ARCTIC FUTURES SYMPOSIUM 2013

A HOLISTIC APPROACH TO A SUSTAINABLE ARCTIC

OCTOBER 16th - 17th
BRUSSELS, BELGIUM

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REPORTING

PREFACE

Every autumn since 2010, the International Polar Foundation and its partners have organized a multinational, multidisciplinary and multi-stakeholder conference on the Arctic. Held in Brussels for the benefit of the European Institutions, as the EU continues to craft its Arctic policy, and free of charge to make discussions on Arctic issues accessible to as many Arctic stakeholders as possible, the annual Arctic Futures Symposium brings together a wide variety of stakeholders: local and national policymakers, Arctic indigenous peoples, natural and social scientists, academics, and representatives of industries operating in or with interests in the Arctic.

Every year, participation in the symposium has grown, reflecting the ever-increasing interest in the Arctic as a region of interest for a wide variety of stakeholders. October 2013 saw the fourth edition of the Arctic Futures Symposium, which saw a record number of attendees, as well as a record number of live video streaming spectators.

The 2013 symposium was organized with the help of sponsors including the Belgian Ministry for Foreign Affairs and Statoil, as well as the support of contributors such as the North Norway European Office, the EU Arctic Information Centre consortium and the European External Action Service (EEAS). A shipping workshop on the second day of the symposium was organized in conjunction with the Arctic NGO Forum, an initiative funded by the EU Commission Directorate General for the Environment and coordinated by GRID-Arendal and Ecorys. The International Polar Foundation wishes to thank all sponsors and partners for their help in making the symposium possible.

The International Polar Foundation would also like to thank the speakers who took time from their busy schedules to share their expertise and knowledge with the audience and other Arctic stakeholders, as well as the participants who contributed to lively and informed discussions on a wide variety of Arctic issues.

What follows are the proceedings of the 2013 symposium as they were recorded.

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WEDNESDAY, **16 OCTOBER, 2013**

OPENING STATEMENTS

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ALAIN HUBERT

PRESIDENT OF THE INTERNATIONAL POLAR FOUNDATION

In welcoming speakers and attendees to the fourth Arctic Futures Symposium, International Polar Foundation President Alain Hubert highlighted the fact that interest in the symposium has been growing over the past years, and that the event could now be viewed online via video streaming. Since the first Arctic Futures Symposium in 2010, the event has evolved into an important occasion for Arctic residents and stakeholders to interface with stakeholders in Europe and elsewhere in the mid-latitudes. The symposium has become an opportunity for stakeholders such as Arctic operators, scientists, policymakers, businesses and residents to share their experiences and viewpoints with those who come to listen and learn.

Mr Hubert expressed the hope that this year's conference would again yield a constructive dialogue, and that this occasion to meet and discuss would lead to a greater mutual understanding as well as new initiatives and partnerships. In reference to the Arctic Council's Ministerial meeting in Kiruna, Mr Hubert highlighted the Council's vision for a peaceful, prosperous, safe and healthy Arctic. The speakers at the 2013 symposium were going to address this vision in its different facets, including the progress already made and the progress yet to be made in areas of cooperation, economic development, scientific research and safety at sea over the two days of the symposium.

DIDIER REYNDERS

BELGIAN DEPUTY PRIME MINISTER, BELGIAN FEDERAL MINISTER OF FOREIGN AFFAIRS, FOREIGN TRADE AND EUROPEAN AFFAIRS

With a main emphasis on the profound changes taking place in the Arctic, Minister Reynders addressed the fact that new opportunities and challenges would force global leaders to show political courage and the power to inspire and mobilize in order to tackle these changes with an international effort. Minister Reynders' speech focused on three key areas:

- Opportunities and Challenges of an opening Arctic
- The Role of the EU
- The Need for a Multilateral Approach

Regarding the opportunities and challenges of an opening Arctic, the Minister called attention to the long-term responsibility of the international community, as the future of the Arctic would directly impact the well-being of generations to come and thus should be seen as one of the most serious issues of our time. The current generation of global leaders, according to Reynders, could design solutions to safeguard the Arctic with imagination and courage.

Rising temperatures in the Arctic have led to a retreat in sea ice in the region, unlocking mineral resources and faster transport routes; the Arctic is therefore rapidly opening up for further development. This can create certain humanitarian and economic concerns, but also a wide range of opportunities for innovative entrepreneurs - including Belgian companies that are involved in maritime transport and offshore activities.

Increased shipping and mining activities as well as hydro-carbon extraction and tourism are some of the new opportunities drawing growing interest from international

actors, said Reynders. The Minister pointed out that fishing, mineral mining, and oil and gas extraction are becoming increasingly significant in a world in dire need of a new sustainable social economic model. Although the emergence of the Arctic as a large-scale bulk-carrier transport corridor was characterized as long-term prospect by Reynders, ice-free summers in the Arctic might eventually, over the long-term, lead to the development of new trade routes. This in turn would indicate the need for disaster prevention measures, as another disaster on the same scale as the 1989 ***Exxon Valdez*** tanker spill in Alaska would have unprecedented consequences.

As environmental changes in the Arctic would lead to repercussions in other parts of the planet and major problems across borders and continents, these changes need to be addressed in a global way.
Minister Reynders stated that the indigenous populations, which account for 10% of the four million people living in the Arctic, are facing a threat to their traditional ways of living due to these changes. Traditional lifestyles are threatened by the ongoing changes.

Concerning the role of the EU, Minister Reynders pointed out that the EU is not only a major user of the Arctic's natural resources, but also impacts the region and its stakeholders through its policies and regulations. Three Arctic Council countries are also EU member states, and the bloc maintains close relations with Iceland and Norway through the European Economic Area (EEA) and upholds strategic partnerships with Canada, Russia and the US. According to Reynders, the EU strongly promotes international efforts to fight climate change and to reach a new global climate agreement during the 2015 UN Climate Conference (COP 21) , to be held in Paris. In addition to its engagement with Norway, Russia and Iceland through the Northern Dimension Policy, the EU's interest in issues such as energy, maritime transport, fisheries and economic opportunities have lead the bloc to work for strong cooperation with their Arctic partners.

Reynders briefly outlined the European Commission's engagement in the Arctic to date, citing its long history of participation in the Arctic Council as observers and the Joint Communication on the Arctic the Commission released in 2012. The latter constitutes a part of the EU Arctic Policy, which places special emphasis on multilateral cooperation and an enhanced dialogue with Arctic indigenous communities. As Reynders recounts, the Commission's application for permanent observer status in the Arctic Council has been affirmatively received, but implementation has been deferred. Against this background, Reynders expressed Belgium's hope that a solution for these concerns can quickly be found, since the EU has an important role to play in supporting Arctic cooperation.

Reynder's third point addressed the need for a multilateral and multidimensional approach to Arctic governance. Although there is an existing framework of international law as well as agreements and tools for multilateral governance, Reynders articulated the need to further develop and strengthen these tools and frameworks. The Minister voiced Belgium's hope that the Arctic Council as the main international forum concerned with Arctic issues, would further develop its important work, and that a strengthened Arctic Council could play a leading role in cooperation in the Arctic.

Minister Reynders briefly referred to recent agreements reached through the Arctic Council, such as the 2011 Agreement on Search and Rescue and the 2013 Agreement on Oil Spill Response. "I hope it is possible for the European Union to take part more efficiently in the work of the Arctic Council," Reynders added.

In his concluding remarks, Minister Reynders stressed the need for an integrated approach across different policy areas in order to ensure that economic development and environmental sustainability in the Arctic go hand-in-hand.

ISABELLE DURANT

VICE-PRESIDENT, EUROPEAN PARLIAMENT

EP Vice-President Isabelle Durant opened by reminding the audience that global warming not only has environmental consequences, but also political repercussions. The melting ice makes the Arctic – which has long been seen as the northern border of humanity – a geopolitically sensitive area. Newly-opened access and natural resources have started to draw interest from a wide range of states, including Russia, the US, the Scandinavian countries, Canada and China, resulting in increased legal and political tensions in the region.

Durant noted that the EU has a number of important economic interests in the Arctic. A quarter of the oil currently used in the EU comes from the region - a figure that is expected to increase in the future. Similarly, 40% of the fish caught in the Arctic is consumed in the EU. Moreover, as 90% of EU foreign trade occurs by sea, Durant stressed that emerging new sea routes are also regarded as crucial.

In its recent communication, the European Commission has set three objectives:

- Protecting and preserving the Arctic in agreement with its population.
- Promoting the sustainable use of its local resources.
- Contributing to a better multilateral governance of the Arctic region.

According to Durant, however, these objectives fail to camouflage the "cynicism" of the current situation. In her opinion, the ice melt caused by man-made global warming facilitates a new rush for raw materials in the region, which will in turn result in more pollution and further emission of greenhouse gases. Vice President Durant described the recent situation as a vicious circle caused by the ever-increasing search for oil.

By the same token, Durant pointed out that more and more citizens are calling for a genuine transition towards more sustainable modes of production and consumption. The European Parliament addressed the Arctic in its resolution on a sustainable EU Policy for the High North, adopted in January 2011. The resolution mainly focuses on two points:

1. Firstly, on the continuous promotion, protection and funding of scientific research and the establishment and expansion of demilitarized areas devoted entirely to scientific research.
2. Secondly, on the normative power of the EU and the legal and international mechanisms it can help to put in place.

Vice President Durant offered the UN Declaration on the Rights of Indigenous Peoples and the establishment of a mandatory code of safety for ships operating in polar waters (polar code) under the auspices of the International Maritime Organization (IMO) as two examples. These frameworks would help to strictly limit human and industrial activities in the extremely sensitive Arctic region. However, Durant stressed that such frameworks should neither serve to resolve legal disputes nor to split the "Arctic cake" into spaces reflecting the respective might of the world powers.

Vice President Durant stated that she would have liked to see the EU stand more firmly behind a UN-led world moratorium on pollution, military and industrial activities in the region, as such a moratorium would help to protect the Arctic as a world heritage site. The same applies to the sovereignty of indigenous peoples, whom she would like to see better protected and defended on the European level. Durant referred to recent efforts of Belgian companies to get involved in the building of oil terminals on Arctic shores as saddening examples of increased oil and gas development in the region.

In a critical remark towards Russia, Durant warned of the dangers of the grip of energy giants such as Gazprom on the Arctic. She also mentioned the exploration activities of Shell in Alaska, Total in the Barents Sea, and Cairn Energy in Greenland. And bringing up the Greenpeace activists detained in Russia at that time, Durant reminded the audience of the power to promote change and concluded by stating that tackling the challenges in the Arctic should have the highest priority.

LOWRI EVANS

DIRECTOR GENERAL, DIRECTORATE GENERAL FOR MARITIME AFFAIRS AND FISHERIES, EUROPEAN COMMISSION

The head of DG Mare at the European Commission started her speech with what she called the EU's primary, straightforward message: "The European Union wants to assume its responsibilities." As the Arctic is facing enormous challenges, Ms Evans underscored the EU's readiness to help to address them. Referring to the Kiruna Declaration, which received the EU's application for observership to the Arctic Council affirmatively but deferred a final decision on implementation until some concerns are resolved, she reiterated the EU's outstanding invitation to Canada to discuss concerns bilaterally within the existing EU regulatory framework. As Ms Evans made clear, the EU is already actively participating as an observer in the work of the Arctic Council.

With the Arctic currently being the busiest region for leisure cruising, the Director General welcomed the International Maritime Organization's work on a Polar Code for ships, and strongly encouraged the Arctic Council member states to push for an early implementation of the code. Furthermore, Ms Evans addressed the potential of northern cities like Tromsø, Reykjavik and Nuuk to become trading hubs in the future, as they may find themselves along transport routes to Europe, Asia and the Americas. Ms Evans called for proper management and safeguards in the face of an expected increase in shipping activities. More shipping would result in a bigger footprint, which in turn would affect the marine habitat as well as the local population. Although shorter shipping routes would cut emissions globally, they would impact the Arctic environment locally. For this reason, Evans spoke in favour of a strong stakeholder involvement regarding the development of all Arctic resources.

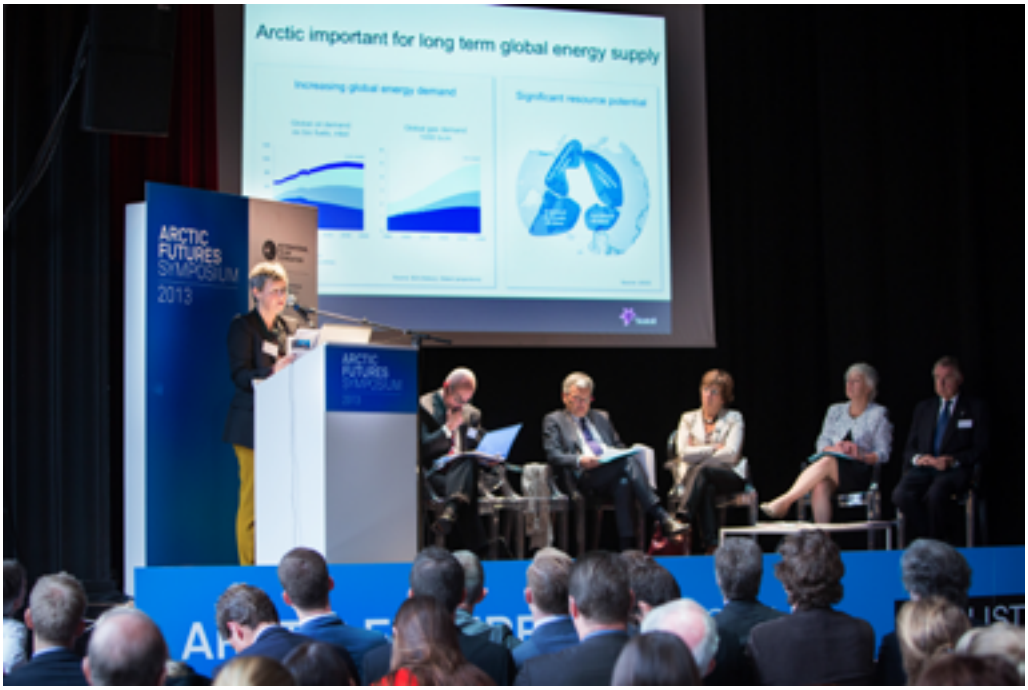
The Director General acknowledged the Arctic Council as the primary forum for policy discussions in this area, stating that the EU would welcome an Arctic Council agenda that incorporates these strategic policy elements alongside its traditional, technical and scientific agenda.

In addition to cooperation with the local community, another important theme of Ms Evans' speech was science and research in the Arctic as indispensable in contributing to the development of efficient policies. Ms Evans emphasized that the EU is one of the biggest sponsors of Arctic research, spending 20 million Euros per year. So far, the EU has already funded 26 research projects and contributed more than 150 million Euros to research efforts. In a next step, the EU is encouraging collaboration between researchers, Ms Evans explained. She referred to the EU's Horizon 2020 programme, which seeks to establish closer ties with researchers from countries outside the EU. The Galway Declaration, signed between the EU, Canada and the US in May 2013, is a step towards achieving this goal.

In her concluding remarks, Ms Evans identified the involvement of local people as being crucial for making progress in the Arctic. She recalled remarks from EU Commissioner for Maritime Affairs and Fisheries Maria Damanaki that the decision on whether or not the Arctic should be exploited economically is not up to Brussels, Berlin or Beijing, but rather to the countries directly surrounding the Arctic Ocean. However, she also

acknowledged that these decisions can have consequences that reach far beyond the borders of Arctic countries.

In order to learn from the Arctic local population and to enhance understanding, Ms Evans stressed the need for constant dialogue and called attention to the dialogue between Commissioner Damanaki and indigenous peoples' representatives, taking place on Friday October 19th, expressing the hope that this might become an annual dialogue contributing to a sound European Arctic Policy.



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GRO GUNLEIKSRUD HAATVEDT

SENIOR VICE PRESIDENT FOR EXPLORATION IN NORWAY, STATOIL

Ms Haatvedt presented Statoil's Arctic strategy, starting with the remark that for Statoil, there is not one Arctic, but several Arctic environments. Statoil has been operating in the Norwegian Barents Sea, north of the Arctic Circle for more than 30 years. With one energy plant, two oil and gas development projects and several exploration wells in the Norwegian Barents Sea, Ms Haatvedt stated that "Arctic operation is part of my daily work."

For Statoil, the Arctic is an important source of energy for the future. In the face of an expected 30% global energy demand increase in the coming 30 years, Statoil considers energy to be an important element to keep pace with economic growth and rising living standards that might lift millions of people out of poverty, Haatvedt explained. However, she added that most of the fields that will produce oil and gas in the coming decades have not been discovered yet.

With the Arctic continental shelf as one of the least explored basins on Earth, it is expected to bear great resource potential. Ms Haatvedt referred to a 2008 USGS study suggesting that Arctic offshore areas may contain 20% of global conventional oil and gas resources, "but with great potential comes great complexity," Statoil's Senior Vice President for Exploration cautioned. Volatile climatic conditions, vast distances, ice-filled waters and vulnerable Arctic communities require special care. Therefore Statoil

recognizes its high responsibility and adheres to high standards when operating in the Arctic.

One of the most common misconceptions in Haatvedt's view is that the Arctic is often regarded as one single entity. "In our view, there are many Arctics," she said. Statoil sorts the Arctic into three categories:

- The "Workable Arctic": Basins in which the oil and gas industry can drill and operate today using existing technology, such as the Norwegian Barents Sea and areas at the coast of Newfoundland.
- The "Stretch": An area where incremental innovation is needed, but where solutions are considered achievable with focused technology in the medium to long-term.
- The "Extreme Arctic": Where more radical innovation is needed, like the area at the East Coast of Greenland. Ms Haatvedt emphasized Statoil's stepwise approach in its operations, starting in southern areas of Norway decades ago and gradually moving northwards to harsher environments, always under close supervision of the Norwegian authorities, who "make sure that the industry does not move faster than technology allows it to."

Haatvedt used the Snøhvit LNG plant as a prime example of a successful operation in the Norwegian Arctic, but she also referred to several discoveries and development projects in the Barents Sea, an area she called an "exploration hotspot."

With regard to the extreme conditions in the Arctic, the Senior Vice President highlighted the interdependence and the need for partnerships among the international oil companies. According to Haatvedt, European companies were heavily represented in the last concession round on the Norwegian continental shelf, with 18 companies being awarded acreage, and 9 of these awarded operatorships. Statoil has recently reached a strategic cooperation agreement with Rosneft, which, among other things, provides for exploration cooperation on offshore Russia and Norway, a fact that Haatvedt said would allow to share value and enhance regional energy security. Other partnerships are being built to operate in the American offshore areas. She stated that while Statoil's discovery of significant oil reserves off the coast of Newfoundland announced in September 2013 are well south of the Arctic Circle, the ice conditions in the region classify as Arctic, which is why Statoil has included this in the company's Arctic portfolio.

Haatvedt pointed out that Arctic oil and gas activities "are not a sprint, but a marathon where stamina is important." The Snøhvit LNG plant took 26 years from discovery to production, going through multiple phases, during which Statoil took great efforts to establish trust between communities, governments and the industry. Haatvedt mentioned the positive coexistence with fisheries and local communities along the Norwegian Coast, and further elaborated on Statoil's ability to create value both for its shareholders and the local community. In Hammerfest, where the Snøhvit plant is located, jobs were created, and a declining trend in population was reversed. The increased tax income from the extraction activities allowed the county to build new infrastructure such as schools, sports complexes and cultural facilities.

In her concluding remarks, Ms Haatvedt reiterated Statoil's belief in the Arctic region's potential as an energy source, as well as the company's view of the Arctic as not one, but several Arctic environments (all of which need to be dealt with in a stepwise approach), and the need to collaborate in order to create value and solve challenges.

DAVID SPROULE

CANADIAN AMBASSADOR TO NORWAY WITH RESPONSIBILITY FOR THE CANADIAN INTERNATIONAL CENTRE FOR THE ARCTIC REGION

Ambassador Sproule commenced by giving a brief overview of the Arctic Council, which consists of eight member states and six indigenous peoples' organizations as permanent participants. He stated that "What is unique about the Arctic Council is that the indigenous peoples sit at the Arctic Council table in their own right; they contribute to all aspects of the Council's negotiations and make valuable contributions to its activities and projects."

Canada is privileged, Ambassador Sproule affirmed, to assume chairmanship of the Arctic Council following successful Swedish chairmanship and to begin a second cycle of chairmanships. In August 2012, Leona Aglukkaq was appointed Canada's Minister for the Arctic Council and the Arctic Council Chair - a step that Ambassador Sproule called remarkable, as it reflects both the importance Canada attaches to the North and the country's commitment to ensure that Northerners play a crucial role in the region. Minister Aglukkaq was not only born and raised in a small Arctic community in Nunavut, but is also the first indigenous person to chair the Arctic Council .

Ambassador Sproule then proceeded to outline Canada's chairmanship priorities.

Drawing from consultations with Canada's northerners and partners, Ambassador Sproule maintained that the well-being and prosperity of Arctic inhabitants and their aspirations for better economic opportunities, education, health and social conditions should be at the forefront of the Arctic Council's priorities. The focus of Canada's chairmanship is therefore development for the people of the North and puts Northerners first. As Ambassador Sproule indicated, the Arctic Council's work will be guided by three sub-themes:

- Responsible Resource Development
- Safe Arctic Shipping
- Sustainable Northern Communities

With 11 initiatives already endorsed by the Arctic Council's Ministers in Kiruna in May 2013, Ambassador Sproule presented some of these themes and the ongoing work of the Council.

One key initiative, according to Sproule, is the creation of a circumpolar business forum. As the business community is increasingly looking to the Arctic to build stronger and more diversified commercial relationships, the goal of this forum is to bring circumpolar business perspectives to the work of the Council, to advance Arctic-to-Arctic business interests, share best practices and engage in deeper cooperation. A new task force chaired by Canada and co-led by Russia, Iceland and Finland will work with businesses and industries to address these issues. The aim to launch the business forum at the biannual Northern Lights Trade Show and Conference in Ottawa in 2014.

With regard to the second sub-theme, the Council will work to establish guidelines for sustainable tourism and cruise ship operations, the Ambassador explained. With shipping activities on the increase, the 2011 Arctic Search and Rescue agreement signed under the auspices of the Arctic Council is an important first step, according to Ambassador Sproule. The Council will build on this work in order to better respond to emergencies in the North and will collaborate with cruise ship and tourist operators to develop best practices and voluntary guidelines that ensure sustainable tourism, passenger safety and environmental protection. Although best practices do exist, Sproule pointed out that there are no comprehensive Arctic guidelines in this area yet.

Concerning sustainable northern communities, Ambassador Sproule highlighted the Arctic Council's work on Arctic marine oil pollution prevention. Under the Swedish chairmanship, the Arctic states signed a legally binding Agreement on Cooperation on Marine Oil Pollution Preparedness and Response. This agreement lays out the basis for further efforts to enhance cooperation and assistance under the Canadian chairmanship, and a newly set-up task force co-led by Norway and Russia will develop an Arctic States Action Plan to address marine oil spill prevention. Ambassador Sproule stressed that the Arctic states are determined to take measures to protect the Arctic marine environment, local communities and traditional livelihoods from the possible impacts of further resource development in the North.

On a related topic, Ambassador Sproule highlighted the importance of reducing short-lived climate forcers such as black carbon and methane, as their reduction will diminish local warming in the Arctic over the short-term. A Canadian and Swedish-led task force in the Arctic Council are working to reduce both black carbon and methane emissions, especially as black carbon also has significant health impacts in the local population.

Environmental issues cut across the themes of the Canadian chairmanship. Other initiatives the Canadian hopes to focus on during their chairmanship include work on migratory bird conservation and adaption to climate change. To enhance scientific cooperation, a US- and Russian-led task force will address this issue along with the promotion of mental wellness, as changes in the Arctic also have impacts on the health and societies of indigenous peoples. Canada and the US will jointly work on strategies and interventions with regard to mental health promotion and suicide prevention. Ambassador Sproule then elaborated on the traditional and local knowledge that has helped Northerners to survive for millennia, and that the Canadian chairmanship will seek to incorporate this knowledge into its work.

As to the traditions and lifestyles of Arctic inhabitants, Ambassador Sproule called attention to the fact that many policies are made thousands of miles south of the Arctic. "Some Europeans have seen the reaction to the seal products ban and the effect it had on rural and remote communities," Sproule stated. "We will work hard to ensure mistakes like that do not happen again with other critical living resources such as polar bears or other important ways of life."

Ambassador Sproule continued by saying a few words on the observer status of the Arctic Council . A growing list of states and organizations interested in becoming observers on the Council indicate a growing global interest in the Arctic, and Canada welcomes the new observers as well as the representatives of the European Union to the meeting of the Senior Arctic Officials in Whitehorse, which took place in the latter half of October 2013 . "With respect to the application of the EU," Sproule said, "the Arctic Council Ministers received affirmatively the EU's application for observer status, but deferred a final decision until Arctic Council Ministers agree and concerns of council members regarding the EU's application are resolved – notably Canada's concern with respect to the EU import ban on seal products." However, Sproule reiterated that the EU may observe Arctic Council proceedings in the meantime and has been invited to all Senior Arctic Official meetings.

In his concluding remarks, Ambassador Sproule emphasized that the voices of the permanent participants will neither be diminished nor diluted in the Council's work, and stated that Canada is delighted to assume the Chairmanship of the Arctic Council at this important time. Ambassador Sproule encouraged the audience to visit the Arctic, "so the EU can begin to have a better appreciation of what it means to live North of 60, as we say in Canada."

