

BREAKING THE ICE

Arctic Development and Maritime Transportation
Prospects of the Transarctic Route – Impact and
Opportunities

Akureyri, March 27 – 28, 2007 at Hotel KEA

Organized by the Icelandic Government

Contribution to the Arctic Council's Arctic Marine Shipping Assessment

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Conference Web Cast and Information:

<http://www.arcticportal.org/breaking-the-ice>



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BREAKING THE ICE



Foreword



We who live in the Arctic region are yet again facing major changes that will transform our life in the region. Technological advances and changing climatic circumstances are bringing us new challenges and opportunities. One of those is increasing maritime transport in Arctic waters, even the possibility of a new sea route across the North Pole linking the North Atlantic and the North Pacific in closer commercial relations than ever before.

Extensive shipping activities in the Arctic will of course bring about environmental risks that must be avoided with effective pollution control measures and adequate emergency response capacity. At the same time new shipping routes will bring new economic opportunities to the communities in the North. This applies in particular to Iceland that will be in a key location for servicing the Northern Sea Route in the future.

Conscious of both the environmental risks and the community benefits, I am aware of the urgency to study carefully the future of the Northern Sea Route. The conference “Breaking the Ice: Arctic Development and Maritime Transportation”, was hosted by the Government of Iceland in Akureyri on March 27-28, 2007, for this very purpose. The conference was a part of a series of steps taken by the Government of Iceland to study this prospect, beginning with the report “North Meets North: Navigation and the Future of the Arctic” published in 2005.

The conference “Breaking the Ice” was like the report “North Meets North”, prepared under the leadership of the Icelandic Ministry for Foreign Affairs in close cooperation with relevant Ministries and stakeholders. The intention was to bring together experts and stakeholders to discuss and assess the prospects of the Transarctic Route, its impact and opportunities. The resulting conclusions, published in this report, will serve as a basis for continued assessment and policy discussion of the Icelandic administration and of the Arctic Council.

I am personally convinced that increased communication in the Arctic region and beyond will greatly benefit the communities and future generations in the region. I therefore take this opportunity to thank the experts, participants and the preparatory committee for the work they did to make this conference possible and for their thoughtful conclusions.

Mrs. Valgerður Sverrisdóttir
Minister for Foreign Affairs, Iceland



BREAKING THE ICE



Introduction

The Conference was organized by the Ministry for Foreign Affairs of Iceland with the support of other Ministries in Iceland and stakeholders.

The main aim was to provide an opportunity for specialists and stakeholders on arctic development and shipping to exchange information on the Arctic shipping and the prospects of a Transarctic Route between the North Atlantic and The Pacific oceans. Also, the intent is to serve as an input into policy discussion of the Icelandic administration and of the Arctic Council. Thus the preparation for the conference was done in close cooperation with the working team of the Arctic Council's Arctic Marine Shipping Assessment (AMSA) and its conclusions will contribute to this assessment.

The main drivers of change in the Arctic are climate change and increased economic activity. Climate change is bringing major challenges and new opportunities to the Arctic region. Among emerging issues is opening of access to rich natural resources in the Arctic, with subsequent increased maritime traffic and the potential opening up of a trans-arctic shipping route between the North Atlantic and the Pacific oceans.

The Conference was organized around the following three key policy issues:

- Future of research and monitoring
- Emergency prevention and reaction
- Viability of transarctic shipping

The Minister for Foreign Affairs, H.E. Valgerður Sverrisdóttir, opened the Conference and Mr. Þórir Ibsen, Director of Department of Natural Resources and Environmental Affairs, Ministry of Foreign Affairs, Iceland, chaired the Conference. The Conference Agenda is included in Annex I and List of Participants in Annex II.

Up to 100 specialists and representatives of governments, organizations and stakeholders from all the eight member states of the Arctic Council and representatives from UK, China and the European Commission took part in the conference. The conference was web cast on arcticportal.org (<http://www.arcticportal.org/breaking-the-ice>) where its pod cast has been made available together with presentations and other material. The presentations are accessible from the PAME homepage (www.pame.is).

Following is a summary of presentations, discussions, conclusions and recommendations made by the speakers and participants.



Opening Address

The Opening Address was given by *Mrs. Valgerður Sverrisdóttir, Minister for Foreign Affairs, Iceland*, and follows below:

Ladies and gentlemen,

It gives me a great pleasure to welcome you here in Akureyri, to this conference on Arctic Development and Maritime Transportation.

