6. 2016: EMERGING ARCTIC ISSUES AND POLICY RESPONSES

Robert W. Corell, Jong Deog Kim, Yoon Hyung Kim, and Oran R. Young
INTRODUCTION

The North Pacific Arctic Conference (NPAC), now in its sixth year, provides a mechanism for encouraging off-the-record engagement among members of the scientific and practitioner communities regarding Arctic issues of mutual interest to leading North Pacific Arctic states (Canada, Russia, and the United States) and non-Arctic Asian states (China, Japan, and Korea). It aims to promote improved understanding of policy issues and options among these six states both in the setting provided by the Arctic Council and in other settings. These six states, all members of the G-20, together account for more than 50% of the world’s greenhouse gas emissions as well as a large share of global commerce.

The Arctic constitutes a system of growing complexity in which numerous forces interact to produce changes that are often nonlinear, sometimes abrupt, and frequently surprising. We have known for some time that the impacts of climate change are more pronounced in the Arctic than elsewhere. But world leaders were taken by surprise by the dramatic collapse of sea ice in the Arctic Basin during 2007 and the following years, and we did not anticipate the accelerated rate of melting of the Greenland ice sheet that scientific observations are now documenting. Some years ago, knowledgeable observers forecast the onset of major investments to assess and develop natural resources as the Arctic becomes increasingly accessible. But these forecasts failed to anticipate the dramatic decline during recent years in world market prices for oil and other fossil fuels or the rise in tension between Russia and the western Arctic states.

As a result, exploratory operations in the Chukchi Sea north of Alaska, the Kara Sea north of Russia, and off the west coast of Greenland have all been put on hold; even plans for the development of massive proven reserves like the Shtokman natural gas field in the Russian sector of the Barents Sea have been postponed indefinitely. Less than three years ago, the Arctic states declared formally that “The Arctic Council has become the preeminent high-level forum of the Arctic region and we have made this region into an area of unique international cooperation.” Today, both the future of cooperation in the region and the role of the Arctic Council are less clear.

There are good reasons to avoid an alarmist response to these developments. It is essential to understand that the Arctic is a complex system subject to major changes that are both rapid and surprising. We
cannot forecast with any precision the likely trajectory of developments in the region, even over the short run out to 2020. More and better analysis will not alter this condition. But we can take steps to monitor major drivers of change in the Arctic more intensively and precisely, to engage in various types of simulation and visioning exercises aimed at broadening our awareness of the range of plausible developments in the region, and to enhance the agility of institutional arrangements dealing with Arctic issues. The Arctic Council provides a helpful venue for dialogue among the eight member states and twelve observer states especially with regard to issues that are regional in scope. But other mechanisms are needed to supplement the work of the council.

Particularly helpful in this setting are high-level but informal mechanisms such as the North Pacific Arctic Conference that allow knowledgeable people from many countries and many walks of life to engage in vigorous, off-the-record dialogues about emerging Arctic issues and the options for addressing these issues in a constructive and cooperative manner. The North Pacific Arctic Conference provides a venue designed to enhance evidence-based understanding of the changes and sustainable socioeconomic opportunities of the high north region, to foster planning strategies that address these changes and opportunities, and to facilitate strategies, mechanisms and tools that prepare nations and peoples for a variety of Arctic futures.

This volume comprises four substantive parts. Part I consists of a principal presentation followed by six perspectives providing insights into how the North Pacific countries and the Inuit Circumpolar Council look at the Arctic particularly through the lens of climate change. Part II contains five different perspectives from three Arctic Council associated entities, a non-Arctic state and an Arctic indigenous community on implications of the Paris Agreement on climate change for the Arctic. Part III presents seven interdisciplinary perspectives on the future of the Arctic Ocean with particular reference to fisheries, shipping and tourism. The seven perspectives in Part IV address major factors influencing prospects for Arctic gas development. A brief Conclusion looks to the future and proposes the theme of Building Capacities for a Sustainable Arctic through Improved Science-Policy Engagement as an overall framework for NPAC activities during 2017-2019.

The common thread running through the contributions to NPAC 2016 is a concern for Arctic futures approached from a number of vantage
points. Some of those who contributed are government officials who bring the perspective of the policy community to this theme. Others are associated with nongovernmental organizations, including indigenous peoples' organizations and other NGOs. Still others come from the world of academics and analysis. The result is not a set of predictions regarding the shape of things to come in the Arctic; the affairs of the region are too complex to allow for meaningful predictions. But the contributions to this volume do reflect a set of plausible projections on the part of knowledgeable people in a position to engage in disciplined thinking about what the future holds in store for the Arctic.

PART I: ARCTIC POLICIES IN A GLOBAL CONTEXT

Daniel Reifsnyder begins Part I with an overview of American climate policy in the Arctic context, focusing in particular on key features of the 2015 Paris Agreement emerging from the twenty-first meeting of the Conference of the Parties (COP21) of the UN Framework Convention on Climate Change. The 2015 agreement aims to strengthen the global response to climate change with the goals of holding the global average temperature increase to well below 2°C above pre-industrial levels and of striving to limit increases to 1.5°C. It seeks to increase our ability to adapt to the adverse impacts of climate change and foster climate resilience through low emissions development. The agreement also aims to make financial flows consistent with a pathway toward low greenhouse gas emissions and climate resilient development.

The Paris Agreement is to be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities in light of different national circumstances. The Parties aim to reach peak greenhouse gas emissions as soon as possible and to achieve a balance between human emissions and removals by sinks in the second half of this century. Each Party must strive to formulate and communicate long-term low greenhouse gas emission development strategies. Parties are invited to communicate by 2020 mid-century long-term low greenhouse gas emissions development strategies for publication on the UNFCCC website.

Reifsnyder summarizes the nature and role of Nationally Determined Contributions (NDCs). Under the Paris Agreement, each party is required to prepare successive NDCs, reflecting progress in reducing emissions and
stating its highest possible ambition. Developed countries should undertake economy-wide absolute emission reduction targets; developing countries should continue enhancing mitigation efforts and are encouraged to move over time to economy-wide emission reduction or limitation targets in light of different national circumstances.