HANNU HALINEN

FINNISH AMBASSADOR TO THE ARCTIC COUNCIL

Ambassador Halinen started by introducing the new Finnish Arctic Strategy adopted in August 2013. Most notably, the Ambassador emphasized the strategy's vision, which calls Finland as "an active actor with the ability to reconcile business opportunities with requirements of the environment in a sustainable manner while drawing upon international cooperation". Containing 50 goals and 125 concrete action recommendations, Ambassador Halinen said Finland's strategy is the most comprehensive national Arctic strategy to date.

Emerging transport routes, natural resources and the development of infrastructure and services give impetus to discussions on the Arctic, said Halinen. With the Northwest Passage and the Northern Sea Route increasingly opening up for marine traffic, the Ambassador also mentioned that one day the direct route via the North Pole might be available for future Arctic shipping.

For Finland, the well-being and social sustainability for the local population is among its key objectives in its Arctic policy. Furthermore, Ambassador Halinen highlighted the importance of research and education, as this forms the basis for Finland's expertise in the Arctic. The country aims to focus on building and maintaining education and research activities.

Another key objective for Finland is to reconcile business opportunities and environmental requirements, as they are inextricably linked to one another. More specifically, Halinen addressed the question of what exactly the term "environmental requirement"' means. For Finland, this includes the development of networks of protected areas as well as risk assessments. A prominent example is the environmental impact assessment adopted in Rovaniemi, Finland, in 1991. Ambassador Halinen called for a systematic implementation of this assessment mechanism. Although it is incorporated into the work of the Arctic Council and EU directives, Halinen expressed the need to review the success of its implementation and to work towards a systematic impact assessment mechanism.

With stability as a key precondition for a safe and secure Arctic, the Ambassador then described Finland's foreign policy objectives. While the country seeks to strengthen its own Arctic status in external relations, it also seeks to intensify bilateral partnerships and international cooperation, including efforts to strengthen the Arctic Council .

Concerning the EU's role in the Arctic, the Ambassador outlined three major goals:

1. To clarify the EU's role in the Arctic together with Sweden and Denmark.
2. To support efforts to consolidate the EU's Arctic policy and its observer status in the Arctic Council.
3. To establish the EU Arctic Information Centre (EUAIC), headquartered in Rovaniemi, Finland.

The Ambassador also called attention to the upcoming reports of the EU's Economic and Social Committee, as well as the consultative committee of the European Economic Area (EEA) as they are expected to contain interesting points that may contribute to discussions concerning the Arctic. One question this raises is how to integrate Arctic issues into the financial frameworks of the EU, such as in the Europe 2020 Strategy for Growth and Innovation and the Horizon 2020 programme.

As Finland took over the Barents Euro Arctic Council presidency in October 2013, another Finnish foreign policy objective Halinen mentioned was closer engagement in the Barents region as well.

In his closing remarks, the Ambassador referred to comments from Canadian Ambassador to Norway David Sproule about the Arctic Council circumpolar business forum initiative. Although the Council would likely remain predominantly occupied with environmental issues, Halinen stressed the unanimous support for this initiative, which will be added to the Council's agenda, and stated that the responsible task force planned to meet in Helsinki in December 2013 to finalize the initiative.

Questions for the opening session were deferred until the following session.

PERSPECTIVES FROM ARCTIC STAKEHOLDERS

MODERATOR: MICHAEL BYERS

CANADA RESEARCH CHAIR IN GLOBAL POLITICS AND INTERNATIONAL LAW, UNIVERSITY OF BRITISH COLUMBIA

Professor Byers opened the first roundtable discussion of the symposium by welcoming the panelists, giving some brief information about the structure of how the roundtable discussions would work. With the aim to enable a strong interaction with the audience, Professor Byers encouraged the audience to pose questions to the panelists and make comments after the opening comments. He further noted that two panelists, Ambassador Sproule from Canada and Ambassador Halinen from Finland, have agreed to waive their opening comments as they have already spoken during the first panel.

RICHARD TIBBELS

HEAD, EASTERN PARTNERSHIP, REGIONAL COOPERATION AND OSCE DIVISION, EUROPEAN EXTERNAL ACTION SERVICE (EEAS)

Mr Tibbels explained the work of the European External Action Service (EEAS) as "bringing all the threads of EU Foreign Policy together, including the projection of internal EU policies." In his view, the Arctic is a very good case study of how the EU can bring its various instruments together to project Europe's influence worldwide.

With the backdrop of climate change and the prospects of economic development in the Arctic, Mr Tibbels emphasized the EU's willingness to engage with all Arctic partners to address the region's challenges. Mr Tibbels mentioned that since its first EU Communication on the Arctic was released in 2008, the EU has taken measures to combat climate change, contribute to the development of regions and cross-border regions in the EU and neighbouring regions, and invest large amounts of money in Arctic research.

Mr Tibbels then elaborated on three key themes behind the EU's approach to the Arctic, which were highlighted in the EU's last Arctic Communication in 2012 Knowledge, Responsibility, and Engagement.

With regard to knowledge, the best scientific information available is seen as vital prerequisite for informed policymaking. The Horizon 2020 programme will establish closer links between researchers from the EU and the Arctic region, and satellite programs such as Galileo will play an important role in collecting data.

As for responsibility, Mr Tibbels gave four examples of responsible EU actions:

1. Firstly, he mentioned the proposed Northern Periphery and Arctic Programme, which would be an important framework for exchanging best practices and promoting innovation and competitiveness in remote and peripheral areas of the EU and beyond.

2. Secondly, Mr Tibbels referred to the EU's contributions towards a swift conclusion of the International Polar Code for safe Arctic shipping.
3. The third example addressed oil spill prevention, preparedness and response, which the EU works on both bilaterally and in the Arctic Council working groups.
4. The fourth example focused on the EU's willingness to work with its Arctic partners and the private sector to develop environmentally-friendly technologies, which could be relevant for both the extractive and the shipping industries.

Regarding the third and final watchword of the Commission's 2012 Communication, engagement, Mr Tibbels highlighted the EU's Engagement with its partners. Tibbels stated that the EU is an Arctic actor, moving forward in close cooperation with the Arctic states, NGOs and indigenous communities. There is research cooperation with the US and Canada as well as a regular dialogue with Norway and Iceland. He also mentioned a developing partnership with Greenland, the Barents Euro Arctic Council and the Northern Dimension as examples of further instruments to enhance dialogue between the EU and the Arctic states.

In conclusion, Mr Tibbels expressed the EU's readiness to work within the Arctic Council framework following the Kiruna decision. He briefly touched upon an increased cooperation with environmental NGOs and a deepened dialogue with indigenous peoples. He closed by reiterating that the EU can contribute very effectively to meeting the challenges the Arctic region is facing.

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ELSE BERIT EIKELAND

NORWEGIAN AMBASSADOR TO THE ARCTIC COUNCIL

In her opening, Ambassador Eikeland used the opportunity to welcome the EU as an observer "in principle" to the Arctic Council . From a Norwegian perspective, she said, the EU has been admitted "in principle" by the ministers of the Council, and Norway looks forward to continuing to work with the EU.

One key message Ambassador Eikeland wanted to deliver was that from the Norwegian point of view, the Arctic is a peaceful region characterized by close cooperation. The strong bilateral cooperation between Russia and Norway is a clear example of that.

Moreover, Eikeland maintained that there is international consensus that the UN Convention on the Law of the Sea is ***the*** legal framework for the Arctic, and that a new governance structure is not needed. The Arctic cannot be compared to the conditions in the Antarctic, the Ambassador pointed out. An international treaty system like the one that governs the Antarctic therefore cannot be applied to the Arctic.

Ambassador Eikeland reminded the audience that there is no "free for all" race for Arctic resources either, as the resources are inside the sovereign jurisdiction of the Arctic states. Since 2009, Norway has been the first nation with clear continental boundaries in the Arctic.

With 10% of the Norwegian population living in the Arctic and most of the country's population living by the sea, Eikeland highlighted Northerners' rights and need for jobs in order to be able to live in the North. She further stressed the whole population's dependence on a clean sea and the environmentally sustainable use of resources, since fisheries and fish farming are a very important economic activity in Norway. Therefore in Norway's view, there is no discussion on whether economic development is needed or not. Economic development, job creation and a sustainable use of resources is key to Norway's Arctic strategy and a priority when it comes to Arctic issues.

Norway seeks to continue its cooperation with the EU on climate change issues, as the country identifies this as an area of great concern. Eikeland pointed out that India applied for observer status on the Arctic Council because of the effects that disappearing Arctic sea ice has on India and its weather, which can have tremendous social and political implications. Additionally, CO_2 emissions do not come from Arctic states only, but from all over the world. The Ambassador therefore believes it is necessary to work closely with non-Arctic states, including the old and new observers, to reduce greenhouse gas emissions. She expressed Norway's openness to work with all international partners, especially the EU, and called the engagement of observers, NGOs, business and all other stakeholders a "vitalizing feature" of the Arctic Council , which is supported by the indigenous representatives as well.

Ambassador Eikeland emphasized that science and knowledge are key to Norway's Arctic Strategy, and that oil and gas companies are taking a stepwise approach to development of oil and gas resources in the region. In a brief note on shipping, Eikeland argued that shipping is not increasing as quickly as predicted in the Norwegian Arctic. Shipping has even declined, with fewer cruise ships in the Svalbard area, probably due to stricter regulations making it more expensive to operate there. The Ambassador cites a figure that 80% of Arctic shipping takes place in Norwegian waters, as they remain ice-free in winter. Therefore, in these areas, the Polar Code, once adopted, would not apply. The Ambassador warned the audience not to see the Polar Code as the one and only remedy to open questions on shipping activities.

In her concluding remarks, Ambassador Eikeland expressed Norway's support for the Canadian chairmanship's focus on northern development and the sustainable use of resources, including the seal hunt. She welcomed the proposal to have an annual dialogue between the indigenous peoples' organizations and the European Commission as this could enhance knowledge and understanding.

GUSTAF LIND

SWEDISH AMBASSADOR TO THE ARCTIC COUNCIL

The Swedish chairmanship of the Arctic Council , which concluded in May 2013, was the focus of Ambassador Lind's opening remarks. During this chairmanship, the Arctic Council adopted a second legally binding agreement on oil spill prevention and strengthened the body by establishing a new Secretariat in Tromsø, Norway. During their time as chair, the Swedes improved the Council's functioning and placed a focus on implementation in order to enhance the Council's legitimacy, said Lind. Under the Swedish chairmanship, the Council also presented groundbreaking scientific reports on acidification of the Arctic Ocean and on biodiversity. According to Lind, the interface between policy and science is what the Arctic Council is all about. Complemented by the presentation of the Council's vision of the Arctic, these combined efforts have helped the Arctic Council to mature.

Turning to the observer applications and the EU, Lind pointed out that "if you read the Kiruna declaration carefully, what was deferred on the EU was not the decision, but the decision on implementation, and that makes a very big difference."

Sweden is now redirecting its focus on its national Arctic strategy and exploring opportunities to make improvements in its own Arctic region. Here, Sweden follows four broad aims:

1. Protection of the environment in close cooperation with the Arctic Council and other international bodies.
2. Improving research, especially with regard to the use of the icebreaker Oden, as a research platform for joint international research projects.
3. Improving living standards in the Arctic. Lind maintained that there are sustainable and attractive communities in the Swedish Arctic that are the basis for further improvements in close cooperation with indigenous peoples.
4. Sustainable business development to generate jobs and tax income to further improve living standards.

Ambassador Lind concluded by tying these four main areas of focus with Sweden's continuing international cooperation through the Arctic Council and other fora.

ERIK LORENZEN

DANISH AMBASSADOR TO THE ARCTIC COUNCIL

Ambassador Lorenzen's speech focused on three main issues, including the Arctic Strategy of the Kingdom of Denmark (including Denmark, Greenland and the Faroe Islands), maritime transport, and defence.

Reflecting on Denmark's Arctic strategy, Lorenzen mentioned a peaceful and secure Arctic, sustainable growth, respect for the vulnerable environment and international cooperation as aims to be pursued. There is no imminent threat in the Arctic, said the Ambassador. The 2008 Ilulissat Declaration, in which the five Arctic coastal states agreed to adhere to the UN Convention on the Law of the Sea framework, is a "very important instrument" said the Ambassador, stressing that Denmark does not see any need for new legal instruments in that regard.

Denmark considers the Arctic Council as the most important organization for future work on Arctic issues, and the Ambassador recognized the positive development and progress of this body over the past decade.

Another important forum, according to Lorenzen, is the Arctic Five group – the US, Canada, Norway, Russia and Denmark – given that 85% of the estimated resources in the Arctic are located within the jurisdiction of these five countries with coasts on the Arctic Ocean. Additionally, the Ambassador identified the need for bilateral cooperation in areas such as environmental protection and border disputes. In November 2012, Canada and Denmark took further steps to reach an agreement on the 2,600 km border between Canada and Greenland, including the disputed Hans Island.

On the issue of maritime transport and security, Denmark hopes to see an increase in infrastructure, surveillance and cruise ships in the Arctic. With 10% of the world's cargo Danish-owned, Ambassador Lorenzen articulated Denmark's will to work closely with the International Maritime Organization.

With regard to defence, Lorenzen pointed out that there is no military build-up in the Kingdom's Arctic territories, but that the equipment and coast guard functions in the region serve multiple purposes such as rescue at sea, environmental protection, fisheries inspection and hydrography in addition to its traditional task of projecting sovereignty.

On a concluding note, Ambassador Lorenzen stressed that Denmark supported the EU's application for observer status in the Arctic Council along with the other EU member states Finland and Sweden, as it regards the EU as an important actor when it comes to climate change policies. The way the seal hunt is debated in the European Parliament, Lorenzen said, is closely followed by the people living in the Arctic, as this is a vital issue for the Inuit. The Ambassador called for an increased awareness for this issue in the European Union.

KATE SANDERSON

HEAD OF MISSION, MISSION OF THE FAROE ISLANDS TO THE EUROPEAN UNION

"It is hugely important that all the nations and peoples in the Arctic context, including the Faroe Islands, have a clear and active voice in international cooperation," said Ms Sanderson in her opening remarks. The main focus when discussing future development in all sectors in the circumpolar region should be on the peoples and communities who actually live in the Arctic, she stressed, as it is their environment that is being impacted by the changing climate, and it is their resources and access to their waters that generates such enormous interest. For this reason, the Faroe Islands appreciate

the strong emphasis on the human dimension in formal cooperation through the Arctic Council . Ms Sanderson also welcomed Canada's emphasis on the people of the North. As a part of the joint delegation together with Denmark and Greenland to the Arctic Council , the Faroe Islands take an active role in Arctic cooperation.

Ms Sanderson then made a few comments on Denmark's, Greenland's and the Faroe Islands' joint Arctic strategy. Considerable areas of competence central to the discussion of cooperation in the Arctic are areas that fall under the exclusive competence of the Faroese and Greenlandic authorities respectively, Sanderson explained. In the light of this fact, she called for more visibility of the Faroe Islands within the EU context, as they constitute a part of Arctic cooperation.

A national strategic assessment of the Faroe Islands' specific challenges and potential was conducted and subsequently presented to the Faroese Prime Minister and will be discussed in Parliament. As a next step, the Faroese government will craft an action plan to implement specific recommendations.

The Faroe Islands consider it important to get the right balance between the level of competence and responsibility they have in areas of Arctic cooperation and the level of representation and participation that is possible when key policies and binding agreements are developed. In Sanderson's point of view, the recognition and respect for devolved competence within the Kingdom of Denmark has allowed the Faroe Islands to co-sign the Arctic Council's 2011 Agreement on Search and Rescue and the 2013 Agreement on Oil Spill Response.

One of the recommendations the Faroese assessment makes is to promote a more effective work structure in the Arctic Council that enables small countries to participate in a meaningful way. Although the emphasis on this is already in the Arctic Council , Sanderson expressed a hope to strengthen it further.

Referring to the Faroese Prime Minister's speech in Reykjavik at the Arctic Circle Assembly, Sanderson closed by reiterating the Faroes' dependence on marine resources and the consequences climate change would have on the very basis of Faroese society. Changes in sea temperature affect marine ecosystems and cause changes in the distributional patterns of commercial fish stocks such as the northeast Atlantic mackerel. Such changes, Sanderson stated, pose new challenges to international cooperation and require the will to recognize and adapt to them. She described cooperation in scientific research as crucial in order to manage shared resources in a constructive and mutually respectful way.

TÓMAS ORRI RAGNARSSON

Counsellor on Arctic Affairs, Directorate for International and Security Affairs, Icelandic Ministry for Foreign Affairs

Mr Ragnarsson shared Icelandic views on the Arctic from the newly-elected government of Iceland, which has put Arctic issues on the top of its foreign policy agenda.

He mentioned the large number of Arctic events over the weeks preceding the Arctic Futures Symposium, such as the Polar Law symposium and the Arctic energy summit in Akureyri as well as the Arctic Circle assembly in Reykjavik.

There is a solid support for focusing and expanding on Arctic issues within the Icelandic Parliament and across the political parties in Iceland, Ragnarsson affirmed. The Icelandic Parliament, the Alþingi, passed a resolution outlining Iceland's Arctic policy in March 2011. Mr Ragnarsson highlighted five major points of this policy:

1. The Arctic Council is recognized as primary forum for circumpolar cooperation, emphasizing that decisions on Arctic issues are taken in the Council.
2. Iceland will work towards having a position as an Arctic coastal state, not strictly focusing on its geographical position, but taking into consideration legal, economic, and ecological aspects of Iceland's position in the Arctic.
3. Iceland will build up new local knowledge and capacity, both within the government and at universities, as well as expand on science cooperation nationally and internationally.
4. The country seeks to increase and enhance cooperation with its nearest neighbours, Greenland and the Faroe Islands. The central aim of the policy is to keep sustainability and the protection of the environment at the forefront when Arctic issues are discussed.
5. The human dimension and the rights of the indigenous peoples to protect their values, culture and habitat, is another core objective of Icelandic Arctic policy.

On the international level, Mr Ragnarsson underlined the importance of international cooperation to Iceland, especially regarding sustainable development. Ragnarsson recalled that the Arctic Council was born in the post-Cold War era, created by countries that share the same environment and geography in their Arctic territories. Over time, the body has grown from a policy-shaping to a policy-making arena. Many challenges the Arctic faces are of a transnational nature (shipping, climate change, investment, tourism, and pollution), and Iceland believes that contribution to the work of the Council would strengthen its ability to ensure sustainable development in the North. It is important to build on existing legal frameworks and to develop bilateral and international agreements that can address the challenges in the Arctic.

Science is another key element for sustainable development in the Arctic, providing the best available information for policymaking. Iceland believes international cooperation between scientists is an effective bridge-building mechanism in order to foster understanding and trust among various stakeholders, the counsellor said.

In short reference to the UN Convention on the Law of the Sea, Ragnarsson dismissed the idea of an Arctic gold rush. The Icelandic government has set up and an inter-ministerial committee focusing on Arctic affairs, which takes a multidimensional approach and makes sure different ministries and institutions involved coordinate in a coherent way on this important policy priority.

DISCUSSION

Professor Byers started the discussion by posing a question to Ambassador Eikeland from Norway and Ambassador Sproule from Canada, asking how major oil and gas producers like Norway and Canada work to reconcile the tension between seeking to promote environmental protection in the Arctic while at the same time being major exporters of fossil fuels.

Ambassador Eikeland responded that for Norway, it is a priority to develop the Arctic so that people can live there. The oil and gas industry has successfully employed and created jobs in the Norwegian Arctic since the beginning of the 1980s. Norway takes a stepwise approach to production in the Arctic and developing new technology. When it comes to CO_2 emissions, Eikeland pointed out that gas creates less greenhouse gas emissions than coal. Norway has bilateral agreements with countries like Germany and the UK focused on downscaling coal production.

Eikeland mentioned that Norway is at the forefront of sustainable development in the Arctic. It is one of the Arctic nations spending the most on scientific research. The

government works with NGOs and businesses in order to create the highest standards for development in the world. Norway wants to be a leader in oil and gas production, and have it produced in as clean a manner as possible.

Michael Byers asked Ambassador Sproule whether Canada's position on climate change may be in conflict with the country's interest in promoting environmental protection in the North.

Ambassador Sproule stated that Canada is proud of its active efforts to ensure that the development of its North is consistent with the protection of its environment. As for Canada's formal withdrawal from the Kyoto protocol, the Ambassador reminded the audience that Canada made very clear commitments at the Copenhagen summit, for example to reduce its greenhouse gas emissions by 17% between 2005 and 2020, and the country is on track to meet that goal. Canada's targets are closely aligned with the US, an alignment Sproule considered very important.

Professor Byer's second question was directed at Richard Tibbels from the European External Action Service. He asked why the situation concerning the import of seal products is not open to a negotiated compromise.

In his response, Mr Tibbels expressed his hope that this issue is open to a compromise. "We stated clearly after the Kiruna meeting that we were ready to sit down with the Canadians immediately and start running through with them in detail how an exemption system could be established for Inuit seal products." The Canadian counterpart required more time for internal consultations, and the EU is waiting for the Canadian side to get back to them. The EU is keen to develop its strategic partnership with Canada and the prospects for a new agreement are looking very good.

Ambassador Sproule recognized the important role of the EU on many Arctic issues and welcomed the EU's participation in Arctic Council meetings in the meantime. According to Sproule, Canada will soon be ready to engage and discuss the issue of the seal products ban so that it can be resolved. He emphasized that this issue is of significant importance to Canada, particularly to the indigenous populations living there.

Neil Hamilton from Greenpeace International criticized "self-congratulations" and "outdated rhetoric" on cooperation, and claimed that it is time to move the debate on. He wanted to bring to the fore "the complete absence of discussion about the insanity of the use of Arctic oil and gas." Mr Hamilton made critical remarks referring to scientific evidence of the catastrophic consequences of Arctic oil and gas extraction, and stated that discussions about the use of Arctic oil and gas "lie with the people who give you the social license to operate."

In response to this comment, Ambassador Lorenzen from Denmark maintained that there is a dilemma: On the one hand, the focus is on development for the people who live in the North. At the same time, there is the issue of climate change and potential oil spills. But within that dilemma, Lorenzen said there is a need for a policy that takes into account the Northerners' right to develop, which includes development of gas and oil. To avoid a catastrophe, it is necessary to adhere to the highest standards.

Ambassador Eikeland added that the most important social license for the Norwegian government is not international NGOs, but the people living in the North and in Norway. She invited Greenpeace and other NGOs to visit Norwegian communities to learn about Northerners' perspectives. She reiterated that when it comes to oil and gas activities, Norway is concerned about the total emissions, the highest technological standards, and energy security.

Adele Airoldi from the ACCESS project stated that the EU was absent at the Arctic Circle assembly in Reykjavik and asked why the EU was not represented at such an

important conference that drew international attention. She further criticized that the EU may still lack a real vision for the Arctic, as speakers from the EU institutions so far have not delivered a clear picture of such a vision of the Arctic.

Ambassador Halinen from Finland called attention to the complexity of the EU system and said that measures are being taken to clarify the EU's position on Arctic issues. However, it is not just the three Arctic EU member states that are responsible for Arctic issues within the EU, but numerous bodies including the EU Commission and its Directorate Generals, the Council and the Parliament.

Agreeing that the EU needs more visibility and a clear statement, Ambassador Lind also emphasized that the EU has done good policy development work both in the Parliament and in the Commission's latest communication, so there is a coherent Arctic policy approach, in his opinion. However, it is a long way from strategy development towards implementation, Lind remarked.

Lastly, Ambassador Lorenzen stressed the need for nuanced perspectives. The EU is an important partner regarding climate issues or fisheries, but border issues in the Arctic do not involve the EU. Therefore there are areas where the EU can play a bigger role and areas where it has a smaller role to play.

The next question, posed by Professor Byers, addressed Iceland's withdrawal from EU accession negotiations and asked whether this policy change has affected Iceland's policy towards the EU.

Before turning to that question, Mr Ragnarsson said a few words about the energy issues that had been raised by Mr Hamilton's comment. Coming from a country where almost all of the energy produced is derived from renewable energy sources – hydro and geothermal – he remarked that renewable energy is playing an increasing role in the Arctic. Icelandic engineers and companies have focused on renewable energy and have been working on many projects in the Arctic including the recent construction of a hydro power plant in Greenland, a 22 Megawatt hydro power plant to replace an existing diesel power plant.

As for withdrawing from EU membership application, Ragnarsson stressed that Iceland continues to be very supportive of the EU's observer status application to the Arctic Council and regards the EU as a very important player in the Arctic.

Another question from the audience directed to Mr Tibbels and the rest of the panel was twofold: First, it asked what EU involvement adds to the Arctic conversation that its own Arctic member states do not already bring. Secondly, the audience member asked why Finland, Sweden and Norway where not represented at the ministerial level at the Arctic Circle Conference in Reykjavik.

Recalling that the first Communication was issued in 2008 and was followed by a second communication in 2012, Mr Tibbels explained that these documents were also designed to build confidence with Arctic stakeholders. The EU does not intend to impose its agenda on pre-existing organizations, which is why it moves from generality to greater detail at a relatively moderate pace. The EU's role in the Arctic is especially important vis-à-vis international climate change negotiations. Furthermore, the EU brings added value in the form of financial resources for regional and cross- border cooperation, through its capacity to unite the research community and to provide a strategic direction within research projects, and through the nature of the EU's normative process establishing legislation, which introduces best practice.

