed in a sustainable manner by minimizing impacts and taking into account the unique character of the people. Most energy and raw materials are located in rural Alaska: the resources are located were the indigenous people live and where dependence on subsistence is most visible.

Canada (Inuvialuit)

Oil and gas exploration has been discussed since the 1960s. In northern communities across the Arctic, local people are going back to cutting wood and gathering driftwood because heating costs are so high.

Energy resources are a very important in Northern communities. Generally, indigenous peoples are not opposed to development, however they want to ensure proper precautions are taken. There are many consultations in communities to make sure development is done properly and harvesting rights are protected. Governments must protect indigenous rights for harvesting and prioritize subsistence rights.

There is a significant out migration of people and human capital in many northern communities due to a lack of economic opportunity. Oil and gas development can provide communities with the economic development need to retain a strong and vibrant population. Additionally, subsistence and increased access to traditional foods increases when locals are able to procure more efficient equipment and technology.

Canada (Inuktitut)

The link between cultural diversity and knowledge, as well as environmental issues and ecological processes must be thoroughly understood when addressing Arctic development. This has been established since the 1990s, when broad efforts encouraged Arctic nations to adopt policies aimed at broadening Arctic perspectives from security issues to sustainable development. These policies sought to include indigenous peoples and communities in the North. These efforts resulted in the Arctic Council.

While much has changed in this time, many of the same challenges remain. These challenges include exploration, extraction and production of oil. There is broad consensus around the need to expand opportunities for future generations, while promoting economic activity safeguards the environment and strengthens cultures of the region. Regions facing development must understand equity is important, but individuals are still ill-equipped to assess risk and reap the benefits of resource development. A greater emphasis on foresight is required when negotiating and developing resources.

Governments must support education and capacity-building in communities. Coherent and targeted investment of capital and infrastructure will alleviate social problems and help facilitate positive community and economic development. This is also a mechanism for the equitable sharing of resource rents and the Inuit must derive direct and substantial benefits from resource development. A portion of resource revenue should be dedicated to an Arctic education trust, aimed at addressing social policy issues in the Arctic.

Inuit are not against development, but want to be able to participate in a meaningful to make sure it is done in an environmentally sustainable manner and is subject to a rigorous environmental process. "Our" common responsibility is to never lose sight of the fact that the Arctic is home to indigenous peoples and that it is they who will face the effects of development.

Greenland (Inuit)

Seal oil was the main source of fuel for heat and light in the Arctic; now people depend mostly on wood and fossil fuels. Fossil fuels are the dominant energy resource in Greenland

Inuit are the majority people in Greenland and have self-government, realizing they have an obligation to not make or repeat the mistakes of their colonizers. Greenland's home rule government has the extra duty to engage local people in resource development decisions, including moderating the debate between exploration and protection of marine animals.

One of the primary goals in Greenland is to develop a sustainable Arctic community by 2020. The Inuit Declaration on Resource Development has committed Greenland to helping global, national and regional missions curbing greenhouse gas. Local authorities, companies and governments must incorporate support for small-scale green technologies to be available to Arctic indigenous peoples.

Dialogue

Success can vary a lot depending on circumstances and the starting point. Success is measured in how society benefits, and includes: scholarships, education, employment, stability of health, growth of community, involvement in scientific peer reviews, and having a meaningful in the outcomes.

To ensure a feeling of success the public must be fully engaged in the process in order to promote the public's ownership in the outcome. Traditional knowledge provides an excellent example. It is incredibly important to incorporate into development plans, but must be balanced with hard science. Finding the equilibrium between local and traditional knowledge and scientific fact must be addressed in development plans.

The Inuit Declaration on Resource Development allowed local communities to refine their vision of energy resources and security. They were able to create a forward thinking vision for addressing development issues. The declaration is a tool for how to talk to each other and others. For those exposed to decades of development, the declaration means local control and local say. This is a way that brings all parties together and minimizes adverse impacts. It is a fundamental right that Inuit are given a seat at the table to protect their community.

Government Support to Upstream Oil and Gas Activities-Benefits to Arctic Communities

Government support through tax breaks, royalty relief, infrastructure investment and other avenues is a powerful tool which determines the profitability and viability of upstream oil and gas projects in the Arctic. It is important to ensure this policy method is always used in a way that does not undermine the resilience of local communities and ecosystems.

Most of the panel participants spoke in favor of:

- Making sure resource development in the Arctic is undertaken in an extremely responsible way, with safeguards put in place. Provision of such safeguards has been referred to as one of the forms of government support to the industry.
- Redirecting the revenues from Arctic resources exploitation to support resilient development of Arctic communities, especially renewable energy development, education and implementing additional safeguards

During the discussion it became clear that there is no 'one-size-fits-all' solution for deciding which projects government should or should not support in the High North. Each case has to be considered individually, ultimately, it may make more sense for governments to establish dedicated financial vehicles (i.e., development banks or funds) to support social and business projects in the North opposed to granting blanket subsidies based on the geographical location. Several indigenous representatives have also spoken against cash handouts, stressing that those who work in the Arctic want decent jobs and opportunities to improve their lives.

Imagining Integrated, Sustainable, and Resilient Remote Power Systems

Stabilization of energy costs is a critical first step for local communities to facilitate economic development. Developing and defining this goal should give Arctic peoples a sense of what can be achieved. There are a variety of different strategies from across the Arctic (Canada, Greenland and Nordic countries were mentioned) and sharing best practices should be encouraged. This is especially challenging in remote areas of the Arctic, which are particularly sensitive to grid connectivity.