Each Party undertakes to communicate an NDC every five years. The first session of the Conference of the Parties/Meeting of the Parties (COP/MOP) is to consider common timeframes for NDCs. The first NDC is due on ratification/accession. But if a Party has communicated an intended NDC, this requirement is satisfied. Parties with NDCs containing a timeframe up to 2025 are urged to communicate a new NDC by 2020 and thereafter every five years. Parties with NDCs containing a timeframe up to 2030 are requested to update these contributions by 2020 and to do so thereafter every five years.

The COP/MOP will periodically take stock of implementation efforts to assess collective progress toward achieving the purpose and long-term goals of the agreement. This Global Stock Take (GST) is to be carried out in a comprehensive, facilitative manner and will consider mitigation, adaptation and means of implementation and support in light of equity and the best available science. The first GST will take place in 2023 and occur every five years thereafter.

The outcome of the GST will inform Parties in updating and enhancing, in a nationally determined manner, their actions and support as well as in enhancing international cooperation for climate action. The COP will convene a facilitated dialogue among Parties in 2018 to take stock of Parties' collective efforts with regard to peaking and achieving balance between emissions and removals to inform preparation of updated NDCs.

Under the Agreement, developed countries are to provide financial resources to developing countries to assist them with both mitigation and adaptation. Provision of scaled-up financial resources will aim to achieve a balance between adaptation and mitigation. Developed countries are obligated to communicate biennially indicative quantitative and qualitative information on finances, including projected levels of public finance to be provided to developing countries. Other Parties providing resources are encouraged to communicate such information biennially on a voluntary basis. Under the related Paris decision, developed countries state their intention to continue their existing collective mobilization goal through 2025 in the context of meaningful mitigation actions and transparency
on implementation. Prior to 2025, the COP/MOP will set a new collective quantified goal from a floor of $100 billion per year.

The Paris Agreement entered into force on 4 November 2016, 30 days after 55 Parties to the UNFCCC accounting for at least 55% of total global greenhouse gas emissions deposited their instruments of ratification, acceptance, approval, or accession to the Depository. The first session of the COP/MOP of the agreement took place in Marrakech, Morocco on 15-18 November 2016.\(^2\)

Reifsnyder concludes by noting that the actions of nations and citizens will determine whether the goals of the Paris Agreement can be achieved. One of the most important and significant actions countries took in the immediate aftermath of Paris was to adopt an amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer in Kigali, Uganda in October 2016 to phase down the use of hydrofluorocarbons (HFCs). This action alone could avoid as much as 0.5°C of warming by 2100.

The Climate and Clean Air Coalition (CCAC), initiated in February 2012, is also working on the so-called “short-lived climate forcers,” including methane, black carbon, and HFCs. Two other important events took place during the fall of 2016:

- The third Our Ocean Conference hosted by Secretary of State John Kerry in Washington, D.C. from September 15-16.
- The first ever White House Arctic Science Ministerial in Washington in September just one year after President Obama’s historic trip to Alaska in 2015.

Both of these events bear importantly on climate change in the Arctic by recognizing the tight links between atmospheric and marine systems and by stimulating the scientific research needed to supplement our existing understanding of the role of the Arctic in climate change.

**Japan**

In presenting a Japanese policy perspective on U.S. Climate Policy in an Arctic Context, Ambassador Kazuko Shiraishi notes that Japan is located close to the Arctic and is near the Bering Strait, the Pacific outlet of the Northern Sea Route. Climate change impacts have serious consequences for non-Arctic states like Japan. Japan’s Arctic Policy, released in October
2015, aims to take cross-cutting perspectives to ensure that Japan is a significant player in Arctic affairs. It contains seven basic elements:

1. Science and technology from a global viewpoint.
2. Environments and ecosystems.
3. International cooperation and the rule of law.
4. Indigenous peoples and respect for their traditional ways.
5. National security.
6. Economic and social compatibility with respect for climate and environment.
7. Arctic sea route and development of resources to assist economies.

Based on these elements, Japan has launched three initiatives:

1. Research and development: what’s going on and how it affects the global environment.
2. International cooperation: Japan has Arctic interests and wants to engage in rule-making in relation to the Arctic based on its scientific expertise.
3. Sustainable use of the Arctic: in order to prepare for utilization of the sea route, Japan would like a maritime authority to govern sea routes and to work on a framework for managing living marine resources.

Japan has more than 50 years of scientific monitoring and research in the Arctic. Japanese researchers have a base at Ny Ålesund in Svalbard. Japan has contributed data on sea ice and other issues including ocean acidification in relation to the Arctic. A project, entitled Arctic Challenge for Sustainability, has been initiated. This project has three aims: to understand climate change through integrated research; to determine future impacts; and to deliver information to decision-makers.

The way forward for Japan from a foreign policy perspective is to engage international stakeholders like those at NPAC as well as domestic stakeholders at home. Japan is trying to identify cooperative initiatives with other states and to implement its Arctic Policy strategically. Shiraishi notes Japan’s appreciation for the United States’ efforts to engage non-Arctic states in the Arctic Council.
Republic of Korea

Ambassador Chan-Woo Kim provides a perspective on the Arctic policy of the Republic of Korea. He notes that there have been a number of important developments since NPAC 2015, including the Paris Agreement on climate change and the 20th anniversary of the Arctic Council. Conferences, such as NPAC 2016, involving participants from Arctic and non-Arctic states, help to work toward sustainability in relation to the Arctic. The IPCC has forecast major reductions in Arctic sea ice. This leads to the conclusion that despite current efforts, the so-called “Arctic paradox” will continue at the current rate. The Republic of Korea adopted an Arctic Master Plan in 2013, followed by action plans to implement it. The Plan is built on two pillars: (i) to address climate change by conducting scientific activity and (ii) to develop economic opportunities arising from changes in the Arctic.