Ambassadors Lind, Eikeland and Halinen made clear that Ambassadors from their respective countries were indeed present at the Arctic Circle conference, with Ambassador Eikeland pointing out that one of the conference's major sponsors was a

Norwegian shipowners company and adding that the quality of a conference should not necessarily be measured by the number of participating Ambassadors.

With respect to the EU's added value, Ambassador Halinen indicated that the EU's capacities are added on top of the member states' bilateral cooperation and are an important complement to national activities.

The last question, posed by Malgorzata Smieszek from the Arctic Centre at the University of Lapland asked Ambassador Lorenzen to comment of the Arctic Five forum that has upset the three Arctic states that were excluded from it.

Lorenzen responded that although the Arctic Council is the most important forum for Arctic cooperation, the Arctic Five forum is necessary due to the border issues these five states need to resolve with each other. For this reason, the 2008 Ilulissat Declaration is regarded as an important instrument to deal with border disputes.

On a concluding note, Ambassador Sproule noted that a new Minamata Convention on limiting the use of mercury was signed in October 2013. This is of special significance to residents of the Arctic, as mercury accumulation impacts traditional food sources and indigenous lifestyles in the region. The convention is one of the initiatives the Arctic Council has championed and signifies ongoing progress, said the Ambassador.

RESEARCH TO INFORM POLICYMAKING

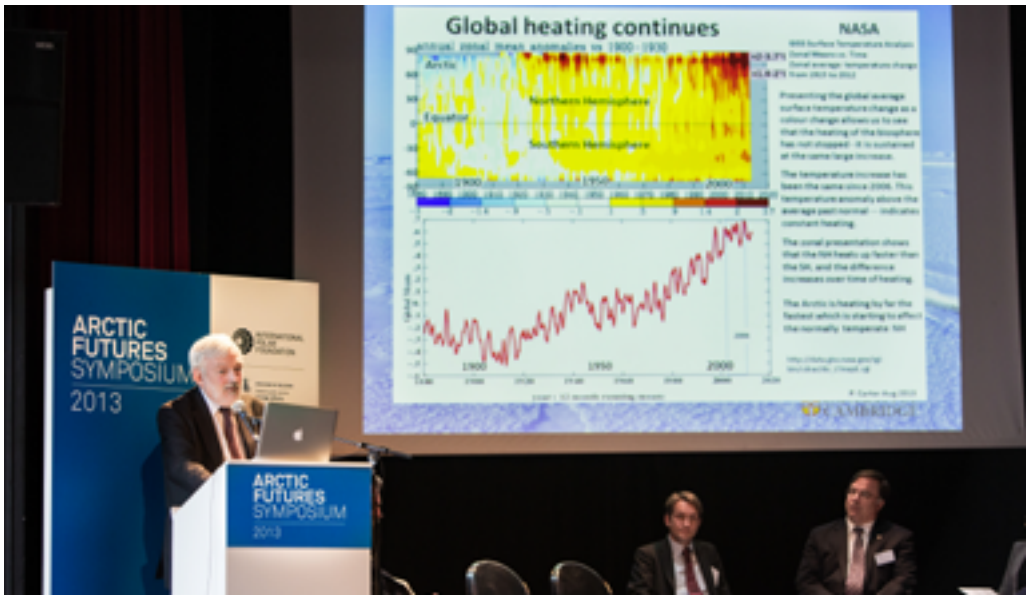
MODERATORS:
FRANZ IMMLER

PROJECT OFFICER, ENVIRONMENT DIRECTORATE, DIRECTORATE GENERAL FOR RESEARCH AND INNOVATION, EUROPEAN COMMISSION

BERNARD W. FUNSTON

CHAIR, CANADIAN POLAR COMMISSION

Introducing the third session, Mr Immler from DG Research and Innovation referred to the EU's strong engagement in Polar research. The Galway Statement between the EU, Canada and the US signed in May 2013 will increase international collaboration in marine and Arctic research. The EU's research framework programme, Horizon 2020 puts a strong emphasis on international cooperation and the dissemination of research results to a wide range of stakeholders, he stated. On this note, Mr Immler welcomed the panelists and the opportunity to learn about the results of their research.



PETER WADHAMS

PROFESSOR OF OCEAN PHYSICS AND HEAD OF THE POLAR OCEAN PHYSICS GROUP, DEPARTMENT OF APPLIED MATHEMATICS AND THEORETICAL PHYSICS, UNIVERSITY OF CAMBRIDGE

Making Sense of Future Sea Ice Extent Predictions

Professor Wadhams made some introductory remarks on the acceleration of global warming since the industrialization in the mid 19th century. The global patterns of warming can be observed for the area north of 60°N latitude as well. However, whereas the average temperature increase for the entire planet since the late 19th century has been about 0.8°C to 0.9°C, the warming in the Arctic has been to 2°C to 3°C – more than in any other part of the planet. This means the same pattern of warming exists in the Arctic, although it is amplified by 3 to 4 times, and this amplification factor increases the further north one goes in the Northern Hemisphere.

Projections of global temperature change by the end of the century in the assessment reports of the UN Intergovernmental Panel on Climate Change (IPCC) predict a warming of 7°C to 9°C in the Arctic compared to 4°C projected temperature increase for the planet on average, which the professor described as "fairly catastrophic warming."

Wadhams then went on to describe that carbon dioxide (CO_2) levels are a driving factor in the warming the planet has been experiencing. The professor explained that from paleoclimate records, scientists have been able to determine that there have been two different levels of CO_2 during the past four glacial cycles – a lower one during ice ages and a higher one during interglacial periods (which the Earth is experiencing today). Average atmospheric CO_2 concentrations were about 280 parts per million (ppm) during interglacial periods, and only about 180 ppm during ice ages. After the end of last ice age ended some 11,700 years ago, atmospheric CO_2 levels slowly climbed back to 280 ppm, and have remained more or less steady at about 280 ppm from 10,000 BC to 1850 AD. Since 1850, atmospheric CO_2 concentrations have shot up to 400 ppm.

"That is what we are doing to our planet, an inadvertent experiment on a massive scale to our atmosphere," Professor Wadhams said. Scientists have seen a similar increase in atmospheric concentrations of other greenhouse gasses such as methane (CH_4) and nitrous oxide (NO_2).

The total radiative forcing (the difference between the radiant energy the Earth receives from the Sun and the energy that gets radiated back out to space) over the Arctic is about 1.6 Watts per square metre (W/m^2). As the radiative forcing is positive, it drives the retreat of sea ice, Wadhams explained. The Professor lamented that in his view, there is no evidence at all that any efforts are being taken to reduce these CO_2 emissions. Even though the US and Europe, for example, have taken measures to reduce their greenhouse gas emissions, these are offset by drastically increasing emissions from developing countries such as China and India. On a global level, emissions have been rising at an exponential rate.

For the Arctic sea ice, this means an accelerated retreat. Summer sea ice started to retreat in the 1950s in a fairly linear manner, Wadhams explained. In the winter, the Arctic sea ice limits are controlled by the land masses – the ice grows out to the coasts of the landmasses and then cannot extend further. Changes in the sea ice extent during winter are therefore less obvious than changes in the summer sea ice extent, where the changes can be seen more obviously. The professor recalled that the Northern Sea Route and the Northwest Passage were available for ice-free transit for the first time in 2005, and September 2007 marked a record minimum summer sea ice extent, dropping to about 4 million km² compared to the 30-year average of 6-8 million km². In September 2012, a new record minimum summer sea ice extent of 3.4 million km² was reached.

Another change the professor pointed to is the reduction of multi-year ice. Whereas it used to occupy almost the entire Arctic Ocean prior to 2004, it had retreated to a narrow fringe by 2012, and has widely been replaced by first year ice.

In critical remarks on the models used in the recently published 5th IPCC Assessment Report, professor Wadhams referred to one of its graphs as "dishonest". While the

sea ice extent graph is supposed to look at developments from 2012 onwards, it only focuses on historical data up to 2005 (which is, he recalled, is the year the big sea ice retreat began). The IPCC graph thus avoids using any data that shows any extreme retreat happening, Wadhams claimed. The same graph projects a sea ice retreat to 3.4 million km² by 2030, although this extent was already reached in 2012, and raises the unrealistic idea that sea ice may even recover before the end of the 21st century. Wadhams criticized that "they have taken models that have been shown to be wrong, extrapolated them to the end of the century, left out some observational data that would have revealed how wrong they are, and then gave a false impression that sea ice is going to quite possibly recover and still be around in the summer at the end of the century."

A major problem of the retreating sea ice is not just the shrinking sea ice extent, but its receding volume and thickness, Wadhams continued. Submarine data shows that the sea ice covering the Arctic Ocean is getting thinner and thinner. "It's only shrinking very slowly, but once it shrinks to a certain point, and the summer melt exceeds the winter growth, we will see a collapse rather than a continued gradual shrinking," the professor warned. Wadhams predicted that September sea ice will essentially be gone by 2015/2016, gradually leading to ice-free summer periods of up to 3-4 months.

As a last point, Professor Wadhams spoke about the threat of methane in offshore Arctic subsea permafrost. Summer sea ice retreat causes the seawater tn the Arctic to absorb more solar energy than it otherwise would. As the seawater warms at the shallow continental shelves, this will melt the subsea permafrost. The melting of the permafrost will release into the atmosphere the powerful greenhouse gas methane (CH_4), which is currently trapped in subsea permafrost as methane hydrates. Scientists have already observed methane plumes coming up from the seabed in the East Siberian Sea.

The Professor projected that 50 Gigatons (Gt) of methane could be released in the next ten years, adding further to global warming. He estimates that this methane release could cost the global economy 60 trillion dollars[1] (using the Stern Review model) over a century. The costs linked to the warming caused by the methane release would far exceed the benefits from Arctic shipping and Arctic oil production. "We are paying enormously for having sea ice retreat in the Arctic, and it overshadows any benefits or booms that people imagine we are going to have," warned Professor Wadhams.

SEETA SISTLA

NOAA Climate and Global Change Postdoctoral Fellow, Department of Ecology & Evolutionary Biology, University of California, Irvine

Arctic Permafrost and Carbon Cycling: Implications for Future Carbon Budget and Climate Scenarios

To clarify what permafrost has to do with the carbon cycle and the climate, Dr Sistla contextualized this with a figure of global stocks and flows of carbon, excluding carbon fluxes to and from the ocean, as her research focuses on carbon flows in terrestrial environments.

Coal, oil and natural gas store about 10,000 petagrams (Pg), or 10 quintillion grams (10^{19} g) of carbon, of which over 8.7 Pg (8.7 quadrillion grams, or 8.7×10^{15}g) are emitted to the atmosphere through fossil fuel combustion and industrial activities each year.

1 According to the results of a study that Professor Wadhams co-authored in conjunction with Gail Whiteman and Chris Hope. Source: Whiteman, G. et al. Nature 499, 401–403 (25 July 2013); doi: 10.1038/499401a.

Additionally, there is a flux of approximately 100 Pg of carbon between the atmosphere and the terrestrial system (i.e., plants and soil; more than a magnitude greater than the carbon released to the atmosphere by fossil fuel burning). This terrestrial-atmospheric flux of carbon is caused by the uptake of carbon dioxide (CO_2) by plants through photosynthesis and the release of carbon dioxide (CO_2) and methane (CH_4) primarily through decomposition. Because the flow of carbon between terrestrial systems and the atmosphere is so large, relatively small impacts on terrestrial ecosystems have the potential to have a large impact on the atmospheric carbon content, and ultimately on the climate. These impacts can include things like land use change in the tropics, for instance burning for cattle pastures, Sistla explained.

The flux of carbon in and out of terrestrial ecosystems determines terrestrial carbon sequestration, she explained. Scientists are very concerned about the rate of warming in the Arctic and how this is going to affect how carbon becomes sequestered in Arctic systems. Terrestrial carbon sequestration is largely determined by the balance between the carbon dioxide (CO_2) plants uptake through photosynthesis and decomposer (microorganisms in the soil that breakdown plant litter) breakdown. During the latter process, decomposing microorganisms release nutrients into the soil in forms that plants can use to grow. However another by-product of decomposition is the release of greenhouse gases like carbon dioxide (CO_2) and methane (CH_4) back into the atmosphere.

As for the Arctic permafrost ecosystems, Dr Sistla called attention to some specific features such as stunted vegetation, saturated soils, highly seasonal ecosystems (short, intense summers with up to 24 hours of sunlight, and long, dark winters), and a mean temperature below 0°C. Plants are relatively small in this system and do not sequester that much carbon (relative to soils). However the soil stores a lot of carbon due to the cold climate. The breakdown of plant litter over millennia is extremely slow. Permafrost soils have an active layer that is approximately 10 to 100 cm thick below the surface. This layer thaws every summer and plants grow roots within this layer. Beneath the active layer, the permafrost that doesn't thaw can be up to 1,500 metres deep, and is very carbon-rich. As the Arctic warms, there is concern that the deeper, non-active layer of permafrost may start to see decomposition. Warming is accelerating the breakdown of permafrost, as Sistla illustrated by pictures from permafrost in Alaska, where soil erosion and collapsed infrastructure came about as a result of thawing permafrost. In addition to undergoing rapid decomposition as the soil warms, some soil carbon can be leached away and hydrologically transported towards the oceans, where some of it can be processed and released to the atmosphere.

Putting this into a global perspective, Dr Sistla noted that permafrost soils are estimated to contain more than twice the amount of carbon that is currently in the entire atmosphere. Because the Arctic is predicted to warm up to 8°C warmer by the end of the 21st century, it is estimated that by 2100, there will be a substantial decline of near-surface permafrost and increase in the thaw depth of the active layer of permafrost.

Increasing plant growth is another effect of a warming Arctic, leading to the question of which scenario for carbon flow is going to dominate: One scenario could be more plants absorbing CO_2 and creating plant litter, which in turn builds permafrost soil. The other scenario would involve increased decomposer activity breaking down permafrost soil at a faster rate than plants are able to grow and absorb the carbon being released during this process. This would eventually lead to a destabilizing feedback and ultimately accelerated warming in the Arctic.

On this note, Dr Sistla addressed the question of whether there is a positive feedback of carbon release from permafrost. A 20 year running experiment that artificially warms a permafrost-underlain ecosystem in northern Alaska found that while over 20 years of simulated warming had restructured Arctic tundra plant and soil communities, net

soil carbon storage in the soils did not change, suggesting that soil carbon pools were resilient to warming over this period.

Another observation drawn from this simulated summer warming experiment, Sistla explained, was that winter conditions were changing in the system. The winter is the critical regulator of soil carbon storage. A small increase in average temperature in winter causes a big increase in decomposer activity, Sistla remarked. In the experimental greenhouses, researchers also observed a secondary feedback: as shrubs grow bigger, they catch more snow. Greater snow cover insulates the soil and keeps it warmer than it normally would be. This winter warming feedback, as Dr Sistla explained, maintained decomposition activity during the winter and deepened the active permafrost layer. Over the 20 years of the experiment, while summer soil warming declined (because plants shade the soil), winter warming increased and caused more decomposer activity in depth.

A recent study by Belshe and colleagues (2013)[2] shows that summer carbon dioxide uptake is increasing, but at the same time, winter carbon dioxide release is also increasing across the Arctic, and it appears that CO_2 release is going to eventually dominate, Sistla said.

To conclude, Dr Sistla stated that ongoing warming may destabilize deeper soils, which store the majority of permafrost soil carbon, by stimulating decomposers. As a last example for warming-feedback in terrestrial systems, Sistla talked about warming feedbacks by fire. A 2007 tundra fire in Alaska caused by a lightning strike during the summer continued to burn until November that year, and it released as much carbon into the atmosphere as is absorbed by the entire Arctic tundra biome in a year. If there is a warmer system with a dryer summer, the potential for such fires increases as well.

Sistla highlighted the importance for policymakers to consider permafrost carbon feedbacks when making greenhouse gas emission targets. With regard to climate scenarios over the next 20-100 years, Sistla noted that the United Nations Environment Programme Policy Implications of Warming Permafrost report stated that warming permafrost can account for 5% to 39% of the total allowable global carbon emissions, if the target atmospheric CO2 concentration was capped at 700 ppm (~ 300 ppm more than current levels).

AGNETA FRANSSON

Ocean Acidification Expert, Norwegian Polar Institute

Arctic Ocean Acidification and its impacts on Marine Ecosystems

Dr Fransson opened with some remarks on the relation between carbon dioxide (CO_2) emissions and the ocean CO_2 uptake. Rapid increase of CO_2 in the atmosphere occurred over a short period of time, so the Earth system has not been able to counter-balance this rapid change. The ocean has taken up more than 30% of anthropogenic CO_2 during the past 200 years, and this uptake has changed the ocean's CO_2 chemistry so that pH has decreased by 30%.

Referring to a graph from the new IPCC report Fransson showed the predicted decrease of ocean pH by 0.3 to 0.4 in 2100, depending on the scenario.

The Arctic Ocean, Dr Fransson emphasized, is particularly vulnerable to these changes because of its "heritage" and specific environment. In this context, "heritage" refers to the fact that the Arctic Ocean stores a lot of CO_2 from historical times and therefore

2 Belshe, E.F. et. al: Tundra ecosystems observed to be CO2 sources due to differential amplifications of the carbon cycle, Ecology Letters 16/10, 1307-1315, (18 August 2013); doi 10.1111/ele. 12164.

already has a low pH and low concentrations of carbonate ions. The water is cold and relatively fresh, so there is a potential for further CO_2 uptake. In the Arctic Ocean, there is also a large amount of freshwater from rivers and sea ice melt. With changes in ice cover, freshwater influx (river run-off and ice melt) and warming, permafrost thawing and the mobilization of methane hydrates will further affect ocean acidification.

The food chain in the Arctic Ocean is short and has few key species compared to other ecosystems, Dr Fransson explained. With regard to calcium carbonate ($CaCO_3$) saturation (Ⓟ), undersaturation occurs when the saturation (Ⓟ) is less than 1, (Ⓟ <1), meaning that calcium carbonate will chemically dissolve. Predictions for the 21st century say that the Polar Oceans will be undersaturated. The Arctic Ocean is even expected to be undersaturated as early as 2030. The development of undersaturation can be observed in long-term studies in the Icelandic Sea, which provide evidence for the rather rapid decrease of pH in the ocean, Fransson noted.

Dr Fransson went on to elaborate on an expedition to the Northwest Passage in 2005, using the Swedish icebreaker ***Oden***, to conduct CO_2 system measurements in the surface of the ocean. The results of this expedition showed that there was already an undersaturation of calcium carbonate, although models had predicted that this undersaturation wouldn't happen until 2030 at the earliest. This undersaturation of calcium carbonate is due to the presence of freshwater in the Arctic Ocean caused by sea ice melt and river run-off from rivers emptying into the Arctic Ocean from North America (such as the Mackenzie River) and Eurasia (such as the Lena).

As long-term studies are missing to a great extent in the Arctic Ocean, the Fram Centre in Tromsø initiated some long-term monitoring north of Norway and around the Svalbard archipelago, Dr Fransson said. The objectives of this monitoring are to identify and characterize the effects of ocean acidification in Northern waters, including the effects on organismal groups (from individual species on up to ecosystems) as well as socioeconomic impacts.

The finding of this research, Fransson reported, is that ocean acidification may affect the whole marine ecosystem. As calcium carbonate dissolves, it can no longer be used by organisms that usually form calcium carbonate shells and skeletons. Low pH concentrations further impact organisms living in the ecosystem such as pollock, king crab and copepods, and the bio-availability of micro-nutrients such as iron, magnesium and copper is affected as well. A key Arctic species, the zooplankton Pteropod, ***Limacina helicina,*** which is an important food source for fish, proves to be especially vulnerable to low pH and high CO_2 concentrations, Fransson stressed. Their aragonite shell makes them especially sensitive, and decreased calcification, or forming of a shell, was observed in ocean water with lower pH. The EU-EPOCA research project in Svalbard was a further effort to yield tangible results, and the German BIOACID project has been started in Kristineberg at the west coast of Sweden, Fransson said.

A further effect of higher CO_2 concentrations is "the rise of the slime", said Fransson in citing Dr Jeremy Jackson[3]. CO_2 in combination with nutrients has a stimulating effect on certain species of phytoplankton, which forms a slimy layer on the ocean surface, which helps these species outcompete larger phytoplankton. As the larger phytoplankton is an important food source for zooplankton, the food base for the zooplankton decreases. As a consequence, energy is not transported to higher trophic levels, which may cause a change in the entire ecosystem.

Sea ice serves as a habitat for organisms such as zooplankton, ice algae and bacteria, but also larger organisms such as seals, which all affect the CO_2 system. With decreased summer ice cover, changes in the whole system may occur. The increased concentration of freshwater caused by ice melt, precipitation, and river run-off will

3 Jackson, Jeremy B.C. Proceedings of he National Academy of Sciences 105,11458 –11465 (11 August 2008); doi: 10.1073/pnas.0802812105.

increase ocean acidification. The warming of the ocean surface might decrease CO_2 solubility, but it is not clear whether this could limit acidification.

To conclude, Dr Fransson highlighted the need for long-term monitoring of CO_2 systems in the Arctic Ocean to detect changes, trends and causes. The first research projects have been undertaken and new projects have started, but continuous efforts are necessary. What is most needed, Fransson recalled, is a reduction of CO_2 emissions.

KONRAD STEFFEN

DIRECTOR, SWISS FEDERAL INSTITUTE FOR FOREST, SNOW AND LANDSCAPE RESEARCH

The Melting of the Greenland Ice Sheet – How does it affect Global Sea Level?

Professor Steffen opened his presentation with a brief overview of Greenland and its ice sheet. Greenland is the largest island on earth, and its ice sheet is more than 3.3 km thick. As a comparison, he mentioned that average sea ice thickness in the Arctic is 1.5-2.5 metres. Professor Steffen also reminded the audience that the melting of sea ice is not changing the sea level, whereas melting ice sheets do change the sea level. If Greenland's ice sheets melt, the global sea level would rise around 6 metres.

Sea level rise is not only caused by ice sheet melting, Professor Steffen explained. About 30% of sea level rise is caused by thermal expansion of the ocean; above freezing, if seawater gets warmer, its volume increases. What has been observed over the last 20 to 30 years was that a third of the sea level rise is caused by the top layer of the ocean taking in energy. Sea level change can also be relativized by land masses moving up or down due to isostatic rebound.

Professor Steffen then went on to explain how sea level changes are measured, indicating that there are several methods, including the use of laser altimeter satellites, radar measurements, tide gauges and gravity instruments.

The sea level today is approximately the same as it was 130,000 years ago, Professor Steffen explained. He then showed the evolution of global sea level over the past 140,000 years. Sea level has risen more than 120 metres since the last glacial maximum 20,000 years ago due to the melting of the ice sheets that used to cover large parts of North American and Eurasia. It is interesting to see that the sea level 120.000 years

ago was about 4 metres higher than today while the average global temperature at the time was similar to what we expect to see on Earth before the end of the 21st century.

"During the past 3,000 years, when our civilization evolved along the coastlines, sea level was extremely stable. But this will no longer be the case in the coming 200 to 300 years," Steffen warned. It is projected that sea level will change much more rapidly than in the past. Whereas the annual sea level rise was around 1.7 mm per year before the 1990s, very accurate satellite measurements from 1992 onwards have recorded a sea level increase of 3.3 mm per year. Up until 2100, a sea level rise of 1 metre is quite plausible, referencing the IPCC's 5th Assessment Report.

However Professor Steffen made clear that 1 metre global sea level rise has actually very little meaning in reality. What is much more significant is how sea level changes locally. Due to many different factors, sea level can vary significantly from region to region. Sea level in a particular area is sometimes two to three times higher than the average sea level across the planet. For example, if a melting Antarctic Ice Sheet causes an average sea level rise of 1 metre, this would mean an increase of the average sea level of 1.6 metres in the Northern Hemisphere.

The next point Professor Steffen addressed was the mass balance of the Greenland Ice Sheet. Mass balance refers to the ice mass influx minus the ice mass lost. Ice mass influx comes in the form of precipitation – snow (around 550-640 Gigatons per year falls on top of the Greenland Ice Sheet). Ice mass outflow comes in the form of meltwater runoff (250-350 Gigatons per year), ice discharge in the form of icebergs that calve off of outlet glaciers at the coast (320-420 Gigatons per year), and evaporation, (around 10-45 Gigatons per year). This leads to an overall negative mass balance of -50 to -200 Gigatons per year on average over the past ten years. However over the last three years, ice mass loss has even exceeded 400 Gigatons. To put Greenland's ice mass loss into perspective, Professor Steffen pointed out that the total ice mass covering the Alps is only 60 Gigatons, meaning the Greenland Ice Sheet can lose around five times the volume of ice covering the Alps in a year. This ice mass loss is still not a lot for Greenland, however this rate of loss nonetheless contributes 1 mm to global sea level every year.

The increased melt of the Greenland Ice Sheet is noticeable, Professor Steffen explained. The Swiss Camp research station in the middle of the ice sheet in Greenland, where Professor Steffen has conducted research over the past few decades, has dropped 12 metres in altitude since 1990. The area of increased melt over the entire Greenland Ice Sheet rose by 65% over the past 30 years.

Professor Steffen stressed that rising ocean temperature is at least as much of a factor contributing to the melt of the Greenland Ice Sheet as rising air temperatures. In the late 1990s, the Gulf Stream pushed a warm current towards Greenland, which is referred to as the Irminger Current. This current warms the water along the western coast of Greenland by 3°C to 4°C, and causes ice sheet to melt Furthermore, as the warmer water comes in contact with the outlet glaciers where the ice sheet normally loses ice, causing their flow rate to speed up. According to an IPCC figure, Greenland lost between 215 Gigatons of ice per year between 2002 and 2011 due to ice melt and ice dynamics.