Remote communities and industries have the challenge to become self-sustaining and a common goal is to move away from diesel energy. In Iceland, communities are connected to a national grid, but in Alaska rural communities must function independently. This reality dictates that solutions must be practical, cost-effective and innovative.

The power systems of tomorrow must be integrated and adaptive, using different power sources and technologies (hybrid diesel systems). These systems should be tested adequately before being implemented in a community. Additionally, testing should be in place for microgrids and efficiencies with different sources.

Challenges remain and include:

- Components needed are there but often made for different purpose
- Larger systems have integration issues and load system
- Storage
- System control: competing objectives
- Diesel vs. System efficiency: have to balance out as one goes up the other comes down

Hybrid systems have to include energy management systems; guidelines for integration; workforce development; R&D/ venture capital; capital investment; and a regulatory framework.

Offshore Energy Production and Response

Oil Spill Emergency Response in the Arctic: Responsibilities in Norway

With the northwards expansion of offshore petroleum activity, there is a growing concern about oil spill response. The Norwegian experience shows preparedness forms a meeting point for environmental and business interests, all while providing opportunities for innovation and economic development. There are, however, many challenges ahead. We emphasize the different scales at which these are addressed. Apart from the local and national scale, the Arctic Council has a potentially important role in harmonizing regulations in order to overcome cross-border challenges. The aim is to analyze the development and adequacy of the Norwegian oil spill response in the light of northward expansion.

Norwegian petroleum activity started in Southern Norway in the 1960s. Beginning in the 1980s production moved to the Barents Sea. There are three petroleum provinces in Norway and certain zones closed to oil development due to ecological value and prolific fisheries. Norwegian development plans for integrated-system-based management, with special concern for the environment taken into account. Norwegian producers and regulators are keenly aware of the specific challenges accompanying Arctic operations: infrastructure, distances, darkness, ice, and vessel/structure icing. With increasing activity, there is corresponding concern about the adequacy of oil spill response (OSR) networks: actors, equipment, material infrastructures, regulatory agreements, and crew.

With regard to OSR responsibilities, there are three levels of response in Norway. Operating companies are organized under the Norwegian Clean Seas Association. Coastal communities are organized under inter-municipal committees, while the Ministry of Fisheries and Coastal Affairs is the national governing body. These represent a market of large investment to prepare for an accident that is unlikely to happen, but oil spill response can be considered a meeting point for business, environmental and regional interests.

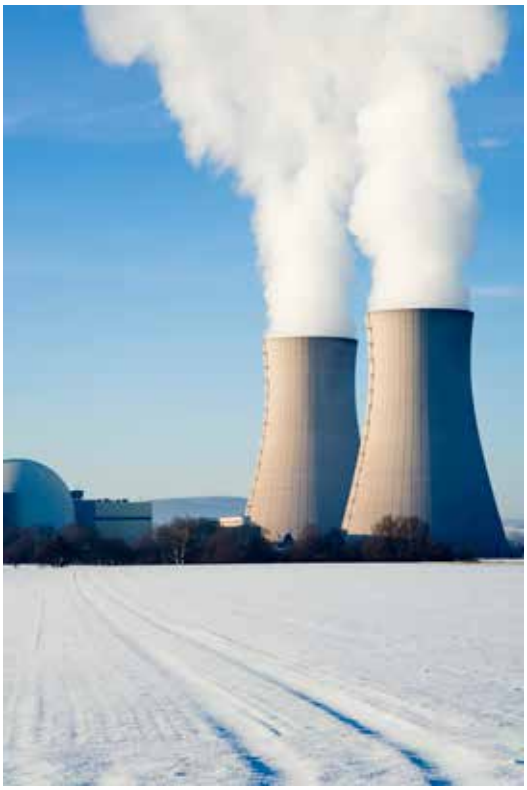
Fishermen have become involved in oil spill response and are contracted by oil companies to report their accessibility and location (they can bring oil booms to vessels and monitor oil slicks). They get a yearly general benefit/reimbursement as well as are paid for actual work time. Additionally, fishing vessels get regular exercises in cooperation with the companies and the equipment depots are managed by the task force. This sector has crucial local and geographic knowledge, as well as rapidly deployable vessels. There is an effort

underway to develop smaller booms which can be carried by the smaller fishing vessels. Norway has a special beach cleaning task force and is developing new equipment depots along the coast.

Arctic nations are fully aware of the challenges ahead, which include the number and capacity of crews and equipment in the case of a spill; the peripheral nature of Arctic coasts; the significant lack of infrastructure in much of the Arctic; technical challenges of oil in and under ice; questions of recovery rate of oil in Arctic; and cooperation across borders. To this last point, there is a need for harmonization of standards and guidelines across borders.

Oil spill response in the Arctic still has "fuzzy" boundaries between the responsibilities of actors at difference scales. "Minimal response assets and infrastructure" still needs to be evaluated on local, national and international levels. Prevention, which has been taken up under the Canadian Chairmanship of the Arctic Council, is of utmost importance to both nations and operators. Here, the shipping and petroleum industries have the main responsibility to ensure prevention.

Nuclear Energy to Develop the Arctic Shelf



Nuclear power has the potential to be the environmentally-safest way to supply energy to offshore oil/gas production facilities on the Arctic shelf. Russia has been assessing energy supplies to offshore oil/gas production in the ice conditions of the Arctic shelf and has developed evaluation approaches. Reserves of hydrocarbons on the Russian shelf are estimated at 100 billion barrels of oil expected gas and eighty percent of the total is gas. The Barents Sea, the Pechora Sea and the Kara Sea hold the biggest reserves.