Scientific knowledge needs to be emphasized and enhanced in the effort to diagnose and understand ongoing phenomena and to find solutions to them. The Republic of Korea will contribute to this scientific knowledge. Korea’s Arctic research effort is led by the Korea Polar Research Institute (KOPRI) and carried out through assets such as the icebreaker Araon. Korea’s efforts will be strengthened by building a second icebreaker.

Business potential is a second pillar of the Arctic Master Plan. The Guggenheim Partners have been conducting initiatives in relation to Arctic infrastructure development based on the assumption that a large portion of container shipping will use Arctic routes by 2030. There are also USGS estimates of large recoverable reserves of fossil fuels in the Arctic. Sea routes and resource development will be important to the Arctic’s future. South Korea believes the Arctic will become a new zone of prosperity.

While the Arctic Council has handled Arctic issues since 1996, The Republic of Korea thinks it is time for the council to reconsider its governance arrangements for the next 20 years as Arctic issues become increasingly global in character. The Arctic Council should be reformed to include non-Arctic partners and acknowledge the global importance of the Arctic. Scientific research is the most promising area for cooperative dialogue. The non-Arctic states have both the capacity and the will to contribute to the sustainability of the Arctic. The Arctic states need to respond to these non-Arctic interests.
Russian Federation

Yury Sychev presents a brief perspective on Russia’s Arctic policy, noting that he is not a politician and cannot present Russia’s official policy. Russia begins from the premise that there are no problems that require military solutions in the Arctic. Current challenges can be resolved through communication and cooperation, and Russia expects this to continue to be the case. Russia has supported and will continue to support and participate in the Arctic Council, the Barents Euro-Arctic Council, and other regional cooperative bodies and fora that bring states with different interests together.

Russia will continue with its Arctic: A Territory of Dialogue conferences after a hiatus of three years. The next conference will take place in Spring 2017. The State Commission on the Arctic has tried to achieve a balance between regional and national authorities working on the Arctic since 2015. The commission has developed a new policy on the Northern Sea Route to be discussed during a later session of this conference.

Canada

David VanderZwagg provides a Canadian perspective on Arctic policy. He notes that he is not speaking on behalf of the Government of Canada. He describes Canada’s current approach as “policy pieces” and provides a number of examples.

Canadian policy is contained in several sources and encompasses several key pieces. The 2009 Northern Strategy put forward by the Conservative Harper government is the primary piece at the moment. Many of the initiatives launched under that strategy are ongoing activities and have not been renounced by the new Trudeau Liberal government. This strategy has four major pillars, (i) sovereignty (vessels are being built; NORDREG has been instituted; Hans Island is being addressed; the Beaufort Sea boundary is being considered, (ii) Social and Economic development (CANNOR has been created; a small craft harbor has been built in Pangnirtung), (iii) Arctic environmental heritage (Canadian High Arctic Research Station is being built; a national marine conservation area is being developed in Lancaster sound), (iv) Northern Governance (NWT devolution has been completed; the Arctic Council is a priority).

A second piece is Canada’s Foreign Policy Statement (2010) which puts some glosses on past policies. For example, it outlines Canada’s approach
to continental shelf extensions in the Arctic. More recent pieces of the Canadian policy picture have been enunciated in the 2015 Trudeau-Obama joint Arctic policy statement on climate, energy and cooperation.

Mandate letters to ministers in the Trudeau government are also relevant to the Arctic. Efforts are being made to increase the number of marine protected areas in the Arctic. Canada is again engaged on climate change issues. There have been policy commitments on Arctic fisheries (e.g. agreement with the Inuvialuit on a moratorium on commercial fisheries in the Beaufort Sea until more science is done).

Two other ideas that describe Canada's Arctic policy are “policy perplexities” and “policy promises.” One perplexing policy issue is the Northwest Passage. There are ambiguities regarding Canada’s position on issues relating to the Northwest Passage. The passage is open to transits, but there is not a clear vision on infrastructure developments and regulations covering use of the passage. Recent suggestions about a possible deepwater port in Iqaluit and a shipping corridor initiative are still unfolding.

With respect to promises, Canada’s Arctic strategy on the Coast Guard has not yet been released. Regulations to give effect to the Polar Code are under development, and the government has promised new initiatives dealing with indigenous peoples issues and health. Canada is making an effort to implement the UN Declaration on the Rights of Indigenous Peoples (UNDRIP). Canada’s NDC under the Paris Agreement pledges a 30% reduction in emissions from 2005 levels by 2030. Prime Minister Trudeau is meeting with provincial leaders and hopes to have a more fully-developed Canadian position on climate change soon.

China

Yang Jian provides a perspective on China's Arctic policy. He notes that his is not an official government position, but rather a “Shanghai Perspective.” He is hopeful that China will follow the lead of South Korea and Japan in developing an Arctic policy. To some extent China's current policy is passive and reactive. Awareness in China on Arctic issues is based on discussions with diplomats from the Arctic nations. Scholars on international law, global governance and international relations and world economy are the main contributors from the academic world to the formation of China's Arctic policy. China is a neighbor of the Arctic and an important stakeholder in Arctic affairs. China tends to approach Arctic policy
through issues like claims to extended continental shelves, sustainable use of resources and sea routes, and so on. More recently, climate change has also been on China’s radar. China’s economy is large and economic policy involves cautious approaches requiring lots of coordination with various departments. Drafting an official Arctic policy will take time. But it is likely to happen fairly soon. China’s overall development policy affects issues of global governance. Key words are: respect (for the Arctic Council, sovereign rights, indigenous rights, international law, and so on); win-win; and sustainability. These were reflected in a speech made by Chinese Foreign minister Wang Yi at the 2015 Arctic Circle conference. China wants to make scientific contributions to Arctic knowledge through multilateral and bilateral cooperation.