In response to criticism about the IPCC's 5th Assessment Report, which Professor Steffen co-authored, he emphasized that the report is no scientific study itself, but rather sums up the scientific literature that has been published on climate issues. No new studies were conducted specifically for the report. Instead, the latest publications are taken as a basis, rated and summarized. The authors do not contribute their own viewpoints to the scientific studies that have been reviewed.

The IPCC's 5th Assessment Report indicates that Greenland has contributed around 8 mm to sea level rise since 1992, which accounts for about 3,000 Gigatons of ice loss over that time. Professor Steffen highlighted the role in discharging meltwater that a physical feature within the ice sheet that he had studied with graduate students: moulins - vertical shafts that direct meltwater at the surface down through the ice sheet and out towards the ocean. Better understanding moulins can help scientists better understand the dynamics of the ice sheet.

In conclusion, Professor Steffen pointed out that the Arctic is only one part of the equation. The Antarctic Ice Sheet holds much more ice (it would raise global seal levels by around 60 metres if all of it were to melt). However it is not going to melt soon, and will contribute to sea level rise at only a slow pace. And while Greenland and Antarctica are losing ice mass from their respective ice sheets, "neither ice sheet will disappear within the next 10,000 years," Professor Steffen explained. "The global sea level might increase up to one metre by 2100, which will be disastrous for those living at the coast, but we are not going to lose the main ice masses for a long time."

GORDON MCBEAN

PRESIDENT, CANADIAN CLIMATE FORUM; PROFESSOR OF GEOGRAPHY, WESTERN UNIVERSITY

Bridging the Divide between the Scientific Community and Policymakers on Climate Issues

Giving a brief historical background of scientific activities in the Arctic, Professor McBean opened by referring to the international polar years in 1882/83 and 1932/33, organized by the International Council of Science (ICSU) and others. In 1957, the International Geophysical Year took place.

The first systematic measurements of carbon dioxide (CO_2) and of ozone (O_3) were made in the 1950s. When the ozone hole was discovered in the mid-1980s, there were already 30 years' worth of observations to show that this was an unusual development, McBean explained. More recent examples are the 2007-08 International Polar Year and the April 2012 International Polar Year "From Knowledge to Action" conference in Montreal.

Professor McBean emphasized the importance of long-term observations of things like ozone and CO_2. Such long-term systematic measurements deliver an important background documentation of what has happened in the past and helps us to analyze current developments.

McBean spoke of a global polar experiment that was planned in a research meeting he attended in Saint Petersburg in 1972. This initiative never came about. However in the 1980s, the World Climate Research Programme was launched, and the Arctic was added to its research agenda a few years later. Almost three decades of systematic polar research has been going on since.

Issues other than climate change, such as ocean acidification and how ecosystems are impacted by climate change need to be brought together in a more integrated way, McBean argued. One effort to inform policymaking is the Intergovernmental Panel on Climate Change (IPCC), which was created in 1988. Another has been the 2005 Arctic Climate Impact Assessment (ACIA), which showed the result of circumpolar research cooperation, mandated by the Arctic Council .

To foster discussion following his presentation, Professor McBean posed the question whether integrated Arctic environmental system assessments should be conducted

on a more regular basis in order to link issues such as climate, ocean acidification, ecosystems, human dimension and health.

Professor McBean then turned towards the IPCC's 5th Assessment Report, stating that "the unfortunate reality is that we are making no progress to the conventions, and global emissions are still going up." As a result, temperatures will continue to get warmer, Arctic sea ice will continue to diminish, and the sea level will rise. McBean sees a clear need to bridge the divide between science and policy in order to address global tipping points in terms of ecosystem change such as biodiversity loss, nitrogen cycles, climate change, global freshwater use and land use changes.

On a more positive note, Professor McBean noted that the amount of ozone being depleted has decreased, thanks to global efforts such as the Montreal Protocol, and stressed the need to build on these positive success stories. "We need to emphasize to governments that undertaking agreements to reduce emissions does make economic, social and environmental sense," Mc Bean said.

In the Arctic, issues of transportation and resource exploration require a strong science-policy interface, McBean argued. He asked what mechanisms could be established to enhance a two-way, continuous dialogue, and whether the Arctic Council could be a possible mechanism for doing this.

Professor McBean then introduced the Future Earth Research for Global Sustainability initiative a ten year research programme recently launched. This programme, as McBean explained, seeks to look across issues of natural, social, economic, health and many other areas of global change and sustainability. One of the biggest uncertainties for the natural sciences in predicting future scenarios of the state of the environment is the lack of predictability of what humans are going to do collectively. To bridge this predictability gap, the Future Earth initiative coordinated by the International Council for Science (ICSU) will provide policy inputs throughout its research process, leading to policies, and eventually feedbacks into research policy. This creates a feedback cycle of co-design, co-production and co-delivery. An engagement committee consisting of business people, civil society representatives, indigenous peoples and government groups allows all stakeholders to be involved.

Finally, Professor McBean championed the need for a major Arctic programme, either as a component of a global programme like Future Earth, or in its own right. He posited the question of whether the Arctic Council could push for such an integrated initiative .

DISCUSSION

Moderator Bernard W. Funston opened the discussion with a few remarks. He wondered how policymakers would turn the information from the previous presentations into policy. He suggested that this would not be a linear process for two reasons: First, policy is not just about information, but is generally made to serve human interests and may be made in spite of what is known. In some cases, however, science takes this into account in balancing and moderating these competing and often conflicting human interests. Second, policymaking on the basis of scientific knowledge would need to be strategic, and because of the electoral cycles in Western democracies, politicians often only focus on a three to four year period. Mr Funston stressed that science is critical to understanding the consequences of environmental change and expressed his regret that policymakers are often are absent when during these kinds of presentations.

Neil Hamilton from Greenpeace International asked for the panelists' assessments of the additional impacts from the issues discussed during the presentation part of the session. He asked what additional risks are currently not addressed by the policy

perspective. To give examples, Mr Hamilton referred to Peter Wadhams' remark that the loss of sea ice is not treated adequately in the global climate models, which leads to underestimated impacts of how this loss of sea ice will influence climate change. He also referred to Wadhams' comment on the exclusion of the melting permafrost and to Seeta Sistla's remarks on the lack of attention to the impact of biospheric carbon from melting terrestrial permafrost.

Professor Wadhams responded that impacts of melting offshore permafrost would cause an increase of average global temperature by about 0.6°C by 2040 if 50 Gigatons of methane were to be released from the East Siberian shelf within the space of ten years. This would add to the warming that is already taking place. Konrad Steffen added that the local sea level would rise by up to two metres – not on a global average, but locally.

Dr Sistla said that a lot of carbon feedbacks are slowly being incorporated into global climate models. The feedbacks she talked about are driven by decomposing microorganisms, but nutrients also play a large role in plant growth. These mechanisms are gradually being included in climate models.

Professor McBean stressed that it is important to spread the message that these changes are really happening, and that they are going to get much worse in the future. As politicians often only think over four-year timeframe, he argued that it is important for the science community to emphasize their findings in order to get some response. This would not work through the attempt to exert direct influence on politicians, McBean suggested. However scientists can influence directly and via the media the citizens who will vote in the next election.

The next question, asked by Professor Michael Byers, was directed towards Professor Mc Bean and touched upon the question of morality within the science-policy interface. There are governments that actively campaign against science and scientists, Byers remarked, seeking to dismiss and degrade public understanding of the scientific process and the objectivity of results. "How do you work with governments like that, who do not want to engage, and how do you deal with your colleagues who continue to work with governments like that?" he asked. "We have had scientists who have made bad moral decisions in the past. Some scientists supported the idea of racial inferiority. Other scientists worked on atomic bombs. How do you deal with the part of the science community that works with governments that do not believe in but rather attack science?"

Professor McBean confirmed that this is a very big issue. As a scientific community, there is a need to be more vocal about the importance of science and to speak out about those scientists who choose to deliberately mislead people and reinforce the views of certain organizations. On the other hand, it is important that organizations like the Arctic Council have a specific role to play. When the Arctic Climate Impact Assessment was presented to the Arctic Council , the expectation was that one government in particular would refuse to accept it, which fortunately did not happen, as everyone else agreed on the report as well. McBean stressed the importance of working effectively through organizations.

Liisa Holmberg, Rector of the Sámi Education Institute asked how scientific information is communicated to the local Arctic inhabitants who do not speak English or who do not understand the scientific language that is used.

Professor Steffen answered that he took part in a US-led townhall programme in which scientists went to the local communities in Greenland. The townhall meetings were translated into Inuktitut and Danish. This ongoing project has been very successful, Steffen stated. Another project took Greenlanders on the ice sheet, as many of them have never been there before, even though they live so close to it. However Professor

Steffen confirmed the need for more efforts to communicate research findings to the local population in the Arctic. Professor Wadhams added that interviews in the media and blogs can also help to get the message across to the public.

Bernard Funston briefly mentioned similar initiatives at the Canadian Polar Commission, in which researchers approach local inhabitants and ask them to identify research priorities they regard to be of particular importance.

The last question from Elena Kolpakova of the Russian NGO Socio-Ecological Union, focused on the aim to limit temperature rise. In order to achieve this, 75% of fossil fuel resources should stay in the ground, she said.

Professor Wadhams acknowledged that this is a valid point. There is a disconnect between two settled government policies, agreed to by all governments in the UN, which are completely incompatible with one another. One is that everyone in the United Nations Framework Convention on Climate Change (UNFCC) has signed on to the target that the climate should not be allowed to warm beyond another 2°C. But research shows that the only way to prevent the climate from warming beyond this is to limit total CO_2 emissions by leaving two thirds of the remaining oil in the ground. Yet every government supports the oil industry and "sustainable development of the oil industry," Wadhams continued. Those two aims are incompatible, he argued.

In closing the session, Mr Funston made an observation about the relationship between science and policy. Our approach is often that science should lead policy, which certainly is an option. Another option is that policy should lead science. He gave the example of the US after Kennedy had announced that the US would send a person on the moon by the end of the 1960s. This statement of policy in fact drove science in many fields. Funston expressed the hope to have that kind of a vision articulated in a trusting forum like the Arctic Council , and hoped another drive for science would come about. The current work on a vision of the Arctic Council , launched during the Swedish chairmanship, constitutes a starting point for a positive development in this direction, Funston concluded.

CHALLENGES AND OPPORTUNITIES FOR ARCTIC RESIDENTS

MODERATOR: PETER HARRISON

PROFESSOR, SCHOOL OF POLICY STUDIES AT QUEEN'S UNIVERSITY; CHAIR OF THE IPY 2012 "FROM KNOWLEDGE TO ACTION" CONFERENCE

Professor Harrison started by thanking the organizers for giving the Arctic residents a platform to voice their own concerns with regard to the challenges of the region. Listening to the voice of the people of the North and indigenous groups would not have been on the agenda of a conference like this five to ten years ago, Harrison said. According to Harrison, there is a number of reasons why this is changing. In the Canadian context, one of the huge and largely unknown changes is the settling of land claims which define the rights of indigenous peoples and the rights of the Government of Canada through treaties. This also means that the way of doing business has changed, the Professor suggested. The involvement of local and indigenous peoples is clearly required by those legal agreements. It has also changed the way science is done. Traditional knowledge of the land, the animals and the weather are increasingly being looked to and included in scientific analyses. From a more global perspective, he added that the last International Polar Year raised the importance of the involvement of the residents of the North and indigenous groups.

REGGIE JOULE

MAYOR, ALASKA'S NORTHWEST ARCTIC BOROUGH

Challenges facing Arctic Residents

In his opening remarks, Mayor Joule explained the concept of a borough as being analogous to a county. The Northwest Arctic Borough, of which Mr joule serves as mayor, contains 11 villages and covers about 36,000 square miles, making it the second largest borough in Alaska. None of the villages are connected by road. They can be reached by boat during the summer, and by airplane or snowmobiles in winter. The total number of inhabitants is approximately 7,500 people, of which 80% is indigenous.

Mayor Joule then described Kotzebue as the borough's hub community. With 3,300 residents, it serves as a seat of the local government. "Our region is made up of mountains, rivers, lakes, tundra, oceans and trees," Joule stated. He highlighted the importance of the land for the community's food security. Fish, sea and land mammals, local plants and birds constitute the basis for subsistence in the region. "Putting away food is like putting money in a bank – as soon as the snow melts in the spring, we are filling up our caches for the next winter because our harvesting season is so short," Joule explained.

In the course of land claim settlements that granted ownership of the land to the communities, the communities were able to decide whether their areas should be used for continued customary and traditional use, or for economic development. Joule noted that 13 regional corporations were formed in Alaska, one of them being the Northwest Arctic Borough's NANA Corporation, which in part opted for economic development through the NANA Development Corporation.

However economic development must to take into consideration the traditional values of the region. As the community also recognized the need for a cash economy, the Red Dog Mine was established. The mine, now operated by Teck, extracts lead and zinc, and is situated in the mountains, away from the communities. The mine is expected to have a 50 year lifetime. The NANA Corporation set up some conditions for an agreement with the mining industry regarding water quality and subsistence. Locals who serve on a subsistence advisory committee are authorized to monitor the water quality in their area and the migration patterns of certain animals. The advisory

committee is empowered to recommend corrective action or to temporarily suspend certain operations at the mine for migrating animals or to shut down the mine in the event of non-compliance. In over 30 years of operation, the advisory committee has only seriously considered mine closure on one occasion, but corrective actions were taken. “A relationship like that is never relaxed, but there should always be some healthy tension,” Joule remarked.

Mayor Joule then highlighted some facts and figures about the Red Dog Mine. It accounts for 10% of global zinc production, and is the world’s largest zinc producer. An open pit mine, it is a main revenue source for the community. The payments the community receives in lieu of taxes are used for a wide range of services, such as planning and zoning, assisting with issues of economic development, public services, public safety, infrastructure such as schools, and search and rescue.

The mine employs around 500 people year-round, 53% of which are local people. This translates into US$ 33.9 million annually, which is infused into the local family networks.

Mayor Joule stated that the Red Dog Mine demonstrates how mineral development can occur in rural areas with the support and input of the local communities. Crucial conditions for the agreement included not only local hire mandates, but also the guarantee that the route from the mine to the port takes into account migration patterns of local animals like the caribou. Vehicle transports of ore have to stop periodically during migration season. Moreover, shipping schedules have to accommodate whale and seal hunting, and a local subsistence committee advises on the protection of food resources.

Another aspect Mayor Joule discussed was the prospective development of Alaska’s outer continental shelf. It is not in the immediate area, but because of the mobility of sea mammals it nonetheless has the potential to impact local marine food sources. The drilling of exploratory wells started in the 1980s, Joule recounted. If oil production occurs one day, the lack of ports and first responder capacity in the region will pose big challenges. The community currently relies on diesel for the Red Dog Mine operations and stove oil for heating, and it is looking for less expensive energy sources. Therefore, the NANA corporation is currently looking for partners to explore for gas in the Kotzebue Basin.

On the topic of energy supply, marine transportation plays a big role in the region, bringing in fuel, food and other goods. According to Joule, the cheapest stove oil and gas in the communities costs US$ 6.50 per gallon for those who can receive it via marine transportation. For those whose fuel has to be flown in, the price is as high as US$ 11 per gallon. With unemployment rates as high as 50% in some areas, Mayor Joule underscored the lack of purchasing power with such high oil and gas prices.

Electricity costs range between US$ 0.44 and US$ 1.05 per kilowatt-hour and pose another great concern. In the communities that depend on their fuel to be flown in during the winter months, electricity prices alone can rise to US$ 500-1,200 a month.

Against this background, the mayor emphasized that the communities of the Northwest Arctic Borough are strongly concerned about food, energy and economic security. Joule raised concerns about the voice of small indigenous groups being heard and reiterated the communities’ search for sustainable economic development opportunities. The region’s renewable and non-renewable resources are vital to the community, but most importantly, as Joule stressed, it is the human resources that “are our gift and responsibility.”

LIISA HOLMBERG

RECTOR, SÁMI EDUCATION INSTITUTE

The Challenges of Educating Northern Residents who Live Traditional Lifestyles

In reference to her home country of Finland, Ms Holmberg opened by saying that Finland is not a coastal state, but the Sámi people are coastal people. Spending the summertime at the sea and moving back inland with their reindeer in winter, they have crossed international borders for centuries and lead a traditional, mostly nomadic lifestyle. The Sámi Education Institute is a vocational school that seeks to support and develop Sámi languages, culture and livelihood in order to maintain this traditional lifestyle.

Ms Holmberg introduced the Sámi Education Institute in more detail and talked about the degree programmes offered by the school. They include Sámi handicraft, reindeer husbandry and other nature-based livelihoods, as well as programmes in business, nursing, tourism, and data education. Additionally, virtual education programmes cover areas all over Finland and abroad. The school teaches the three main Sámi languages (North Sámi, Inari and Skolt Sámi), and is very active in organizing development projects in Finland and internationally.

In her presentation, Ms Holmberg addressed three key issues:

1. The focus and perspectives of Arctic indigenous peoples' education.
2. The importance of international cooperation.
3. The EU's role within Arctic indigenous peoples' cooperation.

The Sámi Education Institute's vision is to be a leading organization that applies the methods and knowledge of Sámi traditions in an innovative way, Holmberg said. The goal is to maintain and develop the Sámi language, Sámi livelihoods and tradition in modern society. In this regard, Ms Holmberg particularly stressed that it is necessary to take into account the cultural and individual Sámi needs when deciding what to teach, how to teach, and who should teach students.

According to Holmberg, it is vital to know how the Sámi society works and what its main concerns are in order to plan and develop teaching curricula. Being situated between the modern and the traditional, it is necessary to know the traditions that are still giving unspoken and often unwritten guidelines to the communities, she emphasized. Therefore, the teachers need to have a deep understanding of the Sámi culture.

The Sámi Education Institute applies traditional ways of teaching while at the same time using modern technology as a tool. Ms Holmberg called the reindeer the major connecting feature between Arctic indigenous peoples. The Institute collaborates closely with other vocational schools and indigenous organizations, and the "BEBO" (Sámi abbreviation for "for the future of reindeer herding") Network was established in 2007 and links 27 schools and organizations.

Ms Holmberg then addressed the EU's engagement, stating that the EU has carried out several projects and provided funding in the region for initiatives regarding indigenous tourism, young entrepreneurs and reindeer education and livelihood. As the school carries out student and teacher exchanges with Alaska, Canada and Russia, some of these have been supported by the EU as well.

Education cooperation and workshops the Sámi Education Institute has undertaken include reindeer-slaughtering and cutting, reindeer skin processing workshops and tourism and media education.

Language cooperation in particular has been a rapidly growing field in recent years, Holmberg noted. Apart from exchanges of best practices for teacher training and on virtual education techniques, a nomad school on the Taimyr Peninsula in Russia forms another component of educational cooperation. As the nomadic people of this area only return to the same place every four years, the nomadic school system ensures that children do not have to be separated from their families.

The funding for efforts like these is considered crucial, and Ms Holmberg expressed her gratitude for this support. She also welcomed the continuous dialogue between the EU and indigenous peoples, noting that the meeting on the October 18th meeting would be the fourth of this kind. However, a permanent structure of the indigenous peoples' involvement in the EU's decision-making is still missing, Holmberg argued. She would like to see that the indigenous peoples are heard in Brussels, and regards the EU Arctic Information Centre initiative based in Rovaniemi, Finland, as a further step towards greater cooperation. Ms Holmberg concluded by highlighting that the Sámi people are the only recognized indigenous group inside the EU, and that they should be more involved in EU decision-making and policy processes.

HARRIET KÜHNLEIN

PROFESSOR EMERITA OF HUMAN NUTRITION, MCGILL UNIVERSITY; FOUNDING DIRECTOR, CENTRE FOR INDIGENOUS PEOPLES' NUTRITION AND ENVIRONMENT

Indigenous Peoples' Food Systems in Northern Canada

Professor Kühnlein presented the work from CINE, the Centre for Indigenous People's Nutrition and Environment. The centre's governing board includes both university staff and indigenous leaders. Many of CINE's perspectives on indigenous peoples' food systems therefore largely come from its indigenous governing board. It recognizes that indigenous peoples with cultural homelands in rural areas have long-term traditions, customs, knowledge, worldviews and values. Because of this, they have a vast understanding of their local ecosystems, which CINE studies and documents.

Indigenous peoples understand and responsibly use the biodiversity of local food resources, Professor Kühnlein remarked. The centre's most recent efforts are in the area of biodiversity and its conservation. The professor mentioned the need for effective policies to ensure indigenous peoples' self-determination to use resources for nutrition and overall health and well-being. For this, they require both food sovereignty and food security.

The focus of Professor Kühnlein's presentation lay on the Yukon area, the Northwest Territories and Nunavut in northern Canada. In Canada, three major groups have been recognized in the Canadian Constitution: The First Nations (sometimes referred to as Indians), the Inuit, and the Métis (who are of mixed First Nations and European ancestry). The proportion of aboriginal people in the Canadian North amounts to 85% in Nunavut, 50% in the Northwest Territories and 25% in the Yukon Territory, leading to a total aboriginal population of approximately 49,000 people.

Professor Kühnlein explained that the Northwest Territories and Yukon First Nations primarily depend on land-based food resources – fish and mammals as well as plants. The primary food source of the Inuit in Nunavut is fish and sea mammals, other land animals to a lesser extent, as these communities mostly live at the coasts. Caribou is constant in its importance as a traditional food source.

When asking the communities about the key cultural attributes of harvesting and using traditional food, the research group received surprisingly consistent answers. To the questions "What does this food mean to you?" and "Why is it important?" Kühnlein remarked that the answers in all regions described the food as an essential part of

identity and culture, and characterized it as "tasty" and "fresh" due to the absence of preservatives. It was regarded as contributing to fitness and well-being, and was further said to provide a healthy diet and good nutrition. It also saves money and favours traditional sharing practices. Moreover, relying on traditional food sources allows the people to stay in tune with nature and respect it, and also builds pride and confidence. To the children, the harvest and use of the food contributes to education by teaching them survival skills, food preparation, spirituality and patience.

The caribou in particular enriches the traditional diet, Kühnlein stated. It is one of the major staple food sources. In order to capture the contribution of the traditional food when analyzing diets of indigenous peoples, it is necessary to dichotomize the diet into traditional food and market food, the professor explained.

She then proceeded to present some results of CINE's laboratory research, which came across some unexpected sources of micronutrients in traditional Arctic animal food. Seal liver and whale skin contain very high amounts of vitamin C, a fact that was well received in the nutrition literature. Early in her research, Professor Kühnlein recounted, she was often confronted with the assertion that people in the North eating fat whale meat instead of fruit and vegetables must be malnourished. However, numerous samples proved that the consumption of whale skin provides more than enough vitamin C. It is key, as Kühnlein highlighted, to eat all portions of the animal to receive all necessary micronutrients. It is further an important aspect of the cultural values not to waste any parts when you harvest an animal. Other examples Professor Kühnlein gave were goose lung and dried whale meat, which contain high levels of iron. Dried whale meat contains the highest levels of iron "in any traditional food worldwide." Professor Kühnlein concluded that negative preconceptions about traditional foods are misleading.

Another component of CINE's research is to ask indigenous peoples what they identify as threats to their food systems. The result is a list of threats that are often interlinked:

1. Loss of wildlife animals and plants, as well as the loss of the number of species, primarily due to habitat destruction.
2. Environmental degradation from poorly managed resource extraction
3. The presence of contaminants like mercury, which come into the Arctic from air and ocean currents.
4. Climate change.
5. The encroachment of outsiders on land and resources due to bioprospecting and piracy.
6. In some cases, trespassing restrictions prevent indigenous peoples from entering their own territory.
7. Urbanization and employment. The process of people moving to cities over generations causes a loss of knowledge on harvesting techniques. To some degree, these people also lose the taste and the acceptability of traditional foods.

With regard to calorie calculations, research demonstrates that the total energy intake is higher with traditional food. Without traditional food, Kühnlein reported, the people's carbohydrate and fat intake is higher, and their protein intake is lower. The intake of essential nutrients such as various vitamins and minerals is higher on days with traditional food, even if only a small amount of it is consumed. Nutrients that are significantly higher on days without traditional food are fat, saturated fat, sucrose, and sodium.

Since indigenous peoples nowadays eat even less traditional food than scientific figures suggest, the proportion of traditional food in the diet is declining, replaced by

refined market food. This market food is accessible through stores in the communities. The shelf life of products in these stores needs to be extensive, as it is expensive to bring in food. Kühnlein reported that food in these communities has become so expensive that people have started to demonstrate and the territorial governments have called to subsidize some of the market foods. A Facebook campaign against high food prices in Nunavut documented food prices like CAD$ 70 for a roast of beef, CAD$ 14 for two litres of juice, CAD$ 5 for a loaf of bread and CAD$ 8 for two litres of milk. Professor Kühnlein reiterated that people in the region do not have the income to buy food of good quality from the stores they have access to.

CINE's research results about human nutrition and food security for Canadian Arctic indigenous peoples stress that traditional food is important for nutrition in that region. Anemia is higher when traditional food is not used. Furthermore, there is less food insecurity where there is access to traditional animal wildlife food. With a decline of traditional food consumption from 1999 to 2008, Inuit obesity has increased, and many micronutrient deficiencies exist when traditional wildlife food is not eaten.