An estimation of required energy supply has been fulfilled for the Prirazlomony and Shtokmanovskoye Projects. Energy consumption by oil/gas technologies is estimated at:

- Oil extraction 70 kWh/t
- Gas extraction 10 kWh/100m3
- Gas compression 30/70 kWh 100 m3
- Gas liquefaction 230 kWh/1000m3

There is a projected need for more than 5.1 gW of power. Nuclear power has the capability of autonomous, efficient and safe offshore operation. This includes underwater/under ice conditions (with minimal environmental issues). In the existing nuclear assurance framework, SNPP operators could be subjected to complete financial liability for possible damage stemming from a nuclear accident. A successful program intended to liquidate the negative radiation consequences for Russian nuclear fleets operating in the Arctic is concurrently underway.

Oil Spill Response – Center of Excellence

The Arctic requires an integrated approach to oil spill research. Key drivers affecting future oil and gas development include: future demand and price; energy endowments; development of technology; access to resources (geopolitical push driving exploration); and environmental risk (the ability to clean up oil spills). Diverse sources of spill risk (shipping, offshore development, runoff) needs a diverse and able response capacity. Preparing coastal communities in oil spill response is vital for their long term resilience.

Oil spill research includes a highly complex interplay of physical, chemical, biological and social processes. It includes evaluating toxicology at lower food levels that move up during bioaccumulation; understanding oil movement under ice; and monitoring the trends of decreasing sea ice and increased open-water fetch, combined with warming air and ground temperatures are affecting environmental conditions.

The outcomes of this research, and the reason for integrated capacity-building, will be science-based decision-making for prevention and detection. This must encompass local and traditional knowledge role for disaster response. University systems can assist with monitoring, predicting, and developing products (e.g.; unmanned vehicles, hyper-spectral imaging) ahead of an oil spill to ensure preparation.

Northern Energy Efficiency through Engineering, Architecture and Design

Addressing sustainable energy development in the Arctic must be included when exploring energy development. Arctic peoples have the opportunity to evaluate energy-saving measures, including the design of the built environment in the Arctic. From an architectural point of view, there are challenges and benefits around designing in the Arctic. Variables such as cold winters, wind, snow, and a short summer construction season pose challenges. The main contribution for engineers and architects is to design sustainable architecture, houses, settlements and environments where people enjoy living. Architecture remains both a link to and transformation of the history and local culture in the Arctic. In the Arctic, there is an obligation to design buildings that are part of the landscape, particularly for indigenous people and communities. Buildings should keep traditional cultures in mind promoting both energy efficiency and sustainable living.

Arctic Markets – Meeting Global Demand

When addressing the Arctic's relationship with the rest of the world, it is important to analyze various theories. Issues in the Arctic cannot be looked at in isolation. These theories are useful tools for analyzing the issues at hand. For example, in thinking of the Arctic's relationship with China:

- Power transition (realism) – rise of China as a global power
- Liberalism = the importance of sub-state actors and their interests
- Institutionalism = importance of law of the sea
- Constructivism = importance of discourse on the Arctic; how we talk about things, matter
- Transnationalism = importance of science, environment and indigenous peoples
- Foreign policy analysis = foreign policy making in China; how does China make decisions?

In order to procure legitimate rights in the Arctic, China is trying to change the perception of the Arctic. These theories must be addressed when interacting with non-Arctic states.

Arctic trends for Northern and Asian cooperation include changing demographics, a scarcity of natural resources, climate change and increased globalization. Arctic states will have large economic opportunities because of these unforeseen changes. The world's economic center of gravity is moving east. This can be thought of as a cooperative effort between resource utilization in the Arctic and the increasing buying power of Asian markets.

Arctic shipping has the potential to be a major bridge, lowering cost, saving time, decreasing CO2 emissions; and adding value and volume by opening new markets.

The Peoples' Republic of China is interested in Arctic development due to increased energy transportation security and safety (the PRC GDP is shipping dependent). Arctic shipping can enhance the PRC's peaceful rise and sustainable growth by ensuring future energy and food security.

China and the CNARC in Shanghai have examined the relationship between Arctic shipping and economic growth. Development of Arctic's resources will prove fruitless without shipping. China's trade could raise the GDP of Arctic nations substantially. As trade increases, Arctic sea routes will become the inevitable choice.

Development opportunities point north and growing markets are in the East. In terms of resource security and safety, it makes sense to link the resource utilization of the Arctic with the purchasing power of East Asia. The Arctic can play an important role in meeting global energy demands, benefiting both the Arctic region and its markets.

Iceland offers a different case study, as it develops the feasibility and effects of developing a high voltage cable from Iceland to continental European markets. Energy from Iceland has been historically difficult to transfer, but HVDC this former obstacle a possibility. This project requires enormous capital, but poses a viable opportunity to send northern renewable energy to non-Arctic markets.

The Icelandic public has raised the questions of what effects exporting energy will be on domestic residential, commercial, and municipal energy use. Additionally, Iceland must evaluate the environmental and socio-economic costs and understanding the real price of energy in Iceland, beyond the price of production.

Another way to think about the Arctic's relationship with markets is by developing the capacity to export expertise. The Alaska Center for Energy and Power is developing an evaluation tool to conduct a broad market analysis, which can help demonstrate the global relevance of Arctic resources and strength, while opening up a dialogue about building on common experiences. Energy in rural Alaska provides the context and the motivation stems from the growth of hybrid micro-grid systems in remote areas, which face substantial integration challenges. There is an international dimension because these circumstances exist elsewhere in the Arctic.