China is a potential user of the Northern Sea Route and a consumer of Arctic resources such as fish, oil and gas. China also wants to participate in global governance to deal with climate change and to see sustainable development that promotes balanced social systems. China takes peace and stability as the key bases for Arctic governance and sustainable development. It believes international security can be advanced by dialogue to preserve peace in the Arctic.

**Inuit Circumpolar Council**

Okalik Egeesiaq presents Inuit perspectives on Arctic policies. She notes that Arctic developments impact everyone around the world and, conversely, the world affects the Arctic. ICC is an international organization within the UN and one of six Permanent Participants in the Arctic Council. ICC represents Inuit in four countries (Russia, USA, Canada, and Kingdom of Denmark) and has been a strong voice for Inuit for almost 40 years. Egeesiaq is the international president of ICC representing Inuit in each of the four Arctic states where Inuit reside.

Arctic peoples have possibilities to work with peoples and governments in non-Arctic areas. Already most stakeholders realize that Permanent Participants are practical partners in their work. A collective mandate can be developed. There is no time for an “us vs. them” approach. There is a need to protect the Arctic as a global commons and to maintain the viability of Arctic communities. There is also a need to take a long-term view of the Arctic.

Inuit look back to the past to help inform their views of the future.
Inuit have survived many challenges in the past and are a resilient people. They have unity across Inuit Nunaaat. Acquisition of knowledge among Inuit has been based on millennia of observation, but now there is a need for a broad-based plan for development and growth to address planetary challenges and issues. Across states and even within states, each Inuit community is unique. So the challenges facing Inuit vary. Responding to these challenges requires creativity. Devolution of governance systems gives Inuit more control over their future. But there are still major capacity and resource needs.

The context for Arctic state and non-Arctic state policy statements has changed over the years. The United States has made Arctic commitments through the 2015 GLACIER conference and held an important White House science conference in fall 2016. Russia has released its Arctic 2020 policy. Most Arctic states have released Arctic policies and strategies in the past five years. This is also the case for many non-Arctic states.

As for Inuit, they need more say in the future of the Arctic to address their own needs and those of their children and grandchildren. Inuit need to be partners in many of these Arctic strategies being generated by Arctic and non-Arctic states because these policies and strategies describe intentions to make use of Arctic resources including human resources. Knowledge of the Arctic is required to implement Arctic policies. Investment in human resources is needed to support trade and economic development. International Arctic policies can be framed to advance domestic policies. The Arctic Council must be strengthened as a governance process with ICC and other Permanent Participants strengthened within it.

Canada has an historical roll in Arctic policy. Canada is working to implement land claims, advance traditional knowledge and develop renewable energy systems for the Arctic. These and many other issues are too big to be handled successfully without partnerships.

Open Discussion

Significant points articulated during the open discussion include:
- The Guggenheim Partners work on an Arctic Infrastructure Protocol suggests that $1 trillion of investment in infrastructure will be required in the Arctic over the next 15 years.
- There is an immediate need to invest in human resources not just natural resources.
• Traditional Knowledge holders in indigenous communities do not always have the means to cooperate in scientific exchanges.
• Science is important for understanding the implications of change to inform business decision-making.
• Not all infrastructure investments will bring a return on investment (e.g. a new water system for a community), so clarity is required on questions of infrastructure development.
• Investors need to understand the differences and the conditions presented by the Arctic.
• Japan will host a consultation to see if there are Arctic specific ideas or projects that could be developed with China and the Republic of Korea.
• The Arctic Council has carved out the Arctic as a place for cooperation and this makes a contribution to global stability.
• Some Pacific states are dissatisfied with Observer status and want to do more in the Arctic.
• Having observers at the Arctic Council table is an advantage but there is a need to work out the details of how observers will participate in meetings.
• The real value-added of Arctic Council meetings comes informally, on the margins of formal meetings over dinner, etc.
• There are some fundamental questions we do not understand about feedback loops in the Arctic (e.g. release of methane; ocean circulation patterns; heat exchange off Greenland).
• To foster cooperation on these big questions, diplomats need to address themselves to getting agreements and commitments to tackle such issues.
• The business and investment communities will need to be involved to tackle infrastructure and other big issues facing the Arctic.
• Some Arctic issues, such as climate change impacts, need to be seen as global issues, not regional issues.
• Interconnections between the Arctic and the outside world are increasing; while most issues over the past 20 years could be handled in the Arctic, this is not the case now.
PART II: IMPLICATIONS OF THE PARIS AGREEMENT FOR THE ARCTIC

Taking the discussion in Part I as a point of departure, Part II directs attention to the implications of recent developments in climate policy for the Arctic. Daniel Reifsnnyder initiates the discussion by observing:

- The changes that may be ushered in because of the Paris Agreement will be crucial to the Arctic, both in terms of coping with the impacts already being experienced and in averting the release of methane, currently locked in the permafrost, as a climate change multiplier.
- The future is in our hands, and it will be up to participants here in this room as well as millions of others across the globe to determine what will unfold and what kind of world we will leave to the future.

Five panelists then consider the impacts of the Paris Agreement on the Arctic from a range of perspectives. Julia Gourley, the U.S. Senior Arctic Official, presents an Arctic Council perspective. Sung Jin Kim, Former Minister of Maritime Affairs and Fisheries of the Republic of Korea, provides a non-Arctic State perspective. Lars-Otto Reiersen, Executive Secretary of the Arctic Monitoring and Assessment Programme (AMAP), outlines the perspective of an Arctic Council Working Group. Okalik Egeesiak, President of the Inuit Circumpolar Council (ICC), offers an Arctic community perspective. James Gamble, Executive Director of the Aleut International Association (AIA), provides an Arctic Council Permanent Participant perspective.