According to Kühnlein, human nutrition in the North is a public health concern. 70% of Inuit preschoolers live in households that do not have food security, and food insecurity is three times higher for indigenous compared to non-indigenous families. Research demonstrates that obesity in Nunavut children is attributed to poor food quality. Obesity in adult Inuit has been linked to high sugar in drinks, declining traditional food use, poor quality diets, and sedentary lifestyles. Further consequences include high levels of lipids, glucose and insulin in the blood, as well as high blood pressure and diabetes.

Professor Kühnlein emphasized that everywhere, not just in the North, indigenous peoples experience disparities because of the cultural transition and loss of their traditions. Poverty, as it is locally defined, and moving away from traditional diets, has lead to the double burden of malnutrition and obesity in the same communities and households.

For sustainable diets and improving food security for indigenous peoples everywhere, Kühnlein argued for improving access to wildlife and other traditional food sources. Wildlife conservation and management of species used for food must be improved as well, and all local food sources need to be documented and promoted, Kühnlein stressed. She further called for improvements in store food and its accessibility, as well as for the reduction of food prices and economic hardships.

In her concluding remarks, Professor Kühnlein referred to a recent CINE project that documents the traditional animal food resources of Indigenous Peoples of North America. A digital reference guide with literature reviews from many sources will be created, and is planned to be posted on the UN Food and Agriculture Organization website by the end of 2014.

HELENA OMMA

VICE-CHAIR, WORLD REINDEER HERDERS ASSOCIATION

Reconciling land-use conflicts facing reindeer herding communities with economic development in the Arctic

Ms Omma started her speech by referring to the remarks of Norway's Arctic Ambassador on the right of Northerners to develop in the Arctic, and asked whether this right concerns indigenous peoples as well.

Recalling the Arctic Ambassadors' remarks about a peaceful Arctic without conflicts, with all natural resources sitting within national borders, Omma asked on whose

territories these natural resources are situated. She further stated that Brussels and the Arctic state capitals may not be aware of conflicts, but that her own experience differs from these official diplomatic statements. "I come from an Arctic community myself, and we do have conflicts," Omma said.

Ms Omma grew up in a reindeer herding family in northern Sweden and emphasized the herders' strong connection to the animals and their well-being. During wintertime, her family lives in the forests outside Gälliväre. In springtime, the reindeer migrate to summer grazing grounds in the mountainous areas close to the Norwegian border.

In her presentation, Ms Omma addressed reindeer herding and the challenges herders face due to the loss of grazing lands. A specific point in case is the conflict over the Gállok Mine in northern Sweden. Gállok has turned into a symbolic fight for Sámi rights, but also reflects the complications of the mining boom that the region is experiencing today, Omma said. This is not an isolated case, but can be observed all over the Arctic.

Omma then briefly introduced the World Reindeer Herders Association , which was founded in 1993. All reindeer herding regions are represented in this organization, and the World Reindeer Herders Congress is held every four years, with the most recent being held in China in the summer or 2013. The association also holds observer status in the Arctic Council .

Traditional reindeer grazing lands can be found in most parts of Eurasia, as well as in Canada, Alaska, Scotland and Greenland, explained Omma. Reindeer herding involves 24 indigenous peoples, close to 100,000 reindeer herders and more than 2.5 million domesticated reindeer. The core idea of reindeer herding is to follow the reindeer to follow their natural migration between seasonal grazing pastures. Throughout generations, people have relied on the reindeer in the Arctic, and reindeer rely on the access to pastures, which in turn makes the herders highly dependent on these pastures as well. Although they are able to adapt to changes, reindeer herders are facing changes at an ever increasing pace, Omma remarked. She stressed the importance of the need to respect the needs of herders in order for them to be able to maintain their traditional lifestyle.

The main challenges reindeer herders face are climate change and a changing use of the Arctic. Climate change alone is not the major concern, Omma stressed. What is of much greater concern is the increased human activity in combination with the changing climate in the Arctic, as this causes heavy impacts on reindeer grazing lands. Scandinavia is expected to be severely affected by the loss of pastures, she explained.

Mining, oil and gas extraction, tourism, large-scale forestry and infrastructure projects are among the increased human activity taking place in the Arctic. Ms Omma put a special emphasis on mining resources in Sámi areas, calling it "the most unsustainable ways of land use and therefore something that causes great concern for reindeer herders." Mining sites cannot be re-naturalized into pastures once they are no longer useful.

Kirunavaara Mountain (Sámi: Gironvárri), now the site of the LKAB Mine in Kiruna, was once reindeer grazing land, and will never serve as reindeer grazing land again. Due to the mine's expansion, more grazing land will be lost, Omma explained. She noted that reindeer herders in the Kiruna area try to adapt to the situation. As little can be done in opposition to the existing mine, dialogue with LKAB is the only measure available to the herders, "although their threshold of intrusion in their lands has been reached a long time ago."

Ms Omma then turned towards the conflict about the more recent Gállok project that escalated during the summer of 2013. The Jokkmokk Iron Mines, owned by British company Beowulf Mining, recently started to operate in the area. The mine is situated

on reindeer grazing lands and will cut the reindeer's migration route between summer and winter pastures. The transportation route for the mine will also affect surrounding villages, Omma stated. As reindeer herders already consider themselves as being impacted by hydropower infrastructure and forestry, protests and demonstrations escalated during the summer of 2013, with many herders complaining that the Sámi lack legal means to reject intrusion onto their lands. There is no law that protects indigenous land rights in Sweden, especially one that would require free, prior and informed consent by the Sámi when it pertains to industrial land use. Ms Omma pointed out that Sweden has been criticized for the lack of such a legal framework by the UN Committee on Elimination of Racial Discrimination. There is, however, a recent policy stating that short-term mining is of greater importance for the country than self-sustained reindeer husbandry, according to Omma.

In response to the Gállok protests, the Swedish Government launched an initiative for dialogue between reindeer husbandry and the mining sector. The Sámi Parliament and the Swedish Sámi Association (SSR) have been invited to this initiative. As the latter does not regard the lack of communication as being at the core of the problem, the SSR declined to participate, Omma reported. In the SSR's view, it is the lack of protection of Sámi rights that constitutes the main problem. The Sámi Parliament has called for a stop to all mining processes until the rights of Sámi people of free, prior and informed consent are realized.

As the Swedish Government often stresses the need for coexistence, Ms Omma emphasized that the reindeer often experience that coexistence entails moving away to make way for industrial land use.

Ms Omma stressed the need for equal dialogue and two-way communication. "Without the right to say no to development projects, the discussion is unequal," Omma declared. She further stated that the loss of pastures needs to be recognized, as there are no unlimited grazing lands for the reindeer herders. Coexistence is about giving and taking, Omma concluded.

DISCUSSION

Before the discussion round started, Mr Ballot, Vice President of the Northwest Arctic Borough Assembly in Alaska addressed the audience. He called to mind the fragile ecosystem in the Arctic and encouraged everyone in the audience to continue to work together in order to address the challenges of climate change and global warming.

The first comment from a lady in the audience was that the last speech should have been the first in the morning session, as everyone seemed to be so happy about the cooperation in the region, and the reality seems to be so different.

Kathrin Keil from the Institute for Advanced Sustainability Studies and the Arctic Institute seconded the previous comment by describing the last panel as really informative. She suggested to start the next conference with the panel of indigenous stakeholders, as this would enhance the chance that policymakers would still be present to hear them. It would also give the people of the Arctic the opportunity to have the first word instead of the last.

A gentleman from the University of Groningen asked Professor Kühnlein about contaminants in Arctic indigenous food and health of the population.

Professor Kühnlein answered that there is a lot of work being done on contaminants in traditional food, showing that the contaminants are there. But people are currently eating so little traditional food that the contaminants by and large do not make a major contribution to the negative aspects of their health. There has been some research

on mercury. But looking at the big picture, the contaminants do not make a major contribution to health because people eat so little of it.

Professor Harrison added that this has been an issue for a long time, and there has been a Northern Contaminants Program (NCP) in Canada, which is often seen as a model of doing research together with the concerned people themselves and with them defining what the main questions and issues are.

Adam Stępień from the University of Lapland asked Ms Omma and Mayor Joule what would be the best practices or solutions to manage the relationship between the indigenous population and the extractive industries, and what kind of dialogue would be needed.

Ms Omma emphasized that the communication is often unidirectional when companies come into indigenous people's lands. The herders are given information on the planned projects, but their perspectives are not taken into account. According to Omma, the herders must be given the right to reject planned projects on their lands. She called for regulations from independent bodies to ensure that companies act in an ethical way.

Mayor Joule explained that the Red Dog Mine in Alaska's Northwest Arctic Borough is located on private land. The State of Alaska currently plans to build a road to connect to another mining district in the area. As these plans involve public land, he pointed out that there will be a difference in how the state will negotiate. As the state is driven to develop these resources, the communities consider what kind of leverage they may get from the projects.

Paul Waldie from the Globe and Mail newspaper in Canada focused on the tensions between Canada and the EU on seal hunt and fur trapping and asked for comments on that issue.

Professor Harrison referred to the speech on traditional food sources as important for indigenous peoples in regard to lifestyles as well as from a cultural and spiritual perspective. He suggested that the challenge is to find a balanced approach.

A gentleman from Columbia University asked whether contracting could be a good way of maintaining indigenous peoples' rights, and if public-private/native partnerships could be a way to develop infrastructure and to negotiate agreements for concessions on mining and other forms of land use.

Helena Omma first distinguished the Sámi reindeer herders from the rest of the Sámi society that does not conduct reindeer husbandry, pointing out that all parts of the indigenous society has to be included in agreements. She acknowledged the need for development, but posed the question as to whether the extraction of non-renewable resources is the only way to develop their society. In order to reach agreements, Omma emphasized that corporate social responsibility is not sufficient to safeguard Sámi interests, but that a legal framework including Sámi rights is an indispensable precondition to work on agreements.

THURSDAY, **OCTOBER 17, 2013**

DEVELOPING THE ARCTIC'S RESOURCES AND ECONOMY SUSTAINABLY

MODERATOR: **OLAV ORHEIM**

CHAIRMAN, GRID-ARENDAL

Professor Orheim opened the second day of the symposium with a few remarks on the strong attention the Arctic has been receiving recently. "What we are seeing now is something we did not see ten years ago, when the Arctic was only a place for specialists," he said. At that time, the Arctic was not on the agenda for many countries. Due to climate change and partly unrealistic ideas about immediate resource opportunities, the interest in the Arctic suddenly increased significantly. The Arctic Circle meeting in Reykjavik, Orheim went on, not only showed a lot of new faces. A number of presentations also displayed misconceptions of the Arctic by only referring to it as "a place of ice and polar bears." According to Orheim, however, the Arctic is also a place where people live and have to earn their livelihood, which is the subject of the first panel.

JENS JOHAN HJORT

MAYOR OF TROMSØ

The Arctic Region From a Local Perspective

Mayor Hjort commenced with a brief introduction of the city of Tromsø. The city is known as a gateway to the Arctic and has been a starting point for polar adventures for centuries. An increasing number of international companies, NGOs and research institutes with a focus on Arctic issues are based in the city. The combination of its strategic location, the potential for economic activities, and the challenges of climate change have moved the Arctic region from the outskirts to the centre of international attention. In his presentation, Mr Hjort wanted to give a picture of this from the perspective of the mayor of Tromsø.

During Mayor Hjort's two years in office, as many as 80 ambassadors have visited Tromsø, and each have expressed the will to cooperate in one way or another. Mayor Hjort pointed out that the one who has visited him the most is the ambassador of

China, Mr Zhao Jun. The reason for the sudden interest of the world is twofold, Hjort suggested. The first and more obvious reason relates to the Arctic's richness in resources. In northern Norway, fishery and fish farming plays an important role, and Tromsø relies on this renewable resources as well. Mayor Hjort emphasized that exporting high quality food to the rest of the world is one of Norway's most important economic activities, "and our ambition is to largely increase this business in the coming decades."

The petroleum industry has played a crucial role in North Norway as well, Hjort stated, and it is believed it will to continue to do so for the next 50-100 years. As about 20% of the world's remaining undiscovered petroleum resources are to be found in the High North, according to a 2008 US Geological Survey study. Tromsø has enacted a strategy on petroleum and maritime activity to ensure a suitable and proactive approach is taken regarding these resources. This strategy has emphasized that Tromsø is ready to take a leading role in facilitating petrol-maritime activities in the region. In late 2011, Norway's biggest private employer, Aker Solutions, announced it would establish its head office with 300 new employees in Tromsø. All this notwithstanding, the mayor accentuated the adherence to a precautionary approach, and stressed that only the highest standards would be applied in order to avoid putting the vulnerable nature of the Arctic at risk.

Minerals are the third important resource, said the mayor. The new government of Norway elected in 2013 announced that the development of mineral resources will be addressed in the coming legislative period, including due consideration to the Sámi people and their livelihoods. With regard to increased tourism in Tromsø, the mayor called nature itself the fourth important resource of the region.

Another reason for the increased attention to the High North and Tromsø is Arctic know-how. The Arctic University of Norway and the Fram Centre contribute to maintaining Norway's and Tromsø's status in the management of the environment and natural resources in the North. As the High North has been Norway's number one foreign policy priority during the past eight years, Hjort acknowledged the accomplishments of the former foreign minister Jonas Gahr Støre and stated that the new government confirmed the importance of the High North.

Mayor Hjort then called to mind the Barents Cooperation as a successful arena to contribute to and further strengthen economic, social, and cultural development in the region. The Barents Cooperation has become a cornerstone of regional cooperation in the North, especially between Norway and Russia. The two countries reached a historic agreement in 2010 when they signed a treaty settling the maritime border between Norway and Russia in the Barents Sea and the Arctic Ocean. With regard to international cooperation, Hjort also mentioned that Tromsø became the host of the Standing Secretariat of the Arctic Council in January 2013. To promote and highlight Arctic perspectives and concerns, the work and efforts of the Arctic Council has significant meaning for the people of the Arctic, and the EU is certainly welcome onboard.

Norway has not had a very proud history when it comes to the Sámi people, Hjort admitted. They have been deprived of their language and, to a certain extent, their culture as well. In light of this, Tromsø signed an agreement with the Sámi Council on enhancing the Sámi culture and languages.

In his concluding remarks, the mayor talked about the Arctic Frontiers conference that is held in Tromsø every January. The mayor invited everyone to participate in the 2014 conference, which focused on Humans in the Arctic, and encouraged the audience to visit the Arctic, including Tromsø, in order to "fully understand the distances, the climate, the changes and the mentality of the people in the Arctic."

ANDERS MARVIK

VICE PRESIDENT AND HEAD OF STATOIL EU AFFAIRS OFFICE

A New Industrial Horizon

Mr Marvik stated that the main reasons why Statoil looks at Arctic oil and gas resources are the increased global oil and gas demand and the prospect that 20% of remaining undiscovered global oil and gas resources are to be found the Arctic, citing the 2008 US Geological Survey report. Referring to Ms Haatvedt's presentation from the day before, Mr Marvik reiterated that there is more than one Arctic. Statoil is currently working in what is defined as the "workable Arctic" - where all its current extractive activities are located.

The Vice President of the Statoil EU Affairs Office expressed the hope that Statoil can plan, learn and develop technology so it can move into the other areas in Arctic in the future. Statoil has been present in the Arctic for 35 years, drilling its first well in Norway in 1980. The company has drilled more than 100 wells in the Arctic, almost half of which are discoveries, Marvik explained.

There are fields already in production, like the Snøhvit project, which started in 2007, and which is a technical first in many regards. All installations of the Snøhvit field are placed on the seabed, and there is 160 km of pipeline connecting the field to the onshore LNG plant. Carbon dioxide (CO_2) coming in through the pipeline is segregated, sent back to the sea, and pumped into a reservoir, which Mr Marvik described as win-win situation, as the carbon is sequestered. Mr Marvik said the fat that very little CO_2 is emitted is a win for the environment, while at the same time the CO_2 injected increases the recovery rates and more gas can be extracted from the fields.

Other ongoing projects include the ENI -operated Goliat Oil Field with a planned production start in 2014, and the Johan Castberg Field, which may start producing by 2018. Besides these projects, Marvik referred the extensive ongoing activities in terms of seismic exploration, both on the Norwegian and the Russian side of the Barents Sea. As there surely will be discoveries that span the border, cooperation with Russia is of paramount importance to be able to develop those resources in a fair way for both nations in terms of taxation, income, and jobs.

Statoil's stepwise approach was another feature by Marvik focused on. Technology is constantly being developed to enable the company to handle harsher conditions, so that it can proceed further north in small increments. In this regard, Marvik particularly stressed Statoil's responsibility: "We are one of the biggest companies in Norway and have a license to operate there – if we do it wrong, we are not going to be allowed to do this anymore, so we have to get this right all the time."

Mr Marvik described how Statoil is a world-leader in subsea technology – a technology that is extremely important in the Arctic, he said. He said that the challenges one faces in the Arctic are not just the icy conditions, but also the remoteness, the cold and the darkness. These conditions make it desirable to have as few surface installations as possible, also with regard to the safety of people, Marvik noted.

After the Snøhvit project, efforts for subsea processing began in order to enable subsea installations to process the well stream and to separate water and gas. In other fields, subsea compression is used: gas is compressed by increasing pressure in the reservoir in order to obtain more oil and gas. Discussing the subsea operations' future potential, Marvik made reference to Troll Field, the biggest gas field in Norway. According to Marvik, the platform is the biggest man-made construction ever moved and today, it just would have been built on the seabed. With regard to subsea gas

compression, the dream of Statoil's technology team is to have a total subsea factory by 2020.

This ambition also relates to the high costs and efforts for the maintenance of drilling rigs and platforms in the Arctic. These need to be covered with plates because of the wind chill factor to enable people to work there. In order to be able to operate in -20°C, heating cables on all walkways are needed, and there are 42 steam heaters to avoid icing on the platforms.

As for future endeavours, Statoil currently has nine exploration wells planned, Marvik reported. Other companies are drilling exploratory wells in the area as well, and additional seismic explorations and projects under development amount to a high level of activity in the Arctic.

The financial benefits from the business activities in the Norwegian North, Marvik said, creates values and jobs across the region. This in turn attracts highly skilled people. He said that having proper industry – namely a multitude of smaller companies operating in the High North and not just Statoil – would also benefit universities and research institutes, and it could create an interesting environment that makes the region more attractive.

Mr Marvik recalled that the last licensing round in Norway for the Barents Sea attracted a lot of interest. With 10 out of 14 companies awarded licenses to operate European companies such as ENI and Wintershall, it also demonstrated that business in the Barents Sea is by no means confined to Norway and Statoil. About 20-25% of the current oil and gas production in Norway is undertaken by companies from all over Europe.

In conclusion, Mr Marvik emphasized that despite the abundance of activity, there is no rush to go to the extreme Arctic. Statoil will only proceed as fast as technology enables it to. Ending his presentation with remarks on Statoil's values, Mr Marvik emphasized that every single employee, himself included, have to live up to the company's values every day.

MINIK ROSING

CHAIRMAN, GEOLOGICAL SURVEY OF DENMARK AND GREENLAND

Mineral Resource Potential in Greenland

"There is an Arctic hype and Greenland is somehow the antidote to it," remarked Professor Rosing as he opened his presentation.

He began with a historical background on Greenlandic minerals and their exploration. The first person to conduct mineral research was Carl Ludwig Giesecke from Vienna, who went to Greenland from 1805 to 1813 to examine the prospects for mineral resource exploitation. He made a large collection of rare minerals that can still be found in museums all over Europe. Half a century later, around 1850, the Danish scientist Hans Christian Rink collected a number of minerals in Greenland as well, many of which were similar to graphite. During that time, graphite was among the most strategic minerals in the world, as it was "at the top of communication technology...the pencil was made of graphite, and England had a world monopoly on it." Because of high demand, graphite was extremely expensive. However shortly after Rink had discovered some graphite deposits in Greenland, Napoleon set up a research programme to invent an artificial pencil. By the time of Rink's discoveries, Napoleon destroyed demand for graphite with his artificial pencil, causing the market for graphite to collapse.

Another mineral Hans Christian Rink found was the rare mineral cryolite. As it was later discovered to be very useful in aluminium production, this finding caused aluminium costs to drop significantly from the mid 19th century onwards. Greenland benefited considerably from the revenues cryolite extraction generated, Rosing explained. During World War II, the US took over cryolite production in an attempt to establish a monopoly on aluminium production. Rosing said that selling cryolite to the US left Greenland with a positive trade balance during World War II. When the cryolite pits were depleted in the 1960s, local companies undertook regional mappings and found iron ore deposits in other parts of Greenland. These deposits may begin to be extracted in 2014, as Professor Rosing said that it takes approximately 50 years of research from discovery to mining of ore deposits.

In the 1930s, the Norwegians claimed East Greenland to be a part of Norway, which Denmark did not like. In response, Denmark deployed a number of geologists to study the sedimentary basins on Greenland's east coast. The Permanent Court of International Justice decided against Norway's claims in 1933, and incidentally, the Danish researchers found large petroleum potential in East Greenland. The side effect of mineral exploration led not only to a comprehensive geological mapping of Greenland, but also to establishing Denmark's claim to Greenland and the discovery of oil deposits.

Today, Greenland has a full geological map of all regions. Compared to Canada, which plans to invest millions of dollars to do the same with Nunavut, Greenland has a history of geological research spanning more than a century, Rosing explained. While it is the largest island in the world with a vast territory, Greenland only has a population of 57,000 people, with very limited infrastructure. This may pose logistical difficulties when extracting minerals.

Professor Rosing then presented Greenland's current most significant resource potentials. "World class potentials" as he called them, Professor Rosing described the largest mineral potentials in the world, which include zinc deposits in North Greenland (however these deposits may be very difficult to access). Furthermore, there are large platinum and gold deposits in East Greenland, and the country's southern region has attracted a lot of attention because it contains rare earth elements. "Everyone somehow gets excited when you mention rare earth elements because of its alluring name," joked Rosing. "What characterizes them is that they are neither rare nor earth; they are not uncommon either." The professor noted that China has a near-monopoly on the production of rare earth elements. The reason for this, Rosing stated, is that "...it is a very messy business. It is very costly and creates a lot of environmental damage. Everybody has been extremely happy that China has been dealing with it in their country, and just sends us the i-phones when they are ready to be plugged in." Greenland, however, possesses large deposits of these rare earth elements as well, and people have begun speculating about how to break China's monopoly.

Over the past five to six years, Greenland has been attracting increasing international attention, and exploration licenses have increased fivefold. This does not relate to an opening Arctic or a melting ice sheet, but rather to rising global commodity prices, Professor Rosing explained. The professor then addressed the problem of rare earth production in South Greenland, which has led to increased attention from the EU. These deposits also contain uranium, something that causes a lot of political debate in Greenland. The Parliament of Greenland plans to discuss whether the country should become a uranium exporter, as in order to extract the rare earth elements, uranium is inadvertently extracted as well. Greenland therefore finds itself in a dilemma and needs to find a solution to this issue.

For the EU, rare earth elements and other minerals such as platinum group elements (PGM) and Niobium are deemed critical, i.e. of high economic importance. The Geological Survey of Greenland and Denmark detected high potentials for the deposits

of these minerals, which is why the country's mineral resources have increasingly been moving into the EU's focus. The possibility of opening maritime transport routes that grant access of Greenland's minerals to Asian buyers adds to the international attention, Professor Rosing added. Despite discussions in Denmark about China potentially taking over mineral production in Greenland, there is no evidence of such a development. Rosing emphasized that all current production in Greenland is carried out by either Canadian or Australian companies.

In his conclusion, Professor Rosing remarked that all nutrients flowing into the ocean due to glacial runoff and other dynamics in the Arctic produces a high level of marine activity in the whole North Atlantic region, creating an important marine habitat that must not be jeopardized by potential future mineral exploitation.

JULIAN VANGEN

FISHING INDUSTRY ANALYST, NORWEGIAN FISHERMEN'S SALES ORGANIZATION

Changing Fisheries in Light of Climate Change

Unlike the petroleum industry, the fishing industry has been in the Arctic for many hundreds years, explained Mr Vangen. The Norwegian Fishermen's Sales Organization (Norges Råfisklag) celebrated its 75th anniversary in 2013.

Mr Vangen's presentation addressed the organization's activities and focused on the business of catching wild fish, although Norway does have a sizeable fish farming industry as well, and is a big supplier of farmed salmon and trout. The organization is the biggest fishermen's association in Norway, is fully owned by the fishermen, and had a turnover of approximately 933 million Euros in 2012. The amount of aquatic resources landed in their district in 2012 totals 892,000 tons. In the high seasons, as much as 1,600 fishing vessels come into the harbours in the fishermen's districts per day. The organization further controls and monitors the amount of fish that is caught by individual fishermen and is authorized to sell its products itself. Furthermore, the Norwegian Fishermen's Sales Organization guarantees payment to its members and offers credits to fish buyers.

Vangen stressed the good partnership with Russian, EU, Icelandic, Faroese and Greenlandic fishing fleets in the region before discussing seafood production in Norway. In 2012, Norway produced 3,6 million tons of seafood, most of which are pelagic species (ones that live in the open sea far form the coast, yet not near the sea floor) such as mackerel and herring. Groundfish species (ones that live near the sea floor) such as cod and haddock, although fewer in number, provide greater value to the industry. The share of wild catches fluctuates from year to year depending on the development of fish stocks, and the growing share of farmed salmon and trout amounted to 1.2 million tons in 2012. In that year, approximately 12,000 fishermen were registered in Norway, working on over 6,200 vessels. However structural changes in the fishing industry have caused a strong decline in the number of fishermen and vessels, and most of the vessels in use today are shorter than 15 metres, meaning that big trawlers are in the minority.