Finally, while there is great incentive to only focus on potential utilization of renewable energy, it would be detrimental to take natural resources out of the equation. There is a premium paid for green energy in Europe and those investments sometimes look more promising, but non-renewable energy development produces revenue at all three levels of government, as well as important jobs for citizens.

Stakeholder Engagement

Communication with the Masses: A Series of Case Studies on Engaging Indigenous Populations in Alaska

Alaska may see an increase in development in all regions supporting increased activity and traffic in the Arctic. Based on the lack of infrastructure in Alaska's remote regions, industry and government need to arrange logistics far in advance in order to coordinate barge schedules and lodging. The weather window for which communities can receive goods, and construct and operate new facilities is relatively short. As stakeholders weigh in on private and government projects in their regions, new questions emerge regarding effective communication. Strategies to engage all generations of stakeholders range from the traditional methods of face-to-face meetings to social media updates.

This presentation will focus on the resilience of these stakeholders who communicate in a manner that remains true to their traditional value sets. In communicating with the masses, the message should be the same, but delivery will need to reflect the values of the intended audience. With familial ties to indigenous populations in other Arctic nations, there is a basis for a communications protocol weighing value-added Traditional Knowledge. This insight from stakeholders may lend to more cost effective solutions for industry and provide mitigation for communities faced with balancing economic development with potential sociocultural impacts.

Arctic Energy Development and Best Practices on Consultation with Indigenous Peoples

Energy development in the Arctic has enormous potential in meeting world energy needs and promoting sustainable development of the Arctic. At the same time, evolving norms of international law pertaining to the consultation of indigenous peoples highlight a significant area of responsibility for states and industry operating in the region. This paper analyzes best practices on consultation appropriate to the region, drawing from an evolving national and international law norms of consultation and connecting them to the particular

circumstances of Arctic environments and cultures. To do so, it will survey key features of existing legal frameworks specific to the region, set out key features of evolving norms on consultation and implied best practices, categorize the variety of typical Arctic circumstances to which these norms must be applied, and go on to apply the best practices to offer recommendations for each of these categories and thus for legal and policy frameworks in the region. Developing appropriate responsiveness to these responsibilities can multiply the potential of energy development in the region. Practical best practices can do so in ways that promote efficiency and sustainability in human and environmental impacts.

Arctic Regulations- Environmental, Technical, Risk Management, and Operations Planning

Arctic peoples recognize fish as for the basic form of food security. For the Arctic to be shielded from the worst effects of rapid change, effective international stewardship must be in place to promote healthy living systems to the benefit of local peoples and all humanity. Such stewardship must have transparency, engagement, ecosystem-based management, and the precautionary principle applied to use of marine areas. Increasing local capacity to respond will continue to be an important issue going forward.

Alaska's Effort to Develop Criteria for Energy Decision-Making

Alaska faces legal, political and practical problems regarding security, cost-effective and clean energy, stewardship and safety. Alaska's leaders must mitigate and share risk, lower costs and care for people's needs, including the management of habitats and ecosystems. Alaska has been referred to as resource rich but energy poor due to the high costs of energy in many communities, and the state must prioritize resource management in conjunction with economic growth.

The Constitution of Alaska dictates that "it is the policy of the state to encourage the settlement of the land." To do this Alaska must develop it natural resource base while maintaining public interest. Maximum use and benefit must include conservation of resources for future generations. The State should help its communities use local resources so that they can become self-sustaining.

Unfortunately, Alaska's approach has compartmentalized decision-making, making it difficult to see the relationship of the decision and effect. Decision-makers need tools in order to evaluate socio-economic and environmental impact, as well as the potential return on investment. Namely, they need to understand if funding projects with state revenue are accomplishing a goal of lowering costs for Alaskans.

Some of Alaska's greatest assets are the Alaska Native regional and village corporations, which are an important part of Alaska's economy and future. Alaska Native corporations are increasingly making resource development decisions which translate into local investment and job opportunities for those that live in rural areas.

Alaskans do know how to work together, especially at the community level. Together they depend on the land and its resources in a challenging environment. That cohesion is challenged by resource development's possible impact on traditional lifestyles. These concerns can be addressed by meaningfully integrating local and traditional knowledge into development decisions. Responsible development in Alaska should result in affordability, because affordable energy is critical to a stable Arctic region and a competitive economy.

Alaska's oil wealth has been poured back into the state in several ways, most significantly through education, power cost equalization, weatherization and energy efficiency, renewable energy and emerging energy technology. The most direct benefit to Alaskans is in the form of the annual dividend, distributed by the state's sovereign wealth fund.

The private sector is advancing on many fronts, and the State of Alaska can help provide incentives for projects resulting in public benefit. The government should have a limited role in private sector decisions. State policies, though, can empower local communities to be innovative in their approaches. It could be said that without energy infrastructure and with its high cost of energy, Alaska is a very poor state. Policy makers in Alaska are working to address this, often working within a very different system than other Arctic jurisdictions.