Major Observations

Several major observations arose from these presentations. The Paris Agreement represents a major step forward. For the first time, most of the world’s countries have joined together to forge an agreement that contains serious commitments to address the problem of climate change. It also includes mechanisms for assessing progress over time and strengthening or ratcheting up commitments in a timely manner. Nevertheless, it was pointed out that there is no basis for celebration from the perspective of the Arctic for several reasons:
1. The impacts of climate change on the Arctic exceed those globally and are accelerating. The impacts of climate change are already severe and will become more severe during the foreseeable future. The reduction in snow cover is as dramatic as the loss of sea ice. Ocean acidification is a growing threat. Greenland is the sleeping giant in the system. There is a need to harvest carbon from the atmosphere rather than simply reducing emissions.

2. The people of the Arctic are particularly affected. The people of the Arctic must live with the reality of climate change as well as a variety of other major problems involving issues of health, education, and welfare. The combined effects of these forces constitute a serious threat to Arctic communities, particularly communities in which a high proportion of residents are indigenous.

3. Arctic communities are particularly hard hit because they are located in advanced industrial societies and therefore are not eligible for sources of assistance available to developing countries.

The ensuing discussion emphasized that a broad range of Arctic actors are taking active steps to address climate change on a number of levels. The Arctic Council is an active player. The council is taking steps to support the Paris Agreement through measures emphasizing resilience as well as adaptation. An Arctic Resilience Action Framework is under consideration. There is discussion of developing an Arctic Council strategic plan driven by the issue of climate change. Arctic Council-associated entities are also active. The Arctic Coast Guard Forum and the Arctic Regulators Council, for example, are focusing on issues pertaining to climate change, especially those related to the Paris Agreements. Indigenous peoples organizations are particularly concerned and active. These organizations are working on these issues from the ground up.

Additional Themes

A number of additional themes emerged during the discussion. We need a new understanding of the co-production of knowledge and especially recognition that indigenous knowledge is a distinct and valuable type of knowledge rather than simply an adjunct to western science. We need to improve the connections among regional bodies, such as the Arctic Council, and global mechanisms, such as the multilateral environmental
agreements and international organizations like the IMO. Climate change is a crosscutting issue that requires integration across a range of sectors. Transcending the stovepipes of distinct agencies is hard under any circumstances, and all the more so when it involves a number of different countries. But it is critical to find ways to bring these different players together in order to solve a problem as complex as climate change. The Paris Agreement does not deal with some major issues (e.g. black carbon emissions from commercial ships and aircraft) that are important in the Arctic. Dealing with these issues should be a priority going forward.

The success of the Paris Agreement will depend on a number of factors that together provide the basis for a “UPA strategy”:

- A robust understanding of and insight regarding the central challenges of change.
- A set of planning strategies, implementation plans and venues.
- A set of realistic and properly supported actions.

We have done well at understanding and are making real progress in the area of planning. But the critical challenge during the next stage will be to translate these advances into action, with a particular focus on more fully engaging the world’s financial capacities to deal with climate change and to make a strong commitment to bring these resources to bear on the problem.

PART III: THE FUTURE OF THE ARCTIC OCEAN

Part III seeks to identify emerging human activities in the Arctic Ocean over the medium to long term (out to 2040 and beyond) and then to ask about issues pertaining to regulation, administration, and the welfare of coastal communities associated with these developments. Activities covered include: fisheries; shipping both along the NSR and using the Transpolar Route; and ship-based tourism. Issues relating to these developments concern: (i) regulatory measures needed to address needs for governance, (ii) organizational/infrastructure arrangements needed to provide services, implement regulations and ensure compliance, and (iii) initiatives designed to ensure that coastal communities benefit from these developments rather than experiencing harmful effects.
Major Trends and Policy-Relevant Issues

Several participants characterize major trends in human activities pertaining to the Arctic Ocean. Alf Håkon Hoel explains that Arctic and subarctic fisheries are currently among the largest in the world. These fisheries are better managed today than they were in 1991. But we can expect significant changes by 2040, including fishing in new areas, more concern about food security, increases in aquaculture, more interest in marine genetic resources, new fishing technologies, and a focus on the shelves rather than the deep water of the Central Arctic Ocean.

Scott Stephenson emphasizes that the picture regarding future uses of the Transpolar Route for shipping remains unclear. There is much variation among models regarding the feasibility of central Arctic shipping. While the use of the Transpolar Route may be feasible technologically, at least in the summer, the economics of the route may be unfavorable. What is most likely is a gradual shifting of shipping routes to the north away from the coast of Russia.

As Yury Sychev notes, on the other hand, Russia expects a major increase in the use of the Northern Sea Route, especially to move cargo to and from Russian ports. Russia is undertaking large-scale developments in infrastructure, including ports, icebreakers, and railroads to serve economic development of the Russian North. There is less optimism, however, regarding through or transit traffic along the NSR.

In assessing the future of ship-based tourism, Peter Ortner explains that there is a fundamental difference between expeditionary cruise vessels and larger conventional cruise ships. Limits on growth in this realm include: lack of shoreside infrastructure, data gaps, SAR facilities, risk management, and regulatory support. There may be a 20-30% growth over the next five years and up to 50% growth over 20 years.

Developments in these areas are likely to raise a number of policy relevant concerns. David VanderZwaag discusses regulatory matters, including the question of whether any fisheries should be allowed in the Central Arctic Ocean, the prospect of the development of a broader UNCLOS Implementing Agreement on Biodiversity Beyond National Jurisdiction, vessel routing schemes for ships, and issues relating to marine protected areas, such as possible PSSAs or EBSAs.

Kathleen Duignan, a captain in the U.S. Coast Guard takes up practical matters, including preparing for emergencies and developing dependable
infrastructure. The U.S. Coast Guard is developing a strategy to deal with these issues, and the efforts of the Arctic Coast Guard Forum seem promising on a larger scale.

Denise Michels, a former mayor of Nome, Alaska, observes that local communities face opportunities as well as challenges in the face of these developments. Food security and the onset of climate change are major concerns. Practical problems include the need for better subsistence harvest mapping, the prevention of spills in the Bering Strait region, and the development of new techniques like "geo-fencing" to protect wildlife of interest to subsistence users.