Most groundfish are caught above the Arctic Circle, whereas pelagic species are more spread out along the entire coast of Norway, explained Mr Vangen. Fish farms can be found all along the coast of the country. While most of the suitable locations for fish farming are already occupied in the South of Norway, there are still suitable locations available for increased fish farming activities in Norway around the Arctic Circle. Around 500 fish processing facilities along the Norwegian coast are the primary buyers of the fish, and about 95% of total fish production is exported, with the European market being the main importer, buying 60% of all exports.

Turing to the impacts of climate change and rising ocean temperatures, Mr Vangen said the impacts of these changes on the fishing industry is hard to predict. This notwithstanding, he stressed that the fishing industry has adapted to changes for centuries, and will continue to do so in the future. If the Arctic Ocean opens up due to further sea ice retreat and access to new fish stocks in the Arctic Ocean becomes possible, these areas and the potential new fish stocks will need to be managed via a joint international effort.

Changed migration patterns of fish stocks may offer new opportunities if new fish stocks move into the Norwegian fishing zones. But as Mr Vangen noted, such changes would need to be managed, and fishermen would need to make adjustments as well. New species could impact the existing ecosystem in an unprecedented way. Within a five-year period, mackerel stocks migrated to the west and to the north, and recently even reached the Svalbard peninsula. The outmigration of such traditional fish stocks pose an even greater challenge to the fishing industry, Vangen stated, and changing weather conditions may cause the need for bigger vessels that are equipped for harsher conditions.

In the face of migrating fish stocks and possible changing weather conditions, Mr Vangen called for increased efforts for international management regimes. Although Norwegian fishermen have not yet been forced to make major adjustments, he stressed the importance of being prepared for greater changes in the fishing industry.

PAULA KANKAANPÄÄ

DIRECTOR, ARCTIC CENTRE, UNIVERSITY OF LAPLAND

The EU Arctic Information Centre: An Impact Assessment for the Arctic (Part 1: Introduction)

"Almost every talk about the Arctic today raised the importance of scientific information, use of knowledge, building trust and making sure that knowledge is available when decisions are being taken," Professor Kankaanpää remarked as she opened her talk. Very few of the presentations, Kankaanpää continued, give answers to how this can be ensured concretely. The bridging of science, policies and stakeholders at different

levels does not come out of the blue, but is a laborious task that requires professional know-how.

The EU Arctic Information Centre (EUAIC) is an initiative that seeks to be that potential bridge builder. The EU Arctic Impact Assessment, a project that tests the feasibility of the idea and will be ready in summer 2014, was the focus of Professor Kankaanpää's and Mr Stępień's joint presentation.

The Strategic Environmental Impact Assessment of development in the Arctic is funded by the EU Commission's DG Environment and runs from the beginning of 2013 until summer 2014. This effort is being taken to systematically improve the flow of information regarding Arctic issues, Kankaanpää explained. The European Union's statements on the Arctic in the form of the Commission's Communication in 2008 and the European Council's conclusions in 2009 provided an impetus for this initiative, as both statements called for knowledge-based decision-making and sustainable development in the Arctic. The idea for an EU Arctic Information Centre was already raised in 2008, Kankaanpää recalled. This initiative is thus an answer to the Commission's documents and involves 19 top Arctic expert institutions in Europe. According to Kankaanpää, the network is unique, as it includes members specialized in Arctic science, education, exhibitions, a library, Arctic logistics, Arctic environmental consultancies as well as outreach and communication organizations. The initiative is led by the Arctic Centre at the University of Lapland in Rovaniemi, Finland. Its aim is to offer a professional and systematic tool to ensure the flow of information and the efficient use thereof. This is needed since the Arctic is under a rapid and dramatic change and an object of a number of various decisions both by private and public sectors, Professor Kankaanpää argued. The systematic approach is needed for the prompt availability of knowledge, but also to avoid randomness as well as to ensure that not only the loudest voices are heard.

The idea of the EU Arctic Information Centre is to offer service packages for the improved exchange of information. These service packages comprise the offer to provide access, to facilitate two-way dialogue and mediation, and to enhance outreach and communication. More concretely, these services can take the form of think tanks, fact sheets, impact assessments and policy recommendations.

Although top expertise about the Arctic in Europe is available, Professor Kankaanpää said only few of them cover all aspects of Arctic issues. By joining forces, the synergies would increase Europe's capacities to respond to the current demand for Arctic information.

The project producing the environmental impact assessment is carried out as feasibility study for the operation of the network. Here the emphasis is on ensuring that perspectives of locals and stakeholders are available for EU policymakers. Similar impact assessment methods are applied in strategic environmental assessments and integrated impact assessments that concern policies and strategies instead of investment projects.

The results of the preparatory action project are several reports such as the European Arctic Initiatives Compendium, a Gap Analysis in European Arctic Initiatives, the Impact Assessment Methodology Report , fact sheets, and the EU Arctic Impact Assessment Report. The first edition of the European Arctic Initiatives Compendium is already available, and other reports will be finished by mid-2014. The second edition will be published in March 2014. The Compendium contains information about recent reports, inventories, infrastructures, institutions and processes and is available on the EUAIC website. Professor Kankaanpää invited everyone in the audience to visit this website to collect information and participate in online discussions.

ADAM STĘPIEŃ

RESEARCHER, ARCTIC CENTRE, UNIVERSITY OF LAPLAND

The EU Arctic Information Centre: An Impact Assessment for the Arctic (Part 2: methodology)

Mr Stępień's presentation focused on one component of the project introduced by Professor Kankaanpää: the EU Arctic Impact Assessment, which seeks to summarize the current understanding of developments in the Arctic and ensuing environmental, social and economic implications. Additionally, the assessment seeks to understand the impacts of Arctic developments on the European Union, while examining the EU's role in shaping Arctic developments and trends. Policy recommendations will be formulated based on the assessment's findings.

The core concept of the assessment as Mr Stępień described is to focus on the local level in the European Arctic (which he defined as stretching from Greenland to the Urals in Russia). The efforts not only seek to cover key issues such as climate change, but also to develop new perspectives on issues such as the implications of increasing land use pressures.

The interaction with stakeholders and the principle of expert humbleness was deemed to be of great importance and forms the basis for assessment, Stępień stressed. The involved experts then assess ideas coming from stakeholders and examine their feasibility and accuracy. The aim is to pinpoint trends through stakeholder interaction, as well as to identify critical driving forces behind ongoing trends and their impacts. In a next step, Stępień explained, experts in the consortium will assess which EU policies are relevant for these drivers and address the identified impacts.

Out of the assessment's seven guiding themes, Mr Stępień picked the example of the changing nature of Arctic fisheries. Special attention is given to the socio-economic changes in this area, including aquaculture as growing industry. Another topical area seeks to integrate various types of terrestrial land use in the Arctic such as tourism, mineral extraction, forestry, traditional land use and renewable energy development. According to Stępień, a focus here lies on mining, as it is regarded as crucial element of current development activities in the European Arctic.

In a first step, the EUAIC consortium has created fact sheets, which was followed by stakeholder meetings and an online questionnaire and interactive website to give room for stakeholder feedback throughout the research process. The stakeholder involvement is crucial to challenge expert understanding of developments and to influence the focus of further assessment work, Mr Stępień emphasized. It further serves to identify critical issues that need to be taken into account in decision-making, and to provide experts with ideas for policy recommendations.

Some of the challenges Stępień spotlighted evolve around the fact that increasing land use pressures and social and cultural developments are closely interconnected, and some issues are subject to heated debate. Furthermore, the incorporation of stakeholder input into an assessment poses a challenge in itself. Stereotypes and a lack of knowledge regarding the EU's role, competences, and structure among stakeholders may also complicate the process.

One of the research themes addresses mining in the European Arctic and is led by the Arctic Centre at the University of Groningen and the University of Lapland. The regional focus lies on the Fennoscandian Shield and Greenland. According to Stępień, mining is connected with various environmental impacts and is likely to induce conflicts, as the example of the Gállok mine close to Jokkmokk in Sweden demonstrates. Proponents of the mining activities raise arguments of increased employment and tax revenues.

Additionally, it is not only traditional lifestyles that are in conflict with increasing mining activities, but also tourism. The expansion of existing mining sites may, for instance, affect recreational areas such as ski resorts.

The EU's interest is first and foremost to secure the supply of raw materials for the European economy, said Stępień. The Fennoscandian Shield is regarded as a key European mining province, and northern Sweden produces 85% of Europe's iron ore. Other critical raw materials are found in the European Arctic as well. Stępień noted that the European Arctic is considered as a safe and secure source for raw materials compared to other regions of the world. Current governance as well as administrative and social support favours the mining industry. The development of "Northern sparsely populated areas" with the creation of employment opportunities are of interest to the EU as well.

With regard to the EU's role, Mr Stępień recalled the fact that the European Union's policies as well as the European Economic Area (EEA) Agreement directly affect the European Arctic. By the same token, activities in this region impact the EU's environmental and economic footprint. The EU participates in many areas of Arctic-relevant international negotiations and provides extensive funding research in the region. By stipulating industrial development while at the same time mitigating the resulting impacts, the EU's role seems to be burdened with inherent inconsistency as well, Stępień pointed out. The EU raw materials initiative seeks to foster a sustainable supply of raw materials from European sources and also entails an external dimension. For example, resource diplomacy in the form of cooperation with Greenland. Transport infrastructure for mining products, the support of research and innovation, and environmental regulation are other areas in which the EU is involved.

In his concluding remarks, Mr Stępień referred to a workshop on mining activities the EUAIC consortium organized in early October 2013 in Rovaniemi, Finland, which involved a variety of Arctic stakeholders. The critical factors that were identified included the global and European demand for raw materials, ecosystem services, and land use issues. Proposed ideas for policy recommendations raised the need for EU legislation on social license for mining activities and taking into greater account the social impacts of mining activities. Liability of the mining industry for damages at the European level was another issue the stakeholders brought up. Most importantly, the stakeholders who took part in the workshop identified the need for dialogue with the indigenous and local population as critical. Mr Stępień invited the audience to participate in the research on the EU Arctic Impact Assessment study and to comment on the fact sheets on the project's website.

DISCUSSION

Peter Wadhams from the University of Cambridge asked Mr Vangen whether there are mechanisms to minimize bycatch, as this seems to be an issue of great concern.

Mr Vangen confirmed that bycatch is a big problem when operating with big trawlers, especially in areas where different species share the same space as in the North Sea. Vangen pointed out that it has been prohibited to discard bycatch in Norway for 15 years, and the EU's new common fisheries policy will prohibit discards as well. He mentioned the possibility to use bycatch to produce fish meal and thus recycle it to feed salmon, for example. In any case, the fishermen are required to develop selective fishing gear. In Norway, Mr Vangen added, fish species mostly live separately from each other, however the situation is more complicated for EU member state fishing fleets in the North Sea.

The next question, from Anders Backman of the University of Gothengurg, inquired about the IMO Ballast Water Management Convention, which aims in part to avoid bringing in alien species from the Pacific area of the Arctic to the Atlantic area and vice versa. He asked Mr Vangen whether he has seen any improvement regarding this issue.

In North Norway, alien species so far have not been a major problem, Vangen replied. In southern Norway, lobster fry (small, young lobster) from the US has been introduced.

Åse Refsnes from Friends of the Earth Norway asked how the international Arctic community could contribute to research on how climate change affects the fish and fisheries. She also asked about the development opportunities within the fishing industry compared to the petroleum industry.

Fishermen support research on climate change, Vangen replied. However, he sees the need for increased international research efforts from all the Arctic states. Regarding the second question, Vangen pointed out that the fishing industry has contributed to the economic development of society for hundreds of years, and offers attractive job opportunities. But when the petroleum industry enters the region and offers very

competitive jobs, this is also an economic opportunity for the local population, Vangen said.

Mayor Hjort highlighted that Norway is dependent on fisheries. In his view, the petroleum industry offers new opportunities as well, but there is no "either or" decision that needs to be taken. What is most important is a precautionary approach to protect the vulnerable Arctic environment.

Neil Hamilton from Greenpeace International posed a question to Anders Marvik and referred to "dramatic scientific news" about the enhanced level of climate change that is not currently encapsulated within the IPCC report. Hamilton then asked whether Statoil supports the right of civil society to conduct peaceful nonviolent protest regarding these issues, and asked whether Statoil would publicly support the release of the Greenpeace activists detained by the Russians in international waters.

Mr Marvik answered that Statoil would never oppose any civil liberties allowing for peaceful protest. Yet he explained that he sees no reason for Statoil to comment on the Russian reaction to the Greenpeace protest action. Statoil, Marvik explained, is not in the position or to judge from a distance. He further stressed that Statoil acknowledges climate change and is aware of the sensitivity of the Arctic region. Nevertheless, he regards it as both possible and necessary to extract oil and gas, especially given the fact that gas a lot cleaner than coal.

Elena Conde from the Complutense University of Madrid directed her question to Mr Vangen. As migrating fish stocks might cause increased competition between Spanish and Norwegian fishermen, she asked whether there is a need for more regulations to promote sustainable fishing.

Mr Vangen said that when new areas open up for fishing, one of the big questions is always who is going to manage the area. There are a lot of bilateral agreements for the existing fishing areas, and with new regions opening up, agreements will be developed for them as well.

Professor Orheim added that such agreements are often based on historic fishing activities, and those do not exist for the High Arctic, where large-scale fishing has never taken place, and maybe never will. He further pointed out that in contrast to the current shallow fishing grounds, the High Arctic consists of deep water, where fishing might not be viable.

Doris Abele from the Alfred Wegener Institute stated that fuel prices have been rising, allegedly due to the costs of implementing renewable energies. On the topic of Statoil's subsea installations, she asked Mr Marvik how affordable these installations are.

Marvik confirmed that some of these installations are costly, but made it clear that if the return were lower than the investments, such efforts would not be taken. All projects have to compete globally, and Statoil spends a lot on research and development to make them profitable. Energy prices in Europe are affected by a lot of different factors, especially tax regimes. Marvik noted that the oil and gas sector is a capital intensive industry. He gave the example of the southern corridor being developed to bring gas from Azerbaijan to Europe – a 40 to 50 billion dollar project.

Professor Orheim closed the session by reminding everyone that it is the price of all these resources driving all development and investment activities in the region, not merely the fact that they are becoming more accessible as the Arctic changes.

ARCTIC SHIPPING IN 2050: A VISION FOR THE FUTURE?

A JOINT WORKSHOP OF THE INTERNATIONAL POLAR FOUNDATION AND THE ARCTIC NGO FORUM

INTRODUCTION: JOHN CRUMP

SENIOR ADVISER CLIMATE CHANGE, POLAR & CRYOSPHERE DIVISION, GRID ARENDAL

Mr Crump opened the Arctic Shipping workshop by introducing the Arctic NGO Forum as the organizer of the panels. The Arctic NGO Forum is a network that has been supported by the European Commission's DG Environment , and this year's forum workshop focuses on marine transportation in the Arctic region.

MODERATOR: BERNARD FUNSTON

CHAIR, CANADIAN POLAR COMMISSION

As the moderator, Bernard Funston introduced the session on Arctic Shipping by stating that aviation has allowed easier access to the North in the 20th century. This notwithstanding, there has always been some level of coastal shipping in the region for centuries to supply Northern areas. It appears that in the 21st century, Arctic shipping is an enabler of a whole series of activities and industries. While the large Arctic transit-type voyages get much public attention, Funston said that it is necessary to think beyond what gets a lot of publicity.

He referred to Professor Michael Byers from the University of British Columbia, who spoke about the ***Nordic Orion***, a bulk carrier that travelled from Vancouver to Finland on one of the first commercial voyages through the Northwest Passage in Canada. In the same month, the Chinese bulk carrier ***Yong Sheng*** sailed from a Chinese Port to Rotterdam via the Northern Sea Route. Whereas the ***Nordic Orion*** saved four days taking the Northwest Passage as opposed to the Panama Canal, the ***Yong Shen*** took 35 days via the Northern Sea Route instead of 48 days via the Suez Canal.

While transit passage certainly is important and can save time and money, there is also a whole range of traffic that is destinational (to and from the Arctic), such as mining-

related transport and community re-supply, Funston pointed out. One question may be which type of activity will drive and increase shipping. There is no doubt about an increase in traffic along the Northern Sea Route, with the Russians issuing 372 permits for passage through the waterway in 2013 as a point in case. In 2012, they issued 46, and only 4 in 2010.

Funston asked what will be the main driver of shipping in the Arctic: fishing, tourism, mining, or community supply? These are important questions, Funston argued, as linear growth cannot be assumed unless there is a clear driver. The following panels hope to examine what might be the drivers.

ANTOINE KEDZIERSKI

POLICY OFFICER, TRANSPORT&ENVIRONMENT

Reducing Air Pollution from marine Transport in the Arctic

Mr Kedzierski briefly introduced the Brussels-based environmental NGO Transport &Environment, which represents about 50 national non-governmental organizations promoting sustainable transport in Europe.

Regarding the current situation of Arctic shipping, Kedzierski explained that the reduction of Arctic sea ice was leading to an opening of new sea routes. Arctic sea ice extent has been constantly decreasing in the past years, with a record minimum in September 2012. In addition, the ice formation is now dominated by first-year sea ice that melts faster than multi-year ice. As a result, the Arctic Ocean is expected to be ice-free during the summer very soon.

According to the Arctic Council's 2009 Arctic Marine Shipping Assessment (AMSA), most of the shipping activities taking place in the Arctic are located in the regions around Russia, Norway and Iceland, and to a lesser extent, around the Svalbard Peninsula, Greenland, Alaska and Canada. Kedzierski noted that current Arctic shipping activities are dominated by smaller ships engaged in community re-supply or fishing.

Kedzierski then referred to the opening of the Northern Sea Route (NSR) North of Russia and the Northwest Passage through Canada's North. In 2012, more than 1 million tons of cargo was transported via the NSR. Although this volume is low compared to the cargo transport via the Panama Canal, the Arctic is experiencing double-digit growth in shipping activities. By 2050, the NSR could attract around 10% of container traffic between Asia and Europe. In 2012, Russia was the main user of the route, transporting energy commodities from Murmansk to China.

The International Polar Code, which is currently being developed by the International Maritime Organization (IMO), is considered by many to be the most comprehensive regulatory framework for Arctic shipping. However, Kedzierski argued that the Polar Code's geographic boundaries are too narrow to cover all shipping activities in the region.

Environmental impacts and hazards from increased shipping activities are threefold:

1. The Arctic environment can be affected by safety failures or accidents (collisions, sinking, mammal strikes).
2. Legally permissible, intentional routine discharges (oil, chemical, sewage, etc.).
3. Disturbances caused by the normal operation of ships (noise, emissions to air, black carbon).

As for transit shipping, Kedzierski highlighted the need for rapid action instruments that ensure the environmental protection of the fragile Arctic ecosystem.

Mr Kedzierski's presentation then focused on air pollution and black carbon emissions. Black carbon is recognized as the second most important human-produced emission in terms of climate forcing. In the cryosphere (ice-covered regions of the planet), the impact of black carbon is magnified: as it is deposited on snow and ice surfaces, it reduces their albedo (ability to reflect solar radiation), and consequently accelerates the melting of snow and ice. Some studies suggest that black carbon could be responsible for half of all Arctic warming, Kedzierski stated. Regarding the aim to reduce global warming, Kedzierski raised the importance to address both CO_2 and non- CO_2 climate forcers such as black carbon.

When talking about black carbon in the Arctic, Mr Kedzierski called attention to the fact that it does not solely originate from Arctic shipping, but also from shipping outside the Arctic. Wind currents transport black carbon particulates to the Arctic, where they are deposited on land and sea ice.

As more shipping activity takes place in lower latitudes, black carbon emissions are higher in those areas. Shipping activities north of 40°N (i.e. approximately between Corsica and Sardinia) may account for a large part of the black carbon that is transported to the Arctic, Kedzierski mentioned, citing the IMO as a source. From a global perspective, Kedzierski noted that around 2% of black carbon emissions are caused by shipping. Furthermore, black carbon emissions often occur in areas that otherwise have low emissions and low atmospheric black carbon concentrations.

With regard to scientific discussions and definitions, the IPCC recently adopted a Global-warming-potential (GWP) figure for black carbon, which is 900 times higher than that of CO_2 over a period of 100 years. The concept of GWP allows the comparison of the ability of each greenhouse gas to trap heat in the atmosphere relative to carbon dioxide (CO_2) over a specified time horizon. Greenhouse gas emissions are calculated in terms of how much CO_2 would be required to produce a similar warming effect over a given time horizon. This is called the carbon dioxide equivalent (CO_2 eq) value, and is calculated by multiplying the amount of a gas by its associated GWP.

The IMO has generated a generally agreed upon "political" definition for black carbon, Kedzierski said. Technical definitions are still subject to discussion. Progress has also been made to adopt more specific definitions in other international fora like the Convention on Long-Range Transboundary Air Pollution (CLRTAP).

Kedzierski noted that emission levels depend on the engine load and the fuel quality of the vessel. Ongoing research is being undertaken with regard to after-treatment like scrubbers or diesel particulate filters.

He identified the IMO as the principal entity to regulate international shipping, and called for rapid and concrete regulation of black carbon emissions.

To end his presentation, Mr Kedzierski briefly referred to the resolution adopted by the European Parliament in 2011, which called for the recognition of the impact of black carbon and supported a ban of the use and carriage of heavy fuel oils in the Arctic. Such a ban is already in place in the Antarctic, and Mr Kedzierski advocates its implementation in the Arctic as well.

KATHRIN KEIL

INSTITUTE FOR ADVANCED SUSTAINABILITY STUDIES (IASS); EUROPE DIRECTOR, THE ARCTIC INSTITUTE

Economic Significance and Industry Outlook on Arctic Shipping Opportunities

Dr Keil focused on the prospects of Arctic shipping (where in the Arctic we can expect increasing shipping activities), and on the regional and global economic significance of Arctic shipping routes.

She mentioned two current and one potential polar shipping routes:

1. The Northwest Passage (NWP), through Canada's archipelago and Alaska's northern shores
2. The Northern Sea Route (NSR) along Russia's and Norway's northern coast.
3. The Transpolar Passage right through the middle of the Arctic Ocean, which is currently not feasible as it is covered by ice year-round, although it may one day if sea ice cover continues to retreat.

Dr Keil's presentation therefore focused on the prospects of the NWP and the NSR, as they are currently in use.

Although both sea routes have been praised for offering distance and time savings, there is a higher likelihood that the NSR will be more viable in the foreseeable future, Keil said. The extent of decreasing sea ice has been especially significant north of the Russian coast, while considerably less within the Canadian archipelago, where much of the remaining multi-year (and thus thicker) sea ice in the Arctic remains. Moreover, the NSR offers sufficient cargo potential to make the route viable, including Russian oil and gas, iron ore and nickel, and possibly also more liquified natural gas (LNG). The infrastructure situation is generally better in the Eurasian Arctic, although significant investments and overhaul are necessary to prepare for the projected increase in traffic, especially in destinational shipping, Keil explained. In contrast, ports and other maritime infrastructure are virtually not existent in large areas of Canada's and Alaska's northern coast.

Russia has made a big leap forward in facilitating the administrative procedure for using the NSR. The new Northern Sea Route Information Office provides information and application documents for using the route. Icebreaker assistance is no longer compulsory for all voyages; rather it depends on the ice class of the vessel and ice conditions in the area in which the vessel will be travelling. These administrative efforts for the NSR are in stark contrast to the NWP, where Canada is not promoting the usage of the route. Part of the explanation is surely that increased international shipping along the NWP could weaken Canada's argument that the passage is part of its internal waters and not an international strait. However lacking economic incentives and the vast investments necessary to provide adequate infrastructure in the Canadian Archipelago also play a role.

According to Dr Keil, it is necessary to differentiate between regional and global perspectives in Arctic shipping. This includes attention to different kinds of Arctic shipping, such as destinational shipping, which is either from one specific place in the Arctic to destinations further south or vice versa, intra-Arctic shipping, and Arctic transits from the Atlantic to the Pacific coasts and vice versa. Furthermore, it needs to be considered for which commodities Arctic shipping routes are a sensible option: for raw materials which are developed in the north, for supply of other economic activities such as oil and gas development, for fisheries, or for general cargos and containers, Dr Keil explained.

From a global perspective, it is necessary to take into account global trade patterns. Many trade routes for dry cargo are located too far south for northern routes to be relevant, Keil explained. Gibraltar and Singapore are the geographical "break-even points", and any points of origin or destinations south of these places makes any northern route irrelevant. Also, container ships often operate in networks of routes. They call at a number of ports, especially at key trans-shipment ports such as Singapore, major ports in India, the Middle East and the Mediterranean. Arctic routes are often longer when you factor in required calls whips need to make at these transshipment hubs. Nevertheless, substantial savings for time charter and bunker fuel are possible when transporting iron ore, coal and LNG along the Northern Sea Route. The time charter costs for LNG vessels are very high, so time savings can make a big economic difference here, said Dr Keil.