Politics and Sovereignty in the Arctic

Energy Politics between Europe and the Arctic: Sociological Investigation of Northern Political Economy

These are two facets to a wider puzzle, 'Energy (and) Politics,' engaging with the theme 'Arctic energy.' Both facets cannot be seen two-dimensionally. The Arctic geographically acts as a backdrop for a range of analyses of the Northern region and also provides scope for external, non-Arctic influences such as the European Union's role in the energy industry. As an external actor, the European Union plays an important role in Arctic energy relations. The EU sources a lot of its non-renewable energy resources from the region, encourages further regulation of the industry, and maintains its support for renewable energy growth. Energy can relate to a range of issues directly or indirectly connected with energy resources, such as investments in research and design, environmental impact assessments, regulation and governance. In order to carry out an investigation on the European Union's influential role in Arctic energy, Pierre Bourdieu's sociological approach was applied to Northern Political Economy (NPE), an umbrella discipline bringing the political economy together with a range of other social sciences, aiming to capture any ambivalence between separate fields. By incorporating Bourdieu's theory and highlighting the rules and rewards appropriate to different fields, the investigation sets out to locate different fields of influence within an 'Arctic energy game,' emphasizing the 'European' influence.

Sovereignty and Foreign State-Owned Enterprises in the Arctic

As the demand for commodities such as oil, gas, and minerals increases, foreign state-owned enterprises (SOEs) are increasing their investments in the resource-rich Arctic. This paper examined the effects of investment from SOEs in countries traditionally perceived as non-Arctic on the sovereignty of Arctic states. Greenland and Iceland - two countries where non-Arctic SOEs have made inroads - serve as case studies examining how resource development has affected national sovereignty. It was found that non-Arctic SOEs may be able to exert greater influence over decision-making in the due to the ability to invest greater amounts into resource extraction than Arctic nations.

Local and Regional Development

Northern Alaska hosts a diverse array of governments. Municipalities, boroughs and the state government have an opportunity to come together address common challenges. Alaska's leaders must work together towards self-sufficiency, while building capacity for resilience. Communities can encourage grassroots solution building and find creative answers to funding issues. The legislature has created the Renewable Energy Fund and the Emerging Energy Technology Fund as a way to jump start micro- In the future, Alaska needs to look towards other Arctic nations by implementing a master plan to provide strategic direction.

Decision-making regarding Arctic development must always recognize the place-based nature of those decisions. Every process must analyze the local populace and how their livelihood is interconnected to other Arctic and non-Arctic s communities. The communities of the Arctic are descended from hunter-gatherer cultures and their way of life is still closely tied to the land. Adaptation is a strong foundation of Arctic living and has made northern peoples resilient in the face of adversity. As northern communities look to the future and plan for a changing Arctic, decision makes must account for not only the vast resource wealth of the region, but must also consider the region's human capital.

In Alaska development projects, utilizing local human capital has been prioritized in the form of local and Alaska Native hiring preferences. There are agreements in place in order to minimize disruption in traditional activity. These practices include managing activity during migration seasons and ensuring a high standard for water quality. Local taxes on resource development projects have given municipalities and borough governments a much needed tax base, allowing local communities to expand services.

Canada's northern communities and First Nations peoples have a strong role in the future development of resource projects. The Inuvialuit Final Agreement (IFA) is the first land claims settlement above 60 degrees latitude in Canada. This is a powerful instrument enabling the Inuvialuit to preserve their cultural identity and values within a changing northern region. The negotiations took ten years and have formed the basis for co-management of resources and ensured that the region's people have a seat at the table.

A corresponding initiative from the IFA is the Beaufort Regional Environmental Assessment, which has been the mechanism for environmental and socio-economic research regarding offshore decision-making activities. This regionally driven instrument seeks to ensure governments are better prepared for offshore oil and gas activities by filling in data gaps and supporting effective regulatory decision-making. There is an on-going need for capacity-building and equipment which can further prepare stakeholders in the region.

Communities outside of Reykjavik are facing huge regional challenges, struggling with constant population and economic decline. Resources in these areas have been used to maintain current infrastructure and social systems, without having the ability to think about growth or prosperity. This is common across the Arctic, especially in small communities with a complex array of interests and needs.

By developing sustainable hydro electrical resources, many Icelandic communities have been able to reverse population decline. This energy asset drove mergers in several municipalities, which ultimately strengthened economic opportunity. These efforts were coupled with the development of port infrastructure (despite early critics). This merger has been very successful and the region now boasts a strong economy as well as supportive infrastructure.

Local governments are often responsible for driving local economic development and diversification as well as marketing Arctic development. Businesses have a huge interest in Arctic development, especially as areas are increasingly opened to activity. Greenland, for instance, has witnessed both large scale oil exploration and increased licensees for mining activity. Iceland can provide needed infrastructure for activities in the largely unpopulated and harsh region of East Greenland. At the same time, as Iceland considers oil exploration in the Jan Mayen area, there are opportunities for the support industry and service sector to take advantage of.

Transportation and Logistics in the Delivery of Arctic Energy

Arctic development must be considered through the three lenses of Richness, Resilience and Responsibility. Arctic nations must analyze access to new energy resources and the impacts of corresponding development.

Governments must take the responsibility to help develop frameworks for adopting emerging and best technology, by understanding the changes like icebreaking, engineering, remote sensing technology which facilitate projects. Industry in the Arctic must consider the meaning and implementation of corporate responsibly when pursuing energy extraction projects. To some extent, this will be a matter of developing projects in such a way that exceeds minimum regulatory requirements.

In the Arctic, access to energy resources is dependent on logistics and transportation. These are complicated by the harsh environment, seasonal operations (open water, extended seasons, etc.), remoteness, lack of infrastructure, and the fact that faults are amplified. Often only big projects can be developed (necessary return on investment); companies have to purpose-build vessels, which must be winterized (cargo and auxiliary – seismic, drilling, dredging, heavy lift, etc.); and local knowledge must be integrated into operational activity.