The title of the conference, “Breaking the Ice”, can be seen as a metaphor of the new challenges and opportunities in the Arctic. On one hand the Arctic ice is being ‘broken’ by global warming. On the other, resource development and new shipping technologies are changing our whole vision of maritime transportation in the Arctic.

Transarctic shipping is of course not without some risks. The Arctic is a pristine environment with rich and unique biological diversity. Great care must be taken to ensure that opening of new shipping routes in the north does not endanger the fragile environment of the Arctic.

The ongoing climate change will have significant effects in the Arctic. The international community is endeavouring to delay these changes, and Iceland is in the forefront of that effort. But we must be realistic. Climate change is already under way and we will not be able to stop it. To secure our future we must prepare ourselves and do our best to adapt to these changing circumstances.

It is not new to us to have to adapt to harsh and changing environmental circumstances. In earlier days, we had, however, little means to react, when sudden natural changes brought havoc into our lives. When volcanic eruptions wiped out vegetation and clouded the skies in Iceland, a great part of the population died of cold and hunger. But we never gave up, and the survivors worked hard to adapt to the changes brought by Mother Nature.

Today we stand better. Today’s science and new technologies will make it easier for us to adapt to coming changes, and to make use of any opportunities they may bring.

I am born and brought up here in the farming community in this beautiful fjord Eyjafjörður. I have lived to see how new technology and knowledge has progressed Icelandic farming, improving its products in harmony with nature.

I also remember learning about how farmers in this region -- the grandparents of today’s farmers -- responded to their harsh conditions by taking advantage of new opportunities in trade and maritime transportation. The farmers took a lead in forming cooperatives to export life sheep in exchange of consumer goods and agricultural machinery. Their courage was to transform both farming and the development of Icelandic society at the turn of the 20th century. Indeed, this very hotel, where we are today, was built by this movement.

Maritime transport is deep rooted in our culture. New shipping technologies brought our forefathers from Norway during the Viking period eleven centuries ago. In those days, Icelanders established settlements in Greenland and explored the coastline of North America. We have old records of voyages further to the north with the Viking ships traveling to lands around the White Sea. In fact, it may be said, that Iceland functioned like a “shipping hub” for the Viking voyages in the middle of the North-Atlantic.



These voyages came to an end after the Viking outreach came to an end, and for centuries the people of Iceland were dependant on other countries for communication over the ocean and international trade.

The sheep export in the late 19th century, I mentioned earlier, was the beginning of a new age of shipping in Iceland.

Today we might be reaching yet a new turning-point in shipping. With the melting of the Arctic ice cover new shipping routes are being opened. What is important is that the new routes will substantially shorten the shipping route for Europe and North-America to important trade destinations in the Pacific. This could mean in some instances a shortening of the shipping distance of up to 40 per cent. In the global perspective, this could provide win-win situation for both the world economy and for the environment.

The two canals, the Suez Canal and the Panama Canal, can not easily meet the dramatic increase in sea transport in the near future, and the passes around the Cape of Good Hope are too long. Passing through the Arctic might also mean substantial decrease in fossil fuel consumption of fast increasing world shipping activities.

Iceland is ideally situated for trans-shipment ports for future Arctic shipping. Moreover, development of alternative energy technologies, such as hydrogen technology, could help reduce emissions of greenhouse gases from shipping. Here in Iceland we have been experimenting with hydrogen technology in public transport, and we intend to bring this experience and the new technology to maritime transportation.

Iceland is fortunate to have rich sources of clean renewable energy. Today, this energy takes care of more than 70 per cent of our energy needs. All our electricity and house heating is provided for by our clean renewable energy. Our renewable energy moreover provides for much lower carbon emissions in energy intensive industry. With the development of hydrogen and other clean energy technologies we may also be able to cross the Arctic in a more environmentally sound way. This might sound as a daydream. But let us remember that few people foresaw at the turn of the 20th century foresaw that the bulk of our energy would be supplied by our waterfalls and geysers.