While certain time savings are possible, how significant these could be is often hard to determine, given the remaining uncertainties about year-to-year ice extent. Although a long-term sea ice retreat can be observed especially in the summer months, there is a year to year variability rather than a constant year-to-year decrease of sea ice, Dr Keil pointed out. For example, the summer sea ice minimum extent in 2012 was 3.4 million km², while the minimum in 2013 was 5.1 million km², and the Northwest Passage did not open up as it had in previous years. Thus, ice and difficult weather conditions can inhibit the reliability of shipping services and may make it difficult to stick to tight time tables. For bulk shipping, some variability in transit can be tolerated, but container shipping is a "just in time" business, and delays can be very costly. Consequently, for container shipping, reliability, consistency and schedule integrity are far more important than on-average shorter and faster routes, which may be subject to large degrees of variability in their navigability.

Another issue Dr Keil pointed out is the seasonality of the northern sea routes. Ship operators would have to adjust their schedules twice a year if they choose to use them. Furthermore, trade patterns may change substantially within the time span an ice-free Arctic in the summer is predicted (sometime between 2030 and 2100, according to estimates). Dr Keil pointed out that many of the emerging markets are located in Southeast Asia, South America and India, so northern sea passages would not be relevant for trade with these parts of the world.

Dr Keil then addressed the regional dimension of Arctic shipping. Most voyages so far take place on the periphery of the Arctic Ocean, along the Norwegian coast, the Barents Sea, around Iceland and the Faroe Islands, Southwest Greenland and the Bering Sea. The NSR is thus far only used by a small number of cargo vessels in comparison to the Suez and Panama Canals. In 2012, 46 vessels travelled through the NSR; the Suez Canal sees around 18,000 transits per year, and the Panama Canal around 13,000.

During the 2013 shipping season, 71 ships transited the NSR, an increase of 54% in comparison to 2012. However, cargo volume only increased marginally by 7.5% to 1.36 million tons. The absolute numbers of transit through the NSR are still rather small, while Arctic shipping on the regional level and destinational shipping are on the rise. This has a lot to do with increasing economic activity, especially in the Eurasian Arctic, due to the oil and gas extraction activities in the Barents and the Kara Seas. However, Keil recalled that shipping in the western Northern Sea Route and the Barents Sea has been taking place for a long time, "and we are not near the peak tonnage number from Soviet days," she pointed out. The total volume of cargo transported via the Northern Sea Route peaked at around 7 million tons in 1987, then declined to 1.5 million tons in the late 1990s. Only recently has it begun to rise again.

In her concluding remarks, Dr Keil recognized the potential for increased Arctic shipping, but emphasized that it is necessary to differentiate between the different kinds of Arctic shipping and the different kinds of commodities for which northern maritime routes could be viable. From a global perspective, the Northwest Passage and the Northern Sea Route are not expected to play a decisive role, Keil argued. Regionally, the Northern Sea Route will see increasing traffic, but it will remain a niche route for certain commodities and economic activities within the region. Dr Keil therefore concluded that the future of Arctic shipping will depend a lot on the economic activities in the region itself.

Dr Keil stressed that she drew her conclusions from an economic and not from an environmental perspective, since in the latter case, one ship might be enough to have grave effects on the fragile Arctic environment in case of an accident. Safety issues are also a serious concern, especially against the background of growing tourism traffic in Arctic waters.

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TOM PADDON

PRESIDENT AND CEO, BAFFINLAND IRON MINES

Mining related Shipping in the Canadian Arctic – Current and Future

Mr Paddon presented on the Mary River mining project on the northern end of Baffin Island in Nunavut Territory in the Canadian Arctic. The iron ore produced in the mine will require transport by ship, while other mines in northern Canada, such as gold and diamond mines, transport their products via plane. With 3.5 million tons per year and prospects to produce 18-20 million tons in the future, air transport is not an option for Baffinland, Paddon explained.

When discussing whether economic development in the Arctic should take place or not, Mary River is a useful point for the discussion, Paddon stated. The reason that Mary River is being developed is that the grade of the material is 65-70% iron, whereas many mines under development today are about half of that amount. The Mary River mining project produces ore that requires no processing and no upgrading. So while the mine's location is challenging from an environmental and logistical perspective, Paddon argued that the carbon footprint associated with producing iron is lower than in some mines further south.

According to Paddon, any mining organization planning to operate in the Canadian Arctic requires regulatory and stakeholder permissions to proceed. Mr Paddon especially highlighted this fact because "nothing happens in northern Canada, specifically in Nunavut today, that does not have the acquiescence and the support of the Inuit. They are the landowners."

Baffinland concluded an Impacts and Benefits Agreement that took seven years to negotiate, and an environmental impact assessment has been concluded after five years as well. Operators that are unwilling to make long-term commitments are not moving into this region. "Given that we make investments of billions of dollars upfront, we must be able to run the business successfully for many decades to come, and in much of Canada, that only comes if you have a good, solid, successful relationship with aboriginal people," explained Paddon.

Alongside the development of the mine, the construction of the Milne Inlet Port as part of the mine's infrastructure network began in 2013. Developing infrastructure in the region drives destinational shipping. In Paddon's opinion, the Northwest Passage will not be an iron ore transit route of any significance for many years to come.

The mine's resupply material was transported from southern Canada to the project site during the open water season of 2013. Export of the product will leave from the production site to the Port of Rotterdam from 2015 onwards. This type of activity will increase as new projects are developed in northern Canada, but the shipping activities as such are not new, Paddon pointed out. The company that is under consideration for coordinating the shipping to and from the Mary River project is the same one that operates the shipping from the Red Dog Mine in Alaska that Major Joule from Alaska's Northwest Arctic Borough mentioned in his presentation, Paddon added. In 25 years of operation, there have never been any environmental incidents.

Mr Paddon emphasized that the long-term operatorship of shipping and mining companies in the Arctic belies the suggestion that there is a "Wild West" approach to business in the Arctic. Those who have been operating in the Arctic for a long time, he continued, are willing to make the necessary long-term investments by reconciling aboriginal rights with developers' interests along with meeting the required environmental standards, emphasized Paddon.

Much of the shipping in the Canadian Arctic is community resupply. None of it goes all the way through the Northwest Passage, and it is mostly undertaken by small local carriers, Paddon said. As for economic activity in the Arctic region, the need for shipping support will remain, but in Paddon's view, it is primarily destinational rather than transit-based. Goods will be brought to and from the Arctic more than they will be shipped between the Atlantic and Pacific basins.

The most efficient way to transport iron ore is on a Cape-size ship with a draft of 19 metres or more, Paddon explained. As the Northwest Passage is not chartered deeper than 15 metres, "that's the end of the story. Cape-size ships are not going to go through the Northwest Passage anytime soon," Paddon stated. It follows from this that the iron ore business is not looking to move material from one side of the world to the other via the Northwest Passage.

In his concluding remarks, Paddon explained that ships operating in the Canadian Arctic and sub-Arctic region sometimes have to stay in the same place for ten days or longer due to unfavourable weather and ice conditions, a fact that does not make such passages economically viable for the usual "just in time" shipping business. Ship operators serving the Mary River site therefore use the 70 to 80 ice-free days per year to transport iron ore products out of the Arctic.

GUSTAF LIND

SWEDISH AMBASSADOR TO THE ARCTIC COUNCIL

Governance of Arctic Shipping

At the beginning of his presentation, Ambassador Lind drew an analogy between the Baltic Sea and a potential vision for the Arctic Ocean: "Twenty harbours that must be kept open for traffic despite ice six months a year. 11,000 ships trafficking these ice-covered areas, many of them carrying raw materials. The neighbouring states have pooled their icebreaking resources in order to work more efficiently and support the traffic. They support about 7,000 ships every year, and they have also integrated civilian and military sea surveillance so they have a joint domain awareness of the region. There are IMO rules having stricter environmental standards for the region compared

to other seas." Although these figures are drawn from the statistics for the Baltic Sea, Lind stated, this could be a vision for the Arctic in 2050.

While Sweden and Finland are not Arctic coastal states, the ambassador drew attention to the bilateral cooperation in the Baltic. The pooling of icebreaker capacities, joint sea surveillance and ice management, Lind claimed, are a good model for how the Arctic states should work together in the future, when there might be a high number of ships in the Arctic.

For Lind, it is equally important to learn from the good things that have been achieved in the Baltic Sea, and to avoid past mistakes. The Baltic Sea is one of the most polluted seas in the world, a development that should not be repeated in the Arctic.

The Arctic Council picked up some elements of cooperation in the Baltic Sea in order to pursue similar achievements in the Arctic. The Council's Arctic Marine Shipping Assessment (AMSA) is "immensely important" in Ambassador Lind's eyes. AMSA sets out a programme on how to move forward on shipping issues, including environmental and safety concerns in the Arctic. One recommendation is to link with international organizations, and the Polar Code the IMO is developing is regarded as an important element. AMSA also identified the need for establishing a search and rescue agreement. In January 2013, the Arctic search and rescue agreement negotiated under the auspices of the Arctic Council came into force, and there have been a number of exercises since it was signed in 2011.

As for oil spill prevention, Lind reminded the audience that the members of the Council signed the Oil Spill Cooperation agreement at the ministerial meeting in Kiruna in May 2013. A task force will work on an arrangement on oil spill prevention under the Canadian chairmanship.

Other task forces of the Arctic Council address the improvement of passenger safety and reducing black carbon emissions from the Arctic states. The protection of sensitive areas is an important element as well, Lind said. In a first step, sensitive areas – both from an environmental and a cultural point of view – are identified, and differentiated protection measures are developed accordingly. Here, Ambassador Lind referred to the Convention on Biodiversity, which sets the target that all parties to it should have 10% of their sea areas protected by 2020.

However, the lack of infrastructure, limited harbour capacity, communication and navigational aid may slow down policy processes, Lind admitted. As governments sometimes may not be able to catch up with ongoing developments and regulations may not yet be in place where needed, Lind stressed the importance to work closely with private business actors to avoid accidents and "Wild West" scenarios.

Therefore, Ambassador Lind argued, it is important that the businesses active in the Arctic self-regulate. During the Swedish chairmanship of the Arctic Council , there were projects and dialogues with companies on corporate social responsibility encouraging them to set targets to respect the environment and the communities in the Arctic themselves.

The Arctic Marine Best Practice Declaration as private business-driven initiative is an example of corporate social responsibility. The declaration sets out a number of different principles that those who sign on to it must respect. It obliges the signatories to work using the best environmental practice, best available technology and with well-developed ice management. Training the crews and information sharing among actors is extremely important as well, Lind stressed. The International Union of Marine Insurers (IUMI) has officially endorsed this declaration, along with a number of other actors in the region.

Ambassador Lind explained that the Swedish Government supports this initiative and does not seek to get involved in such private business-driven efforts. From a governmental perspective, this is a good solution before the states get their regulations and safety measures in place, Lind argued in closing.

REGGIE JOULE

MAYOR, ALASKA'S NORTHWEST ARCTIC BOROUGH

Commencing with a brief reminiscence of his first hunting experiences and initiation to seal hunting in Alaska's Arctic, Mayor Joule illustrated the importance of local food sources and food security for local Arctic people and communities.

On a visit of the United States' westernmost mainland city, Wales, Alaska, Joule became aware that "people really can see Russia from their window" in this part of Alaska. The people living close to the Bering Strait, Mr Joule emphasized, were very concerned about ships dumping waste in the area. With the help of modern technology, however, it is possible to track ships in the region and to identify them if need be. Such mechanisms help to support local communities in their efforts to safeguard their environment.

From a community point of view, Mayor Joule stressed that a significant increase in traffic coming through the Bering Strait has been observed. Whereas some of it is local traffic, bringing construction material and equipment, much of it is related to the oil, gas and mining industries in the region. A rising number of cruise ships and tank vessels have also been observed. Mayor Joule stated the biggest concern from the local communities is about accidents, since ships carry a lot of fuel, and ocean currents may bring the pollution resulting from these accidents to their shores. Even if such incidents occur on the Russian side of the border, Joule remarked that oil pollution, fish and sea mammals know no borders.

Another impact of increased marine traffic is noise pollution, which can divert animals from their traditional migration patterns. By impacting sea mammals, marine noise pollution can indirectly affect the food security of local communities, and Mayor Joule called for increased attention to such side effects.

In his closing remarks, Joule reiterated that there is very little infrastructure in the North, especially along the sea routes. The last port south of the Alaskan Arctic, Dutch Harbor, is very far south of the Northwest Arctic Borough. Addressing the issue of emergency response or large scale search and rescue mechanisms, Joule stressed that western Alaska lacks the infrastructure to provide such search and rescue mechanisms. Even though the US Coast Guard is interested in maintaining an increased presence, a lot of efforts have yet to be taken, said the mayor.

Marine traffic off Alaska may be considered light, Joule concluded, but a resolution on marine shipping by 2014 and an implementation of the IMO Polar Code would be welcomed by the local communities in Alaska.

SANDRA RITA ALLNUTT

SENIOR TECHNICAL OFFICER, MARINE TECHNOLOGY SECTION, MARITIME SAFETY DIVISION, INTERNATIONAL MARITIME ORGANIZATION (IMO)

The Development of an International Polar Code

The IMO has been working on requirements, recommendations and guidelines for ships operating in polar waters for more than 20 years, Ms Allnutt stated. The final part of this work is the International Code of Safety for Ships Operating in Polar Waters .

Four conventions serve as the basis for the work on ship operations in polar waters. These are the SOLAS (Safety of Life at Sea), MARPOL (International Convention for the Prevention of Pollution from Ships), UNCLOS (United Nations Convention on the Law of the Sea) and STCW (Standards for Training, Certification and Watchkeeping).

Regarding SOLAS, regulation 5, 6 and 31/32 of the convention's chapter 5 deal with matters on polar waters, namely with meteorological services and warnings, ice patrol services and danger messages. The International Code on Intact Stability (2008 IS Code) is not a part of SOLAS , but is mandatory in the latter as well. The 2008 IS Code specifically refers to ice accretion as an important factor in ships' stability calculations, Allnutt explained.

In 2007, a passenger ship sank in the Antarctic. Although it was a small ship with just over 150 people, rescuing them in such a remote area proved to be very difficult. The higher the number of passengers, the more difficult the rescue in case of emergency, Allnutt pointed out.

As work on the Polar Code developed at the IMO, the organization adopted guidelines for ships operating in polar waters in 2009. According to Ms Allnutt, these guidelines formed an important basis for the polar code and provided a starting point for the ensuing work. Other IMO activities on Arctic shipping include a pocket guide for seafarers on cold water survival and guidance for ships operating in remote areas.

For the work on the Polar Code , not only IMO regulations, but also international standards like the IACS Unified Requirements for Polar Class Ships are considered.

Those requirements, Ms Allnutt explained, are the base for the categories of ships that are considered under the Polar Code . There will be more stringent requirements for certain types of ships, depending on their Polar Class (PC). PC 1 refers to year-round operation in all ice-covered waters, whereas PC7 applies to summer/autumn operation in thin first-year ice, which may include old ice inclusions. PC1 to PC 5 constitute one broad category of ships, and PC5 to PC7 another, explained Allnutt.

Ms Allnutt then went on to introduce a peculiarity of the MARPOL requirements on pollution prevention. MARPOL bans any kind of discharge in the Antarctic. Discharge includes oil and oil mixtures, noxious liquid substances, and the disposal of garbage. As the Antarctic is considered a special case, these requirements will be part of the Polar Code , but will not apply to the Arctic.

Other MARPOL requirements concern the prevention of oil pollution in polar regions. In the Antarctic, the use of heavy grade oil is banned, a regulation that also does not apply to the Arctic. A technical working group is currently working closely with the Arctic Council on oil spill response in ice and snow conditions.

The STCW (Standards for Training, Certification and Watchkeeping) convention considers the importance of training and competence of seafarers. Amendments to the convention were adopted in 2010 and entered into force in 2012.

Regarding the safety of fishing vessels, Ms Allnutt highlighted the current lack of international requirements, as several previous attempts to install conventions did not succeed. A 2012 meeting in Cape Town, South Africa, led to an agreement on the provisions of the Torremolinos Protocol, and Ms Allnutt expressed the hope that this agreement will soon enter into force.

After the Polar Guidelines were adopted by the IMO Assembly in 2009, the work on the International Code of Safety for Ships Operating in Polar Waters began. Most recently, an intersessional working group on the Polar Code was held at the beginning of October 2013 at IMO Headquarter in London, Allnutt noted. One of the topics that was especially important was life-saving appliances in cold waters. Many issues such

as personal survival kits, group survival kits, life boats and life rafts were discussed, Allnutt mentioned. There is a lot to take into account, although life requirements for life-saving appliances are already in place under the Life Saving Appliances Code

The Polar Code will have two parts: one focusing on safety measures and one addressing environmental protection measures, Allnutt explained. Each part will then be sub-divided into mandatory requirements and provide additional guidance. According to Allnutt, the Polar Code's mandatory safety measures will cover all relevant areas including structural integrity, stability, watertightness, machinery and operational safety. The environmental requirements include but are not limited to oil pollution, pollution by sewage from ships, and pollution by garbage and harmful substances. Additional guidance includes the list of MARPOL requirements for the Southern Ocean surrounding Antarctica, guidance regarding garbage management plans, ballast water management and anti-fouling provisions.

In her concluding remarks, Ms Allnutt briefly touched upon issues that are currently under discussion. For instance, the Polar Code is intended to apply to passenger and cargo vessels. However with MARPOL – which includes fishing vessels as part to the Code – it is currently under discussion whether MARPOL needs to apply to fishing vessels as well. Furthermore, the Marine Environment Protection Committee (MEPC) discusses regulations on black carbon emissions and possible discharge bans in the Arctic. Allnutt stated that it is premature to regulate the use of heavy fuel oil in the Arctic at this point in time.

In order to make the Polar Code mandatory, IMO instruments like MARPOL, SOLAS and several others would need to be amended, which generates further discussions in the development of the Polar Code . These difficulties notwithstanding, the Polar Code is planned to be approved in May 2014 and to be adopted by the end of the same year.

ROUNDTABLE ON EXISTING AND EMERGING ISSUES IN ARCTIC MARINE TRANSPORTATION AND SHIPPING

MODERATOR: HANS BOLSCHER

ASSOCIATE PARTNER, ECORYS

The discussion focused on contemporary issues and concerns about Arctic marine transport and allowed members of different constituencies in the Arctic to express their views on Arctic shipping and transportation.

Mr Bolscher introduced the roundtable session and briefly outlined the proceedings of the following panels. He encouraged the audience to actively engage in discussions with the panelists.

LAYLA HUGHES

COMMISSIONER, ALASKA ARCTIC POLICY COMMISSION

Environment

As a lawyer, Ms Hughes mostly represents conservation and Alaska native groups. The Alaska legislature recently created a commission to come up with an Alaska Arctic Policy over the next two years, and Ms Hughes is the conservation group's representative on this commission.

The Arctic Marine Shipping Assessment (AMSA) is a reliable source with regard to the environmental impacts of Arctic shipping, Hughes said. Generally, the main categories of concern are pollution (both accidental and routine discharges to the water), air pollution, disturbances (including underwater noise and vessel strikes mostly to marine mammals), and invasive species.

Ms Hughes then briefly recounted major incidents like the ***Exxon Valdez*** spill in 1989, which had a major impact on the environment. AMSA identified oil spills as the number one risk in the Arctic. The ***Exxon Valdez*** was an oil tanker that struck a reef in Prince William Sound, Alaska, and spilled around 750,000 barrels of oil. The oil covered 2,100 km of coastline and 28,000 km² of ocean, and some of the species living in that area have not yet recovered even today, Hughes said. A more recent accident she recalled was the running aground of the ***Selendang Ayu***, a bulk cargo ship carrying soy beans. The incident occurred close to the Aleutian Islands in Alaska in December 2004. Six crew members died, and over a million litres of bunker oil and diesels spilled. 1,600 bird carcasses and six sea otters were recovered from beaches in the area.

While oil spills cause the greatest concern, local air quality and emissions – especially black carbon emissions – are also of concern. Nitrous oxide (NO_2) causes haze, and resulting feedback to global warming from carbon dioxide (CO_2) emissions further exacerbate the situation. In Alaska, cruise ships and the air pollution they cause raise big concerns.

Ms Hughes also addressed less obvious concerns such as noise pollution, which can disturb marine mammals. The beluga whale and the bowhead whale are especially sensitive, Hughes explained. If these animals are too close to the underwater noise source, it can damage their hearing and disturb their behaviour. She further stressed that marine mammals rely on their hearing to communicate with one another, to find food, or detect predators. Bowhead whales exhibit different behaviour as a result of a disturbance as far as 4 km away, and beluga whales in some cases even from 70 km away. "Underwater noise is like fog; it obscures communication," explained Hughes. The disturbance of marine animals could make hunting more difficult, and as a consequence, have an impact subsistence hunting, as ships also transit through traditional hunting areas.

Light disturbance is another issue of concern in Alaska. In bad weather and foggy conditions, seabirds are attracted to lights on ships and collide. Ms Hughes mentioned that some of the oil companies in the area are experimenting with new techniques in order to reduce the lighting on the ships to avoid such collisions.

With increasing ship traffic, vessel strikes with marine mammals start to become a concern as well. Even though there is not a lot of ship traffic in the northern part of Alaska yet, scientists have been measuring the occurrence of ship strikes over the past 20 years, and have found that 2 to 3% of the bowhead whale population have ship or propeller injuries.

As a last concern, Ms Hughes touched on the issue of invasive species. In Alaska, this is not a major problem so far, as only 15 non-native species have been identified in the

waters around the state. Compared to approximately 250 non-native species off the Continental US Pacific coast, this number is still rather moderate, but requires close monitoring in the future.

HANNU HALINEN

FINNISH AMBASSADOR TO THE ARCTIC COUNCIL

Governance

Halinen described governance as a hot topic. The term "governance" itself is already quite challenging, because if translated into some of the Arctic countries' languages, it may have very different meanings, and may even refer to imperialistic ideas. It is therefore necessary to be very clear about what is meant by "governance" the ambassador explained.

Even though the Arctic may be one of the most regulated areas in the world, efficient regulatory frameworks in the region are constantly subject to discussion. Ambassador Halinen said that the UN Convention on the Law of the Sea is an important and valuable tool for governing the area. However, Halinen noted, some parties may have some concerns about how to retain the freedom of the sea principle after the remaining questions on the extension of the continental shelves are decided. Russia, Greenland and Canada are submitting their claims to the UN Commission in 2013 and 2014, and Halinen expressed the hope that the Commission's recommendations may follow soon after the submissions. Apart from the resolved Norwegian-Russian border uncertainty, other territorial demarcations have not been agreed upon yet, the ambassador pointed out. However, it has to be kept in mind that all Arctic states have agreed to adhere to the UNCLOS Commission's science-based recommendations, Halinen said.

Touching upon the IMO Polar Code as a UN-based process, Halinen stated that it and should be in place by the beginning of 2016 at the latest. As a mandatory code, it is going to include both technical as well as environmental regulations.

The Arctic Council agreements on Search and Rescue and Oil Spill Prevention are also tools of governance mentioned by the ambassador. As Halinen indicated, more international agreements are to come under the auspices of the Arctic Council . In Ambassador Halinen's view, what is more important than binding agreements themselves are the related operational guidelines, like the Oil Spill Prevention agreement . Most importantly, there is a need to agree on the operational level in order to handle practical questions in the Arctic.

As for governing questions and ongoing processes to clarify Arctic governance, Halinen pointed out that many actors regard the current regulatory framework as sufficient. The idea of an Arctic Treaty following the example of the Antarctic Treaty was described by Halinen as a "non-starter", as all the Arctic coastal states oppose it. Instead of looking at a comprehensive framework, the ambassador instead proposed a more sectoral approach where decisions and agreements are made on a case-to-case basis. Halinen pointed out that what he called "de facto governance mechanisms" - the practical cooperation among stakeholders - may be much more important for the Arctic. In this regard, he called for measures to improve the cooperation between officials and Arctic stakeholders, and to facilitate the exchange of and access to information.

AERNOUD WILLEUMIER

PORT OF ROTTERDAM

Economy

As the biggest port in Europe, the Port of Rotterdam has a keen interest in following the developments in the Arctic, began Mr Willeumier. Although Arctic shipping as such is not new, he remarked that the arrival of the Chinese vessel ***Yong Sheng*** in Rotterdam after sailing the Northern Sea Route generated a lot of media interest. Direct gains in using the NSR include shorter distances, resulting in shorter transit times and fuel savings.

Mr Willeumier then spoke about the various trade flows between the Asian Pacific and Europe. In terms of tons, he highlighted that the biggest trade flow is eastbound, coming from Western Europe and Russia and going towards the Asian Pacific area (i.e. all Asian countries east of Singapore). The trade flows primarily consist of dry and liquid bulk cargo, with coal forming the largest amount. Mr Willeumier reminded the audience that these observations apply to cargo flows between the two continents, not to intra-regional flows. The total volume of eastbound trade flow is nowadays nearly twice as large as westbound trade flow, whereby the latter mainly consists of containerized cargo. Subsequently, Mr Willeumier briefly introduced the major market segments: the dry bulk market, the liquid bulk market and the container market.

In the dry bulk market, ice class bulk carriers are available, but global cargo flows between exporting and importing ports do not necessarily run along Nordic routes. Mining activities generate dry bulk cargo flows out of the Arctic, but this is a very specific market. As for the worldwide dry bulk flows, they are dominated by flows from the Southern Hemisphere towards the Northern Hemisphere, Willeumier explained.