Discussion among the panelists turned up several important observations:

1. Developments in the areas of fishing, shipping, and tourism may interact with one another. It will be important to look for synergies in this realm as well as to solve tensions among these activities. For example, there may be opportunities to develop infrastructure that is useful at one and the same time across all of these areas.

2. The use of strategically designed marine protected areas may help to avoid serious environmental impacts arising from resource development. But it is important to be clear on the purposes of MPAs and to recognize that there are many types of protected areas.

3. Infrastructure is a central concern. The contrast between the large-scale development of infrastructure in Russia and the more modest developments in the western Arctic is striking. Achieving the proper balance between the private sector and the public sector in the development of infrastructure is a challenge.

4. It is important to take note of global initiatives that could have a major impact on activities in the Arctic Ocean. One prominent example is the prospect of reaching agreement on the terms of an Implementing Agreement on Biodiversity beyond National Jurisdiction under UNCLOS.

General Discussion

A number of additional issues emerged in the course of the general discussion. We should be thinking not only about shipping but also more broadly about marine operations. The real issues lie in addressing the
broader problems of marine operations beyond ships per se. Regarding infrastructure, there may be opportunities to involve local actors, to provide training for first responders, and to achieve a lot with a modest investment of resources. Exercises like the 2016 Arctic Chinook exercise dealing with SAR can be helpful. With regard to projections of the future of shipping, much depends on the choice of scenarios concerning matters like sea ice.

The impacts of large numbers of tourists descending on small Arctic communities constitute a serious concern but there are limits to the growth in numbers of tourists. There are opportunities for improving the integration of western knowledge and indigenous knowledge in addressing issues in this realm. One interesting option would be to run intensive exercises or workshops designed to focus on specific challenges in this realm. Finally, we must not ignore the danger of serious accidents in the Arctic Ocean and the human costs of such events. One participant recalled the problems arising from the sinking in 1989 of the Bahia Paraiso near Palmer Station in Antarctica. Something like this on a larger scale could occur in the Arctic.

PART IV: ARCTIC NATURAL GAS IN A GLOBAL CONTEXT

Part IV directs attention to energy development and specifically to the role of Arctic natural gas out to 2040. Arctic gas is expensive to extract. This raises serious questions regarding the profitability of Arctic gas, given the recent collapse of world market prices for energy and the prospect that low prices may continue into the future, resulting from the emergence of new supply sources at the same time as increasing efforts are made to reduce dependence on fossil fuels to combat climate change. However, Arctic deposits of natural gas are large; they are politically and economically important, especially for Russia whose economy is heavily dependent on the production and sale of hydrocarbons. They are also of potential significance to countries like China, Japan, and Korea interested in diversifying their sources of imported fuels.

Seven experts present perspectives in Part IV relating to Arctic gas development through 2040, with particular reference to developments in international climate policies, the global energy supply-demand picture, technological innovations, and trilateral relations among China, Russia, and the United States. David Pumphrey speaks of the role of natural gas
as a transition fuel to a low carbon future. Tomoko Hosoe addresses the impact of the Paris Agreement on the mix of fuels used by Japan in power generation. Yong Hun Jung discusses a similar set of questions pertaining to the fuel mix of the Republic of Korea. Keun Wook Paik adopts a broader perspective in asking about the possible role of the Arctic as one of the future global natural gas supply hubs.

Mark Myers turns to technological innovation and infrastructure development as determinants of the future course of hydrocarbon development in the Arctic. Tatiana Mitrova emphasizes the importance of long-term price projections as determinants of the prospects for the development of large gas reserves in the Arctic. Yang Jian then brings in considerations of political economy in analyzing the role of natural gas as a factor affecting the broader course of relations between China and Russia.

Taken together, these perspectives highlight seven factors influencing the prospects for Arctic gas development ranging from technological innovations to global markets and the choices of individual countries regarding their fuel mixes.

Technological Innovation

Arctic oil and gas development increases the risk of a serious oil spill into the Arctic marine environment due to the growth of ship traffic, more offshore wells, and additional coastline facilities such as fuel storage tanks. This requires that a complete oil spill toolbox be readily available for early response. Continued research is important in understanding and characterizing the long-term potential of methane hydrates in the Arctic. Arctic sandstone reservoirs hold the most promise for near-term recovery of natural gas from methane hydrates; portions of these reservoirs are located onshore within range of existing oil and natural gas production infrastructure.

China-Russia Relations

China and Russia are developing closer economic ties with energy as a central element. However, China will want to avoid alienating western countries. China does not want to form blocs or military alliances. Russia-China energy cooperation faces three big challenges: agreement on pricing; mutual understanding of policies; culture and business; and western
sanctions. China has an interest in Russia’s Arctic oil and gas as well as the Northern Sea Route because it offers diversification of energy supplies. This is the main reason why China has taken a strong interest in development of the Yamal LNG project.

Russia’s Priorities and Constraints

Despite a lower price environment, Arctic gas development remains quite promising over the longer term, because gas use is growing in all global scenarios. There is, however, a huge difference in the economics of Arctic offshore development and onshore projects (e.g. Yamal). Onshore production in Northwest Siberia (Nadym-Pur-Taz and Yamal peninsula) is commercially viable, with low costs of production ($0.3-1/Mbtu) and the use of predominantly Russian technologies. The transportation infrastructure is already in place. There is no doubt that gas production in this area will continue in any projected price environment.

Low prices and a new geopolitical environment, however, will have major impacts on offshore developments in the Barents Sea, the Kara Sea, and Ob-Taz Bay. The new Arctic offshore projects in these areas are associated with high costs of production (above $3/Mbtu), uncertainties, and technological, economic and environmental risks. In the current geopolitical climate, the future involvement of international majors in the Russian Arctic is becoming increasingly uncertain. At present, transfer of all technologies for Arctic offshore drilling and production are under sanctions by the United States and the European Union. Attracting international financing for these projects is difficult, while the Russian domestic financial market as well as investment possibilities of Russian companies are limited. China’s financial commitment to the Yamal LNG project is a turning point in Arctic gas development.