Ladies and gentlemen,

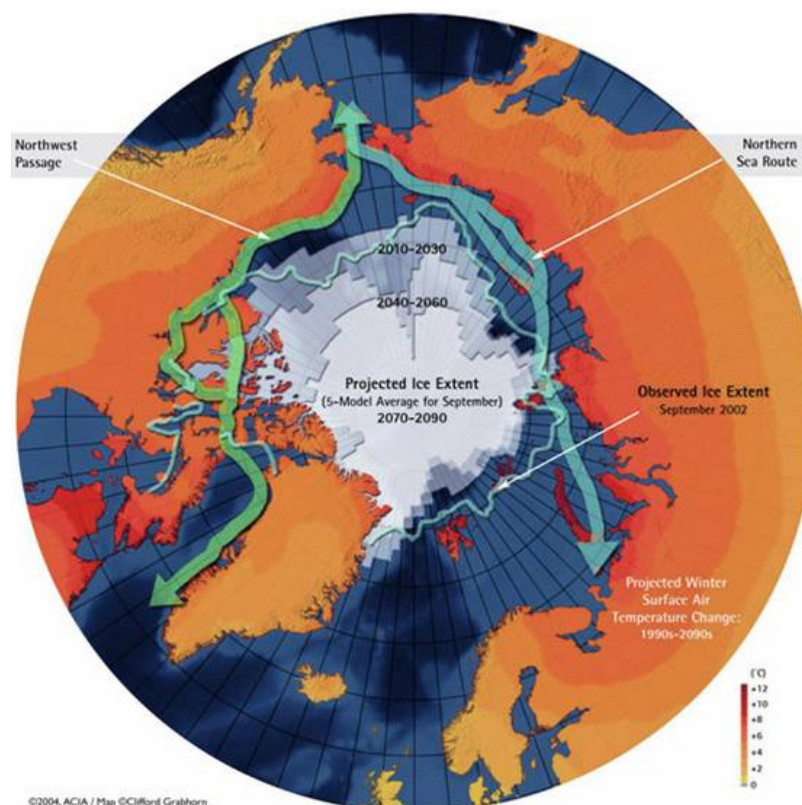
I would like to express my strong view that Governments on all sides of the Arctic Ocean should take a serious look at the possibility of opening up a new transarctic transportation route, and thus connect the Northern Atlantic directly with the Pacific Ocean. The opening of such a route would decrease the reliance of the world economy on present routes and be an important contribution to global security. This conference, together with your expertise, will make a valuable contribution to our future policy discussions on this important matter.

I therefore wish you success in your conference, which I am sure will be fruitful, while I sincerely hope that you will have the opportunity to enjoy my beautiful home surroundings.



Keynote Speech

Dr. Lawson W. Brigham, Chair, Arctic Marine Shipping Assessment of the Arctic Council gave the keynote speech and noted the changing circumstances in the Arctic and the need to be forward-looking to adequately assess and understand both the challenges and opportunities ahead of us. Global climate change and an extraordinary 50-year retreat of Arctic sea ice have resulted in unprecedented increases in marine access throughout the Arctic basin. Observed data show a continuing decrease in sea ice coverage and a recent model indicates the possibility of an entirely ice-free Arctic Ocean for a short period in summer (September) by 2040, if not sooner. Such a change would mean the end of multiyear sea ice, since all subsequent sea ice would be newly formed (first-year) early in the autumn. As shown by the work of the Arctic Climate Impact Assessment (ACIA), the Arctic is a preview of Earth's future climate ~ 10 years of change in the Arctic is approximately equivalent to 25 years of change observed in the rest of the globe. Thus, enhanced monitoring of the entire Arctic region can provide important indicators of environmental change for the planet, as well as providing key information to support increased marine activity throughout the Arctic basin.



Average of five computer models showing projected changes in the distribution of polar sea ice at the end of summer according to a report produced by the Arctic Council on the effects of climate change on the Arctic region (ACIA published in 2004).

A relentless exploration and development of Arctic natural resources continues, as an example, for hydrocarbons in offshore Norway, northwest Russia, and in Alaska's Arctic coastal seas. Other industries, such as hard minerals, fishing and tourism, are increasing their



marine use of the waterways around the Arctic Ocean. Surface ships have reached nearly all regions of the Arctic Ocean in summer, and, notably, since 1977 there have been 64 voyages by icebreaker to the North Pole (one voyage was conducted in late winter). Seven, full transarctic voyages by icebreakers have also been accomplished in 1991, 1994, 1996, and 2005. These successful voyages indicate to the global maritime industry that the Arctic Ocean is indeed more accessible than earlier years.