Various ice class tankers are available in the liquid bulk market as well, mainly for transporting oil, chemicals and LNG. The Port of Rotterdam sees special opportunities with regard to the production of oil and gas in northern Russia, Willeumier said. A setup could be developed in which some major ports in Asia and Europe would serve as transfer hubs. Here, the exporters of oil and gas products from Northern regions could store their commodities for later re-export to the rest of the world – especially ports that are open and accessible year-round and have sufficient facilities to handle the storage of such commodities. Willeumier described this as a "shuttle system" setup. Such a system is already in use in the case of transporting oil products such as fuel oil from Russia to the Port of Rotterdam . Fuel oil is stored in large facilities in Rotterdam and then re-exported to other places around the world. If a similar setup is developed in northern Russia, shipments to European and Asian hubs could be a possible development for the future, Willeumier explained.

The situation is different for the container market, however. As economy of scale is crucial for survival in low profit margin businesses, Ultra Large Container Carriers (ULCC) such as the Maersk Triple-E class are utilized to reduce costs per unit volume and to combine trade flows, Willeumier explained. These ships require a high amount of capital for investment. Making these large ships suitable for navigating ice-covered seas requires the hull to be reinforced, as well as meeting other requirements to make a vessel an ice class vessel. Doing so would create huge additional costs. In a very low profit margin business such as container shipping, Arctic shipping routes therefore do not look viable.

Furthermore, the fuel-saving practice of slow steaming – where container ships travel much slower than their maximum speed – further impedes prospects for Arctic container shipping. The slow steaming practice is driven by periods of oversupply. To keep as many vessels as possible in service while keeping the same (weekly) frequency

of port calls, they often travel at lower sailing speeds. Due to slow steaming practices, the newest ships are not provided with high power propulsion engines anymore, which means these ships do not have the required additional power to operate in icy conditions, and they would need icebreaker assistance to operate in polar waters.

To make optimal use of container ship capacity, shippers "double use" container slots, meaning they reload the containers at intermediate ports along the shipping route. Such intermediate ports exist via the southern shipping routes through the Panama and Suez Canals, but not along the Arctic shipping routes. Furthermore, Mr Willeumier pointed out that shippers and freight forwarders require reliable, timely, high frequency and year-round container service with fixed sailing and arrival dates in ports – something that the Arctic routes cannot provide at the moment.

In his summary, Mr Willeumier said that the Arctic routes can be attractive to shipping companies during the summer months in regional development scenarios, such as Arctic oil and gas exploration in combination with some ports functioning as transfer hubs. The Arctic route may also be attractive for transport of one-off project cargo during the summer. In conclusion, he re-iterated that shipping via the Arctic routes will not be a viable option for container shipping in the foreseeable future.

DISCUSSION

Nighat Amin, Vice President of the International Polar Foundation, remarked that the analysis of shipping via Arctic routes should be done in terms of tonnage and not in terms of ship numbers, because ship numbers can be really deceptive.

Mr Willeumier commented that from a port's point of view, it is preferable to look at cargo flows, and it does not matter too much whether the port receives a high number of vessels with lower tonnage, or a low number of vessels and a high volume of handling, as the port cannot influence such flows anyway.

Ms Amin then asked what kind of statistical analysis would be useful for looking at the trends in terms of larger-sized ship movements through the Arctic, and whether the port keeps statistics of ship size.

Mr Willeumier answered that the port keeps track of the average size of ships and the number of vessel calls per ships class, but no statistics are kept on which specific shipping lanes the vessels use.

Kevin Harun from Pacific Environment, an Alaskan NGO that holds permanent consultative status in the IMO , congratulated the Arctic Council for its work to highlight the impact of heavy fuel oil and black carbon. However, he believes there is a disconnect between the Arctic Council and the IMO . His first question was how the Arctic Council and the IMO can become more connected, so that the Arctic Council vision becomes more incorporated into the IMO . Mr Harun's second question was whether the Finnish ambassador would support placeholders for regulations on heavy fuel oil and black carbon in the Polar Code , so that these issues could be included at a later point in time.

Ambassador Halinen replied that the IMO's secretary general has sent a clear message to the Arctic Council that he is willing to discuss the issues of the Polar Code at the Arctic Council . As the Arctic Council is rather a "soft law" discussion forum, Halinen regarded it as very significant that the head of a UN special agency intends to come to the Arctic Council to discuss with Council members. The ambassador stressed the importance cooperating and coordinating the work, and highlighted the fact that there is an Arctic Council task force on black carbon, and the work of this task force can lead to a binding agreement between the Arctic Council member states as well.

Mr Bolscher asked Ambassador Halinen how is it possible that the Arctic Council's views are not reflected in the IMO .

The ambassador remarked that from the Finnish perspective, one has to be aware that there are different officials responsible for the work, and a lot of different ministries are involved. Halinen also stressed the need to engage more with the industries and to consider their views as well, as the Polar Code's requirements and regulations will have a considerable impact on them.

Mr Bolscher then addressed the same question to Rita Allnutt from the IMO .

All members of the Arctic Council are members to the IMO as well, Ms Allnutt said. She highlighted that the Arctic Council is very actively involved in the work on the Polar Code , and the Arctic Council member states' views have already been incorporated. She mentioned that the EU member states hold coordination meetings prior to the IMO meetings, and the Arctic Council could do the same to further coordinate their position on specific issues.

With regard to heavy fuel oil and black carbon regulation placeholders, Ms Allnutt pointed out that the IMO Secretariat does not have the decision-making power on such issues, as it only has an advisory role. The decisions are taken by the IMO's member governments. The timeline for approval, adoption and implementation of the Polar Code is quite ambitious but feasible, and any missing elements can be amended afterwards. However, Allnutt called attention to the fact that after being adopted, it will take at least 18 months for the Polar Code to enter into force, and amendments cannot be made before those 18 months pass.

Antoine Kedzierski from Transport & Environment commented that adopting a set of rules that is not regarded as a perfect outcome and then waiting several years before making amendments does not seem like a desirable procedure. In Mr Kedzierski's view, time is of the essence. Although the level of Arctic shipping may be considered reasonably low at the moment, it is uncertain what the situation may look like in a couple of years. Mr Kedzierski was therefore of the opinion that there is a window of opportunity that should not be missed, and that it would be better to prevent unwanted developments, and the sooner the better. He asked how many incidents like ***Exxon Valdez*** would have to happen before such issues would be tackled.

Mr Bolscher confirmed that this question would be addressed, but first allowed another question from the audience.

Anders Backman from the University of Gothenburg remarked that he has been responsible for the operation of noise measurements in the High Arctic. Although the best available experts and technology have been involved and microphones have been placed as deep as in 1,000 metres, it was hardly possible to identify the ships' noise because the ice's noise was much louder and covered almost all frequencies. He asked Ms Hughes if she had come across similar difficulties related to such measurements.

Ms Hughes answered this question in the affirmative and added that storms and winds can make it difficult to detect industrial sounds. Sometimes natural sounds in the ocean are even louder than sounds ships produce. In the US, Hughes said, it is particularly difficult because there is no agreement on which standard to use for measurements, and regulations do not currently address these issues sufficiently.

Tatjana Minayeva from Wetlands International remarked that 22,000 km of Russian shorelines are not covered by any oil spill response plan and asked how these areas can be protected from spills caused by ships. With regard to light pollution, she posed the question as to whether there is a platform in which companies can exchange experience and learn from each other, as some companies have made some progress. Her third question was whether shipping in the Arctic would be economically feasible at all.

Mr Willeumier replied that the ships' choice of routing is determined by the economies of transport. Another factor is where the port of export and the port of import are located. From a northwest continental point of view, there are indeed doubts whether an additional shipping route through the Arctic is necessary, although there are individual shipments that benefit from time savings by going through the Arctic. Willeumier added that the question could also be more fundamental – namely whether the market should be allowed to find its way or whether certain areas should be protected and prevent shipping from passing through those areas. As shipping has already been taking place in these areas for a long time, it might be difficult to impose such restrictions.

Mr Bolscher asked whether stricter environmental requirements could create an economic disincentive.

Mr Willeumier answered that if transiting the Arctic is subject to high costs, this would cause ship operators to look for alternate routes, so environmental requirements would indeed be a factor. Returning to the question of whether an Arctic route is needed, Willeumier said it is usually the market that decides this point.

Peter Wadhams from the University of Cambridge addressed Ms Minayeva's question about the safety of Russian shorelines. The US National Academy of Sciences is currently is drawing up a report on oil spills in ice in the Arctic, and the question of shoreline protection has been considered extensively. As Wadhams put it, "there simply is not any way of protecting long lengths of coastline. So, what oil spill cleanup plans talk about is protecting short, critical lengths of coastline which are in the path of the oil spill." Professor Wadhams added that there are many other factors involving oil spills in ice, which lead to wider questions as to whether shipping or drilling should be allowed, because there is no way of cleaning up an oil blowout under ice. "You have to balance the advantages of drilling with the enormous danger of a blowout under ice," Wadhams explained. All oil companies are required to provide oil spill cleanup plans, and some reputable companies like Shell have provided quite complex plans. The problem, argued Professor Wadhams, is that that they will not work in Arctic conditions.

Nighat Amin commented on the option of having placeholders on heavy fuel oil and black carbon regulations in the IMO's Polar Code . The problem with the black carbon emissions, Amin said, is that they are not produced by the ships, but by coal-fired plants in places like China. According to Amin, China produces more black carbon than the all shipping activities around the world. This would therefore, in her mind, be an attempt to impose a change in regulations based on evidence that is not up to the standards required to bring about a change in the legislation. Regarding heavy fuel oils, Amin continued, the US unilaterally banned all ships using heavy fuel oil from entering their ports. If countries want to use marine gas oil (MGO) instead of heavy fuel oil, she argued that they are entitled to do so.

Kevin Harun added that black carbon regulations could still make a difference in the Arctic with regard to the disproportionate impact that black carbon has on the region. Regarding heavy fuel oil, Harun stated that countries do not have the ability to regulate ships that have the right to innocent passage.

Mr Bolscher closed by saying that this discussion may be continued over the coffee break, as opinions seem to diverge on some issues.

LOCAL AND COMMUNITY PERSPECTIVES ON ARCTIC SHIPPING: DECISION-MAKER PANEL

MODERATOR: HANS BOLSCHER

ASSOCIATE PARTNER, ECORYS

A PANEL OF DECISION-MAKERS ADDRESS THE INTERESTS AND CONCERNS REGARDING ARCTIC SHIPPING IDENTIFIED DURING THE PREVIOUS ROUND-TABLE SESSION.

Mr Bolscher introduced the speakers of the last panel, which aims to sum up the most important issues in the Arctic that policymakers need to address. To stimulate discussion, a powerpoint slide showed six discussion questions focusing on Arctic shipping:

1. Do we know enough about what will drive Arctic shipping in the future (economics/climate change/other)? Do we need Arctic shipping? Should we allow markets to drive Arctic shipping or have exclusion zones?
2. What are the knowledge gaps in oil spill response in ice? Do we effectively share best available practices (BAP) and best available technologies (BAT)?
3. Are there synergies between the prospective shipping activities? Can an ore carrier help with community resupply? What mechanisms would be needed to take advantage of increased shipping for community wellbeing? Can community-based monitoring be an effective tool for shipping surveillance?
4. Do we know enough about black carbon and the impacts of Arctic shipping to inform appropriate policy instruments? Are IMO place holders needed? Are the boundaries defined by the polar code effective? Is there enough coordination between other instruments and governance structures?
5. Are current insurance and liability regulations effective to cover the true costs of an incident in the Arctic?
6. Will Arctic shipping increase before regulatory measures are adopted by states and others using the Arctic? Is corporate responsibility / voluntary measures enough? Can the environmental concerns be addressed in time?

LUC BAS

DIRECTOR, IUCN BELGIUM

Environment

IUCN is a union of predominantly government agencies and many non-governmental organizations, among them landowner associations and hunter associations, Mr Bas stated. Six commissions gather around 11,000 experts in IUCN's effort to generate knowledge for informed policy making. The predominant task of IUCN is convening

and facilitating knowledge exchange and providing an evidence base for policymakers to take smart decisions, Bas explained. In order to gather different perspectives, IUCN also maintains partnerships with different industries.

One of the areas IUCN is active in is the zoning and identifying of ecologically and biologically significant areas by applying criteria of the Convention on Biological Diversity (CBD). 77 such areas have been identified by IUCN , 13 of which are located in the Arctic. From the environmental perspective and by applying a precautionary approach, Bas stated that Arctic shipping does not make economic sense with regard to the internalized environmental costs and possible impacts.

When talking about Arctic shipping, the bulk of activity will be in the field of oil and other resource extraction, Bas noted. From the IUCN's perspective, this is one of the biggest challenges. IUCN has been focusing on the Bering Strait, as it is one of the areas where the organization has tried to facilitate dialogue between the different American and Russian partners. In the past year, there have been 245 passages through the Bering Strait, carrying up to 1 million tons of oil, coal and iron ore, indicating that the number has increased more than tenfold over the past years.

Due to these developments, Bas emphasized that IUCN closely follows up on the Polar Code and works to make the code viable, although this work is sometimes confronted with political realities. The development of regulations is also way too slow to meet the urgency of the problem, Bas argued. IUCN has therefore focused on voluntary agreements as well, although this approach has been seen as controversial in some circles. However, Mr Bas stressed once again that waiting for regulations to come into force would take too long. The voluntary measures include slow steaming to reduce CO_2 emissions and reduce the risk of collision with sea mammals. Seasonal buffer zones could be another measure that parties would agree upon on a voluntary basis first, as well as not to use heavy fuel oil.

Mr Bas reaffirmed that black carbon needs to get increased international attention, and from his point of view, the effect of invasive alien species is underestimated as well. IUCN has been working on a red list and has identified where the invasive species occur and what impact they have.

Ending on a positive note, Mr Bas referred to former Russian Prime Minister Medvedev' initiative to form a buffer zone around Wrangel Island in the Bering Strait in late 2012. This will aid in the protection of this sensitive area from marine activities, as it will allow better control of ships transiting this portion of the Northern Sea Route.

ANDERS BACKMAN

HEAD OF POLAR OPERATIONS, ICE COUNCIL CHAIRMAN, VIKING SUPPLY SHIPOWNERS, UNIVERSITY OF GOTHENBURG

Industry

Mr Backman began by giving some history about his career. He has spent most of his time as a Master Mariner at sea, mostly on icebreakers, salvage and diving vessels. He has further been involved in ice management and shipbuilding and design. When oil-related activities in the Beaufort Sea started in 1984 and 1985, Mr Backman gained some experience in offshore activities in severe ice conditions. He first worked on the icebreaker ***Oden***, and later stayed in the area and worked as a captain.

Regarding the future of Arctic shipping, Mr Backman expressed the view that offshore industry is likely to be developed rather rapidly, as all the resources of oil and gas are under the ice in the region. The oil deposits in these areas are much larger than in many other parts of the planet, Backman noted. The problem is just that it is currently difficult and expensive to extract it.

Mr Backman further remarked that he does not believe in dramatic developments in Arctic transport. A transport line that is only open for a very short period of the year is not viable for regular transport shipping. Along the Northern Sea Route, temperatures below -55°C and very thick ice would make such transport very expensive, and the Northwest Passage would not be a feasible alternative, either. In Mr Backman's opinion, there may be a small but not dramatic increase in voyages during summer. Offshore activities will constitute the majority of development in the Arctic.

The primary focus should be on marine safety, Backman stressed. A number of actors in the oil industry prioritize low costs above safety. However, safety for man, material and environment must take priority. Companies should be required to have reliable safety management, including experienced staff, periodic training, efficient ice management for the provision of data, and increased standard requirements for the ships themselves. The vessels operating in Arctic waters must be specifically designed for this purpose.

If appropriate available technology and experience is used, there is no higher risk to operate in the Arctic than in any other areas, Backman argued. From his own experience, he said that insurance costs for operations in Arctic waters may even be lower than in other areas if preconditions like experienced personnel and best available technology are met. One reason for this is that the risk of collision in the area is close to zero, compared to much higher risks of collision in the English Channel, for example.

Turning to the Polar Code , Backman stated that there is already a tool in the IMO regulations that could be used today, namely the International Safety Management (ISM) code. If applied rigorously, the Port State Control tool (the inspection of foreign ships to ensure that their condition and equipment complies with international requirements), would result in much higher safety onboard the vessels, Backman said.

Backman said that his current work includes efforts to convince insurance companies to be very restrictive in giving extra insurance for environmentally challenging areas by following the guidelines laid out in the Arctic Best Practice Declaration. "If we do it like this, I am convinced that we can slowly and safely proceed along this road," Backman concluded.

REGGIE JOULE

MAYOR OF ALASKA'S NORTHWEST ARCTIC BOROUGH

People

Alaska's Northwest Arctic Borough is a municipal government in which Mr Joule is the Mayor. He works closely together with an assembly and other local and federal organizations on the challenges of increased shipping and activity in the Arctic. "We are here to learn about how everybody else is viewing the Arctic," Joule remarked in his opening comments.

On the topic of oil spills in ice, Mayor Joule stated the answer to the previously posed question – whether enough is known about this issue – is "no". This makes it very difficult to be prepared for such a scenario. As for the traffic going through the Bering Strait and heading north, the Borough is currently not able to respond if an incident occurs. In the last five years, the Mayor explained, shipping in the region has more than doubled.

A way of dealing with these activities is to work with the industries, Joule proposed. Shell asked to place an oil spill response vessel in the Borough's area. However, there is currently no port in the area to make this possible. It is now being explored whether a medium-sized docking area could be built to harbour such a response vessel.

These are the kinds of projects the Borough is working on with the industry, and in cooperation with the US Coast Guard. Ultimately, it is those who live by the shoreline who will see the most impacts of the ongoing development. Being responsive while also working with industry and the government on search and rescue is important, Mr Joule concluded.

JOSEP CASANOVAS

DG MOBILITY AND TRANSPORT, UNIT FOR MARITIME TRANSPORT AND LOGISTICS, EUROPEAN COMMISSION

Governance (European Commission)

Mr Casanovas reminded the audience of the first communication on EU Arctic Policy released in 2008, followed by a second one in 2012. Knowledge, responsibility and engagement are the three key priorities for the European Union in the Arctic. The 2008 communication's main objectives were protecting and preserving the Arctic in unison with its population, as well as promoting the sustainable use of resources and international cooperation. The 2012 communication highlights the next steps and also references the achieved progress, Casanovas pointed out. It also included an inventory of actions and a staff working document on space and the Arctic.

As a lot has been said about the Polar Code , Mr Casanovas observed. He addressed this topic as well by mentioning that the European Commission holds observer status at the IMO . There are EU coordination meetings with EU member states prior to the IMO meetings, with the purpose of developing a unified EU position in areas of EU competence, relevance and interest. EU/EC representatives have also been present in the ship design and equipment subcommittee meetings at the IMO since the first meeting covering the Polar Code in 2010. Although the goal is to have the Polar Code finalized by the end of 2014, Mr Casanovas stressed that this is a very complex procedure.

When talking about Arctic shipping, Casanovas referred to the clear increase of transits through the Arctic summer after summer, due to distance and voyage duration reductions. The transit period has also been extended, Casanovas noted.

The European Commission's policy priorities lie on maritime safety, including the work on the Polar Code . The European Maritime Safety Agency (EMSA) works on this issue and follows developments, like in the area of satellite-driven, AIS-based vessel monitoring, Galileo satellite navigation and many other areas as well. Another priority is adhering to basic principles of international law, in this case the UNCLOS framework. Principles like the freedom of navigation and the right to innocent passage need to be respected, and any discriminatory or unlawful practices need to be avoided, Casanovas stressed.

Mr Casanovas then focused on the fact that maritime safety is closely interlinked with environmental protection, an issue that has been fully taken into account in the work on the Polar Code . Discussions on black carbon and heavy fuel oil have been held or are taking place.

The Arctic Council is a very important forum in which these issues are discussed, Casanovas noted. In the Council's working group on the Protection of the Arctic Marine Environment (PAME), discussions are held and evolve around the Arctic Marine Shipping Assessment (AMSA) report.

Another issue Mr Casanova raised was the increasing number of cruise passenger ships – a fact that poses great challenges in Arctic and polar waters and calls for preventive solutions, like coordinated sailing, given the limited search and rescue

capacities. These ships often do not follow standard routes as merchant ships do, and sometimes enter uncharted waters. The development of a search and rescue coordination effort from the Arctic coastal states, reflected under the first legally-binding agreement on Search and Rescue all Arctic Council member states have signed on to is a very positive development, Casanovas said.

In his concluding remarks, Mr Casanovas also spotlighted the Arctic Council's second legally binding agreement on oil spill preparedness and response as another major achievement of international cooperation.

DISCUSSION

Nick Hanley from DG Environment at the European Commission commented that some of the best known pieces of the EU's environmental legislation have followed disasters. He stated that it has been very interesting listening to the concerns of the people and to hear the work that is going on. The IMO has a very poor record in terms of its environmental performance, Hanely remarked, and he found the fact that this code is developing – albeit rather slowly – to be encouraging. He asked Mr Backman whether he is personally confident that what is being developed is developing fast enough and is going to be rigid enough to ensure that accidents do not happen, or if they do, that they are effectively dealt with.

Mr Backman replied that the danger of ice is often underestimated. In all areas, there are pieces of multiyear ice that weigh 50 to 100 tons. If an ice-strengthened vessel, but not a polar-strengthened vessel hits such ice, this would probably result in a total loss of that vessel. He stated that experience is indispensable, and that many of the operators in the Arctic lack this experience, a fact that concerns him.

Mayor Joule seconded Mr Backman's skeptic assessment of preparedness, and Luc Bas added that when talking about the urgency and the magnitude of what needs to be done, this also often relates to trust and trust-building between stakeholders and partners. Of course, this is difficult at the international level, considering all the different interests. However in a bilateral context like in the Bering Strait region, this could be a way to accelerate communication and to set up infrastructure to enhance safety.

A Russian lady from the audience commented that the influence of shipping on the Arctic marine ecosystem, for instance on breeding places of fish etc., has not been discussed during the different shipping panel sessions. More attention to the vulnerable ecosystems in the future would be desirable, she stated.

Sigurd Enge from the Bellona Foundation, an environmental organization based in Norway, stated that oil exploration and production in the Arctic will lead to increased traffic within the region. As for the Northern Sea Route, Mr Enge claimed that one motivation for opening the route for sea transport is to help Russia finance its logistics for resource extraction, which in turn could lead to even more ship traffic. Mr Enge asked whether the use of liquified natural gas (LNG) would be a solution to reduce pollution in the area.

Mr Bas supported Mr Enge's view that increased traffic and the focus on oil and gas extraction is worrying, especially because it also distracts from concentrating on renewable energy development. The resources are immense, and they are intended to be burned in the form of fuel, Bas went on. If the known reserves would be burned, this would raise the CO_2 concentration in the atmosphere from the current 400 parts per million (ppm) to 1,700 ppm.

Mr Backman reiterated that he does not believe there will be much oil production in the Arctic in the next 30 years, as there currently are cheaper sources of oil elsewhere. There will be, however, a lot of exploration and seismic investigation. Concerning LNG, there are some difficulties that may be technically resolved in the future. Another alternative would be nuclear power.

Intra-Arctic ship traffic is predicted to grow, Mr Casanovas added. With regard to LNG, the European Commission has adopted a proposal on clean power for transport, and this proposal also promotes the use of LNG for shipping. According to the proposal, it is a goal to ensure that all core European ports establish facilities for ships running on LNG by 2020. A zero emission, large ferry vessel is also under construction in Europe. Energy for this vessel will be produced by hydrogen/fuel cells and wind energy on board to transform water into hydrogen by electrolysis, so interesting technology developments are already taking place, said Mr Casanovas.

On behalf of the Arctic NGO forum, Mr Bolscher thanked all participants for their presence and the fruitful discussions, as well as the International Polar Foundation for organizing the event.

CLOSING REMARKS:
NIGHAT AMIN

VICE PRESIDENT, INTERNATIONAL POLAR FOUNDATION

All the ideas that have been expressed and discussed throughout the conference mirror that the Arctic is a very complex area, Ms Amin stated. For Amin, the Arctic has always been the final frontier, the last place on Earth where there is still a little bit of the “old life” and freedom, a way of living without too many regulations.

However, it can be observed that this is changing, and more and more needs to be regulated to protect and manage the area. There is a balance to be achieved in deciding what is given priority, as the Arctic and the people of the Arctic cannot be locked in a sort of time capsule that should not be touched. Arctic residents face the same changes, developments and economic drivers as those who live elsewhere on the planet, Amin stated. The challenge is to manage this change in the best way possible for all stakeholders involved. The multiple stresses on the Arctic system and the effects of climate change show that all stakeholders are linked with one another. One needs to be aware that the Arctic is not an isolated place, Amin stated.

What has also become clear, Amin continued, is that the EU has become an important actor in the Arctic. The people of Alaska’s Northwest Arctic Borough , although it has only 7,500 inhabitants living in a vast territory, have the power to call the shots and influence what happens in their backyard, whereas many people living in large cities often do not have this possibility. She sees the opportunity to learn from each other with exchanges like the one that took place at the Arctic Futures Symposium.

Ms Amin thanked all the participants and partners that made the symposium possible, as well as all her colleagues for their work in making the Symposium happen.

CONTACT US:

International Polar Foundation
Rue des Deux Gares 120A Tweestationsstraat
B-1070 Brussels
Belgium

tel: +32 (0)2 543 06 98
fax: +32 (0)2 543 06 99

info@polarfoundation.org

INTERNATIONAL POLAR FOUNDATION
KINGDOM OF BELGIUM Federal Public Service Foreign Affairs, Foreign Trade and Development Cooperation
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