International Climate Policies

The policies countries adopt to confront climate change will have a major impact on the demand for natural gas. Less stringent polices, like those represented by current NDCs under the Paris Agreement, are not likely to accelerate demand for natural gas. Current commitments will not reach the 2°C target. As carbon policies become more stringent, however, natural gas is expected to play a larger role in the power sector. The Paris
Agreement, which implies a continuous strengthening of commitments, will require massive changes in the energy sector, particularly the power sector. NDCs under the Paris Agreement will be politically and commercially difficult to fulfill. Maintaining acceptable prices for energy is a key to economic growth, seen by governments in many developing countries as more important than reduction of GHG emissions. Should climate policies become an important issue in trade negotiations, however, it could push governments and industries to take serious measures.

Fuel Choice for Power Generation

The electric power sector is viewed as the most critical part of the overall energy system in the context of actions to address greenhouse emissions. Consumption of various fuels used to produce electric power has been growing rapidly as economies are becoming increasingly electrified. Electric power generation represents about 40% of all energy consumed in the global economy. The electric power sector has the broadest range of options to produce power from both fossil energy and “clean” fuels such as nuclear, hydropower, and renewables, such as wind and solar.

Fuel choice for power generation is driven by relative costs for plant, fuel, efficiency, utilization rates, and location. In the United States, natural gas has moved quickly to overtake coal as the leading base-load fuel in power generation, thereby becoming a major factor in regulating GHG emissions. According to EIA’s cost of energy estimates, natural gas shows a cost advantage over nuclear and coal in electric power generation, but wind power is at similar cost level. Lowered costs for renewables and increasing utilization rates have improved their competitiveness.

Rapid increases in U.S. production of shale gas led to a discussion of whether gas could be a bridge fuel on the way to decarbonization. Natural gas has about half the carbon intensity of coal and one-third of oil. Gas combined cycle technology is more efficient than coal – even advanced coal technologies. However, if the world envisages radical decarbonization in the longer term, consumption of natural gas also will have to be curtailed at that point. This could mean that long term investments securing natural gas as a bridging fuel in the medium term will not be forthcoming. To solve this paradox some sort of support or ‘insurance’ scheme may have to be developed to prevent gas investments from drying up.
Global Gas Supplies

For Arctic natural gas development to become attractive, an increase in demand due to greater use of natural gas to meet climate commitments is not a sufficient factor. A price of natural gas high enough to make the Arctic attractive for long-term investment will likely exceed the price that will support a natural gas bridge. Only a limited number of Arctic LNG projects serving established natural gas production bases are likely to become a reality. But all the major Northeast Asian countries will be big consumers of gas. In particular, China’s environmental policies will drive gas demand and contribute to global LNG production. China, Korea and Japan may share an interest in forming an alliance of “gas consumers to coordinate LNG purchases and facilitate lower cost investment in LNG projects. A gas-purchasing consortium could provide negotiating weight in contracts with suppliers and thus lower LNG prices. The three Northeast Asian countries could use government financing institutions and sovereign wealth funds to provide financing for LNG hubs in the Arctic to increase supply. In the meantime, supplies from other regions are likely to increase, including the U.S. (LNG via the Panama Canal), East Africa and Iran. In this context, LNG supplies from Arctic areas will help to make the prospect of LNG as a global commodity more realistic.

Energy Policies of Major LNG Importers

The Chinese government sees increased use of gas in power generation, alongside greater use of nuclear power and renewables, as one of the key ways to reduce carbon emissions and improve the country’s environment. In April 2016, the National Development and Reform Commission and the National Energy Administration announced new measures that would halt the planned construction of about 200 new coal-fired power plants in China.

China, by far the world’s biggest emitter of greenhouse gasses, is aiming to reach a peak in carbon emissions by 2030 or before. China’s gas-fired power capacity accounted for 4.4% of the country’s total generating capacity in 2015. According to the National Energy Administration, it is likely to reach 5.1% by 2020 and 6.3% by 2030 (200 GW). All China’s gas is supplied at present by the three big Chinese oil companies—PetroChina, Sinopec and CNOOC. For the future, power generators will be allowed to import LNG directly from abroad.
The highlight of Japan's current power generation mix target for 2030 is that nuclear energy remains a factor in base-load capacity, accounting for 20-22%. Coal is also regarded as a base-load fuel, thanks to the low cost of using it as well as lack of geopolitical supply concerns. Nevertheless, due to persistent environmental opposition to coal-fired power generation, METI supports use of LNG as a fuel for Japan's base-load power generation. There is also some uncertainty over the scope for nuclear in base-load power generation because of market deregulation.

In Korea, nuclear power generation has become politically unpopular. If the planned nuclear program is either revised downward or cancelled totally, demand for fossil energy will inevitably increase to meet the growth in electricity consumption. Korea is a small country and more than 70% of the land is rugged terrain. It lacks not only fossil fuel resources, but also renewable resources such as good quality wind and sunlight. If Korea acts to reduce GHGs to the level pledged in its NDC, switching to natural gas from oil and coal appears most suitable, as it is economically viable and publicly acceptable since Korea already owns relevant technologies and experience to expand natural gas consumption. So far, however, maintaining acceptable prices for energy is of key importance to the industrial sector and more important for the government than reduction of GHG's.

CONCLUSION: METHODS FOR ANALYZING ARCTIC FUTURES

In envisioning Arctic futures, NPAC 2016 included a facilitated discussion focused on the Future of Arctic Marine Infrastructure. The discussion explored a broad set of maritime issues: ports, charting and hydrography, aids to navigation, search and rescue (SAR) capacity, environmental response capacity, icebreaking, salvage, pilotage, ice information systems, environmental monitoring and observing, marine domain awareness (ship traffic surveillance), shipyards and repair facilities, communication systems, routing schemes, and more. Marine infrastructure is seen as a key priority for future safe, environmentally sound, and efficient uses of the Arctic Ocean, which are closely linked to the sustainable development of the Arctic’s natural wealth. Linkages between Arctic marine operations and shipping and similar activities in the North Pacific and North Atlantic regions are also expected to draw investments essential to an expanded
Arctic marine infrastructure that will enable and stimulate the connections of trade within the Arctic to the broader set of outside global markets.