The presence of ice complicates every project and many more parameters must be considered. The effect of ice on operation and logistics is difficult to calculate and there remains a significant difference between offshore and onshore fields.

Shipping in the Arctic must seek to do no harm to local communities or the environment. The level of cooperation needed in Arctic decision making is high, and making a physical connection with local communities makes all the difference. There is a shared opportunity for inclusive stewardship and local knowledge. Industry has a responsibility to benefit the communities who bear the brunt of the associated risk.

Political cooperation actually follows trade and generates a great deal of cooperation (i.e.; this is a bright spot in US-Russia relations). Where there is not adequate infrastructure, peoples in the Arctic can support each other with shared resources. Already, there are success stories for shared richness, such as Sakhalin Island, Red Dog, and Prudhoe Bay. Success in the Arctic relies on alignment between industry and community.

Dialogue

Over the past decade the Arctic has witnessed a huge increasing in international shipping. Currently seasonal traffic is assisted by icebreakers, but year-round operations will require different conditions. Navigation in the Arctic is possible, but the only real open route is the NSR and other routes will take decades to develop.

There is an obvious need for further infrastructure for ports, in order to support response abilities and/or destinational traffic. Unfortunately, local communities and economies do not processes the capital needed to develop maritime infrastructure. These will have to be national responsibilities that leverage local and private sector resources.

Resource Policy and Planning

Extraction or Conservation and the Role of the State

Alaska is an incredibly oil-rich state. Prudhoe Bay is the largest field ever found in the Northern Hemisphere. The State of Alaska has struggled to find an appropriate fiscal system keeping both the State government appropriately funded, while simultaneously encouraging additional investment and development. The current incentives for investment have been described as the "most generous in the world."

Current production in Alaska is at about 600k barrels of oil per day and oil prices have increased. The state government has spent nearly a decade attempting to stem the decline. Tax regimes in Alaska include both a royalty and tax system (based on progressivity). Royalties are a bilateral negotiated contract between owner of the resources and the producer (who brings money, production and marketing knowhow). These are negotiated, authorized and approved by the Legislature. The majority of the State of Alaska's wealth comes from the oil production tax. The State is very interested in the benefits of discoveries away from Prudhoe Bay are given greater tax breaks for oil companies.

The discussion within Alaska has two threads – a narrative of morality (fairness), with "feisty Alaska standing up to rapacious oil companies" (Alaskans saying, "It's our oil") versus an empirical argument, with "big government overreach once again strangling the golden goose." Alaska is still developing the right balance for assessing a resource rent that encourages investment (100% rent results in no investment/0% rent results in depletion the resource without contributing to State revenue).

It is worth noting that an Alaska-owned oil company was considered but determined to transfer too much risk to the state (though dependence on risk-free has become risk itself). Tax changes now based on new fields which could take 5-10 years to first production. Finally, revenue from oil has rules - 5% of the royalties have to be dedicated to education funds and 25% goes to the Alaska Permanent Fund, a sovereign wealth fund that pays an annual dividend to Alaska citizens.

The Icelandic Framework Plan for Energy Resources and Conservation: Approach and Methods

In 1999, divisive disputes on energy development in Iceland prompted the launch of a strategic national-level plan for the development of hydropower and geothermal energy. Its objective was to evaluate other potential land uses and the environmental, regional and economic impacts of energy development at an early stage. Four workgroups defined and evaluated the energy options, the natural environment and cultural heritage, other land uses, and regional consequences.

Of course, there is a challenge when you have to deliver benefits to both conservation and other land uses and to energy development. The process asked a number of questions:

- How is the scientific knowledge converted into policy?
- Who should be in charge of the distillation process?
- What is the role of the scientists or academics in a policy-making effort such aat this? What the dangers and possible conflicts of interests?
- How should uncertainties and risks be evaluated and treated?

Inclusivity was a strong element of the Framework Plan, which had a number of phases: 1) public participation and audits (dialogue with the public and comments), 2) allocation of areas and EO, 3) government decision-making, 4) legislation, and 5) implementation. The public's attitude toward the outcomes was deeply rooted in personal values. People accepted that the outcome was more of a balance. During the process, however, the steering committee went from 17000, to 12, to only 6 people, which has been determined to be too small for the work required.