The facilitated discussion employed a scenario planning process with an emphasis on identifying drivers or significant factors that will influence the future of Arctic marine infrastructure. As the U.S. National Climate Assessment noted in its 2014 report:

"Scenarios are important tools that help with analysis of climate drivers and the effects of management and policy decisions. They provide the scientific research and assessment communities with the capability to:

1. Evaluate the governing conditions (such as timing and rates of change in concentration of greenhouse gases and aerosols) in the atmosphere that might unfold under specific socioeconomic conditions and technological and environmental options;
2. Assess the natural response of the Earth system and the potential impacts and consequences of a range of future climates; and
3. Evaluate the implications of different approaches to mitigation and adaptation."

Stakeholders whose interests are affected and scientists with the expertise to identify the drivers provide the foundation for a scenario-building effort to enable assessments at regional to more local scales on timeframes of relevance to policy-making.

In the NPAC 2016 exercise, participants identified a diverse set of key drivers that would underpin the development of scenarios dealing with the Future of Arctic Marine Infrastructure. The session highlighted the complexity and range of drivers of change (social-indigenous, economic, political, environmental, and technological) that are likely to impact the future of the Arctic and the needs for maritime infrastructure. The NPAC planning exercise focused on the initial phase of scenario development, a brainstorming session that generated ideas to serve as a basis for developing a set of plausible scenarios.

During the brainstorming session, participants identified 75 drivers of change that could affect the future of Arctic marine infrastructure, from which a consolidated set of nine key drivers emerged. The numbers in the following list are the number of participants in a voting session who thought that this driver was among the most import:
1. Financial Challenges (Combined votes 48)
2. Geopolitics and Sovereignty (33)
3. Rising Indigenous Voices and Needs (32)
4. Governance (32)
5. Market Forces (31)
6. Regulatory Environment (27)
7. Climate Change (25)
8. Redefining Regional Arctic International Community (25)
9. Environment (20)

The next step in a scenarios process is to use the key drivers as axes of variance in four-quadrant matrixes. For example, during the development of the Arctic Marine Shipping Assessment, an exercise similar to the one used in this session identified a set of drivers that resulted in a Four-Quad Scenario (high demand and unstable governance, high demand and stable governance, low demand and unstable governance, low demand and stable governance) where two drivers were the critical elements of the scenarios:

**Governance**: Depicts the range of levels of relative stability of rules for marine use both within the Arctic and internationally. Less stability implies shortfalls in transparency and a rules-based structure, and an atmosphere where actors and stakeholders tend to work on a unilateral basis. More stability implies a stable, efficiently operating system of legal and regulatory structures, and an atmosphere of international collaboration.

**Resources and Trade**: Depicts the range of levels of demand for Arctic natural resources and trade. This axis exposes the scenarios to a broad range of potential market developments, such as the rise of Asia or regional political instabilities. More demand implies higher demand from more players and markets around the world for Arctic resources, including increased access for trade in the Arctic Ocean. Less demand implies fewer players interested in fewer resources.

To obtain a set of plausible scenarios, a description and detailed analysis is developed for each of the four quadrants.

Scenario planning has become a major strategic tool for exploring many environmental issues, from the IPCC to national climate and environmental change issues. Scenarios are plausible sets of future conditions that are relevant in a particular analysis of the future. These scenario planning efforts are likely to be important to the future of NPAC activities, hence building on the 2016 NPAC facilitated discussion and other scenario
planning strategies will be a foundation for NPAC in 2017 and beyond. Over the next three years, NPAC should develop the overarching theme of “Building Capacities for a Sustainable Arctic” and focus on topics such as:

- Sustainable Arctic marine operations and supporting infrastructure.
- Engaging the next generation of leaders for the future of the Arctic.
- Sustainable communities in ice-free coastal regions.
- The Arctic region as a global partner in sustainable futures.

In this connection, NPAC should move from a “Supply Strategy” (i.e., providing insights, new knowledge and strategies arising from the work of the science and expert communities) to a “Demand Strategy” where future NPAC initiatives reach out and engage those affected by change who understand the challenges and opportunities and who are partners across a cascade that moves from:

1. Enhanced and deeper Understanding to;
2. Strategic and user-oriented Planning; and finally, to
3. Actions that adapt to and address causalities of change and provide pathways to a more sustainable future for the Arctic region and beyond.

The programs for 2017 and beyond will build on NPAC’s past accomplishments and engage these framing concepts to: Build Enhanced Capacities for a Sustainable Arctic through Improved Science-Policy Engagement.

Notes

1. Many of the following points are based on Session Chairs’ Reports from the 2015 North Pacific Arctic Conference prepared by Charles Morrison, Robert W. Corell, Oran Young, Yoon H. Kim, Bernard Funston, David VanderZwaag, and Arild Moe.
2. As of February 2017, 129 countries have signed on as Parties to the agreement, including seven of the eight Arctic Council members.
The Korea Maritime Institute (KMI) is a government-affiliated research organization under the umbrella of the National Research Council for Economics, Humanities and Social Science (NRC) in the Republic of Korea. Since its establishment in 1984, KMI has been a major think-tank in the development of national maritime and fisheries policies including shipping and logistics, port development, coastal and ocean management, maritime safety and security, and fisheries affairs.

The East-West Center (EWC) promotes better relations and understanding among the people and nations of the United States, Asia, and the Pacific through cooperative study, research, and dialogue. Established by the U.S. Congress in 1960, the Center serves as a resource for information and analysis on critical issues of common concern, bringing people together to exchange views, build expertise, and develop policy options.