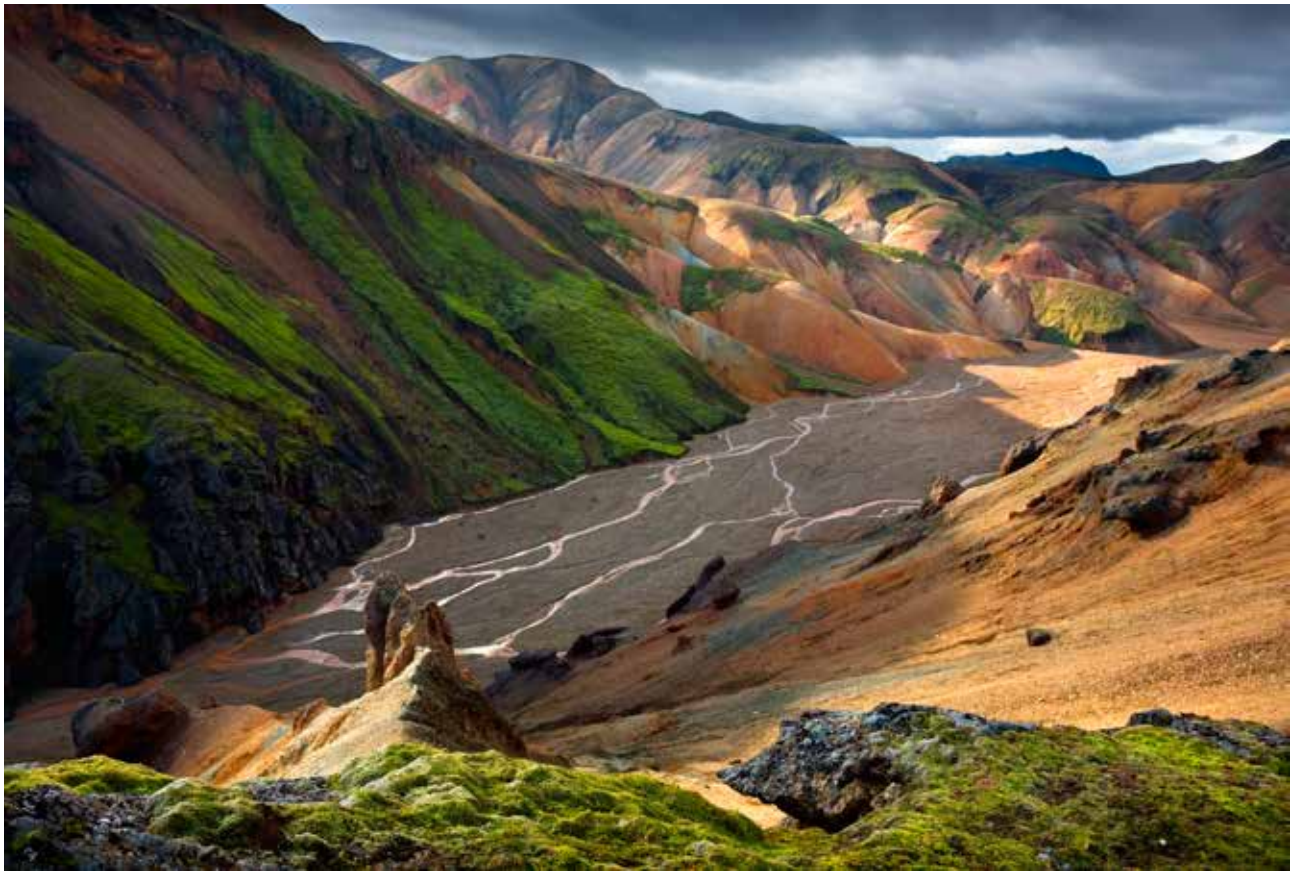
Social and environmental responsibility in the Arctic region - an Icelandic perspective

Our image of the Arctic is changing from remote and unreachable, to a sought after destination. The growing interest in the Arctic, in resources exploration, offshore petroleum exploitation, circumpolar maritime transport, tourism and northern migration of fish and thus fisheries is facing a wide range of challenges including social and environmental responsibility towards this scarcely populated, fragile environment. The increased activities require, due to long distances, extreme weather conditions and winter darkness, a robust information infrastructure for communication, monitoring and surveillance for improved preparedness, logistics of shore-based resources and life-saving equipment for emergency response, search and rescue service with, well-trained, stand-by rescue units and shared operating procedures.

The essence of this message is to link closer – formally or informally – initiatives regarding social and environmental responsible practice to:

- Strengthen operational capacity and operation awareness while building platforms for sharing knowledge, expertise and equipment.
- Focus on how international policies and agreements already in place, such as the Agreements of the Arctic Council member states regarding Aeronautical and Maritime Search and Rescue and Marine Oil Pollution Preparedness and Response can best be implemented.
- Raise situational awareness across borders and create a consensus on the practicalities of operation.
- Explore how Iceland with its Arctic training and response agencies and strong infrastructure can better contribute to emergency and environmental response in the Arctic, for our common good.

Fish is important to our food security. By protecting the environment, we protect the people (it is as simple as that). Therefore, there is a social and environmental responsibility to be prepared for accidents. To improve preparedness, a chain/system of rescue coordination centers around the Arctic and identification of forward operating bases could be initiated. Permanent multi-lateral/multi-national SAR stations could leverage existing facilities, knowledge and communications.



Presentation of Conclusions and Next Steps

RICHNESS

Richness includes many types of wealth – Energy/Resource, Ecological, Social systems and Cultures; because of this, and in an effort to achieve balance and security, it is worth highlighting that Richness has scales.

The Arctic Council has done a lot to look at richness, but there hasn't been enough effort to examine renewable and alternative energy. The Arctic Energy Summit recommends the development of a survey based on the value of each of these resources, with a measureable matrix in order to develop the real value of these resources. At the same time, there is a need to assess local need (access and affordability) versus the global needs. Such an assessment should include the relative income spent on energy, both power and heat.

Additionally, the Arctic Council should explore value-added exports; cultural resources; benefits of local fuel and microgrids; and the potential for public/private partnerships. A global Arctic energy fund could be one way (though difficult to fund) to help stabilize costs for remote Arctic communities.

RESPONSIBILITY

Responsibility is of fundamental concern because of the increase in interest and activity in the Arctic that affects the peoples of the North, especially indigenous people in the Arctic, which means rights-holder interests must be protected and respected. The Arctic Energy Summit acknowledges that there will always be an element of risk in resource development, thus, Arctic nations must be committed to response ability, benefits to communities, and mitigation of acceptable risk.

Renewable energy should be evaluated for its feasibility and scalability, reviewing best practices and lessons learned from around the Arctic. With high energy costs affecting many Arctic communities, short-term solutions should be implemented to build capacity. In this, communities can be empowered to take on local challenges at the local level.

There is a long-term vision for some type of circum-Arctic governance that will support and implement environmental, social, economic and cultural responsibility. Another aspect of Responsibility is to study consultation processes and indigenous participation; increase capacity to map sensitive areas; and integrate science into decision-making.

RESILIENCE

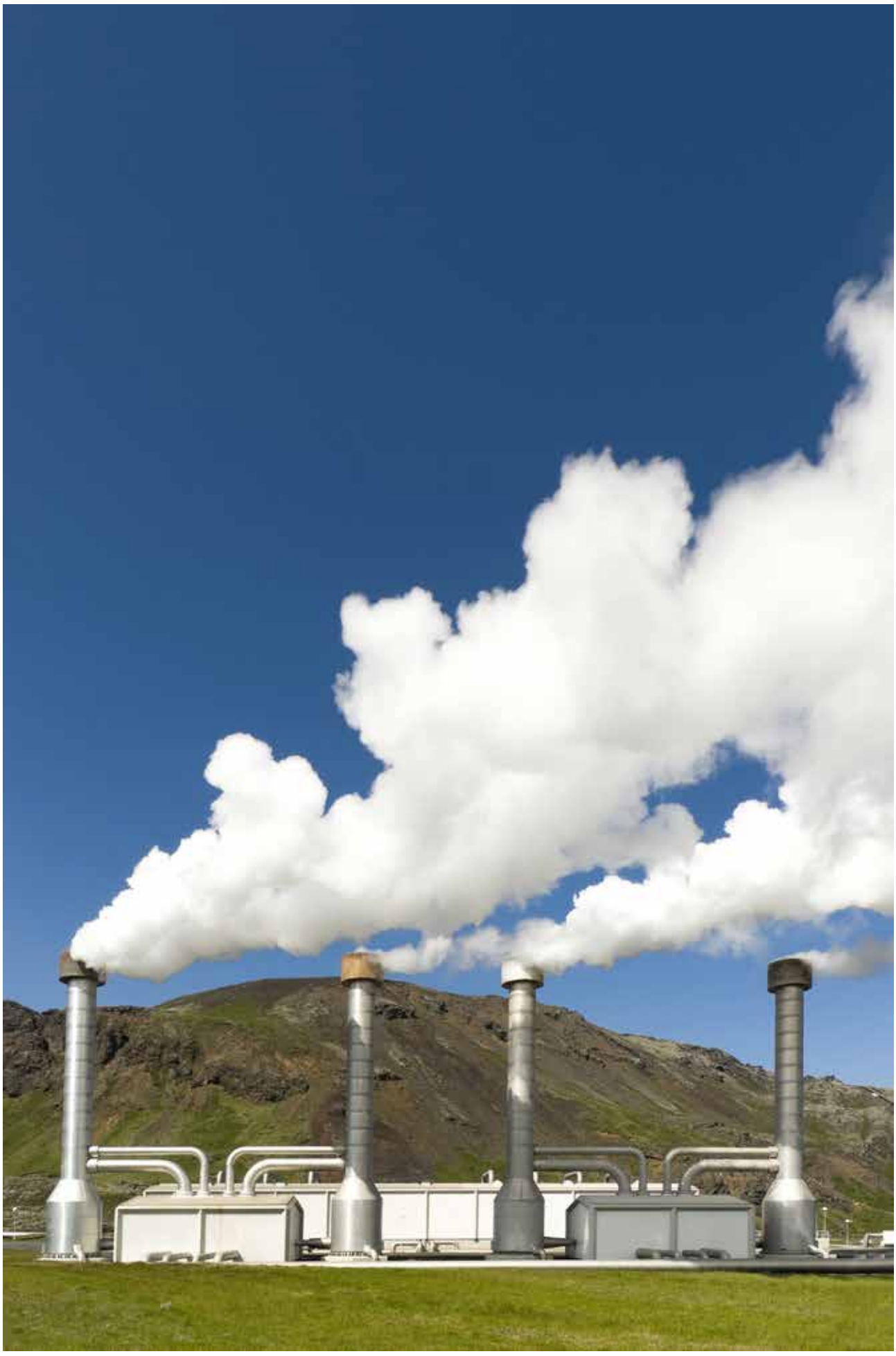
Resilience can be defined as the capacity of a social-ecological system to cope with disturbance, responding or reorganizing in ways that maintain its essential function, identity and structure, whilst also maintaining the capacity for adaptation, learning and transformation. Changes in a system decrease resilience, and increase the risk of reaching a critical, negative threshold.

For the purposes of the Arctic Energy Summit, we can understand 1) Richness as "what we have or could have;" 2) Resilience as "setting the rules;" and 3) Responsibility as "what we choose to do in the Arctic."

Recommendations from the Arctic Energy Summit, relevant to Resilience, include:

1. Development of an energy development and distribution roadmap
    a. Intentional and inclusive planning for self-sustaining economy
2. Drafting of a master plan for community survivability
    a. Driven by local ownership
3. Establishment of an Arctic Resilience Bank
    a. Framed by local implementation

Resilient energy systems and communities can be evaluated against just, clean, effective, and efficient energy development, transmission and use.



2013 ARCTIC ENERGY SUMMIT

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