Dr. Brigham noted that the shortest route between the North Atlantic and North Pacific oceans (2100 nautical miles) is a crossing over the North Pole between Bering Strait and Fram Strait (between Greenland and Svalbard). This route, although covered by substantial Arctic sea ice, is attractive to many since it shortens transport distances between Far East and European ports by 40%. One key question is whether transarctic routes can be economically attractive alternatives to global maritime trade routes that utilize the Suez and Panama canals.

In response to the Arctic Council's ACIA report released in November 2004, the Council called for an Arctic Marine Shipping Assessment (AMSA). AMSA is to be a comprehensive assessment of Arctic marine activity at current and future levels (to 2020 and 2050); it will also be circumpolar in scope, yet also regional and local in its focus where the social, environmental and economic impacts may be greatest. AMSA must also be inclusive and involve a host of key actors: the eight Arctic states; the Permanent (indigenous) Participants of the Arctic Council; the Council's working groups and observers; the international maritime industry including the ship classification societies, insurers, and shipping companies; maritime research organizations; and, many non-Arctic stakeholders who may influence the future of Arctic marine transport.

AMSA is led by a team from three lead countries (Canada, Finland and the United States) under the Arctic Council's working group Protection of the Arctic Marine Environment (PAME). The findings of AMSA will provide crucial information to the Arctic states so they can address one of the key challenges to increased marine use of the Arctic Ocean ~ how best to work with the global maritime industry and find ways to balance the traditional freedom of navigation of the oceans while ensuring that highly effective marine safety and environmental protection measures are in place throughout the Arctic Ocean. Dr. Brigham suggested that only through constructive, multi-lateral engagement of the Arctic states with a host of actors can the many challenges of this new Arctic Ocean be met. He noted that Arctic navigation guidelines, although voluntary, have already been established by the International Maritime Organization (IMO). Of significance to these issues is that most of the world's commercial goods in today's globalized economy rely on a safe and efficient marine transport system that uses a set of select, global maritime trade routes. Adding Arctic Ocean routes to this set of historic global routes will provide many challenges to the maritime industry as well as to the eight Arctic states.

Reviewing the findings of ACIA, Dr. Brigham suggested that the maritime future for Arctic navigation most likely would advance initially along the western Northern Sea Route (NSR) as a result of increased resource development. Traffic along the eastern NSR could follow and next shippers might look to the central Arctic Ocean for "windows of opportunity" for seasonal transarctic voyages. Transarctic navigation along the Northwest Passage (NWP) could likely be the least favorable option in the decades ahead when the overall retreat of sea ice in the Arctic Ocean is taken into account. It is important to note that the western region of the NSR has experienced year-round shipping for the past 30 years ~ regular voyages between Murmansk on the Kola Peninsula and the port of Dundinka on the Yenisey River have been maintained throughout the winter using icebreaking cargo carriers and escort icebreakers. Independent icebreaking carriers, such as the new M/V Noril'sk Nickel, have



shown recently that modern icebreaking commercial ships can operate in this region without the need for icebreaker convoying.



Icebreaking (Double Acting) Container Ship: *Norilskiy Nickel* on the Northern Sea Route (March 2006)

Dr. Brigham indicated that there were many wildcards, perhaps unknown issues that might affect the future of Arctic navigation. Three possibilities are: the future multiple uses of Arctic waterways that have been in the past the sole domain of indigenous hunters, whalers, and fishermen; the potential impacts of increased Arctic ship emissions on local and regional environments; and, the potential extension of the continental shelves of five Arctic coastal states (into the central Arctic Ocean) allowed under Article 76 of the UN Convention of the Law of the Sea (UNCLOS).

In closing he noted that the “new” Arctic Ocean would require increased presence, more enforcement, much greater environmental monitoring, and enhanced cooperation among the Arctic states. He thanked Iceland for its leadership role in creating a vision and a strong dialogue for the possibility of future transarctic navigation, and for its many contributions to the Arctic Marine Shipping Assessment of the Arctic Council.



Future Research and Monitoring

Ice Monitoring and Ice Decrease

Mr. Stein Sandven, the Nansen Environmental and Remote Sensing Center, Norway, provided an overview of ice monitoring and ice decrease research in the Arctic. He noted that over the last 25 years the total ice coverage in the Arctic has decreased by 10% and multiyear ice by 25%. He informed participants of remote sensing of sea ice in the NSR and the use of satellite SAR coverage and images in ice navigation.

There is an observed difference in first year and multiyear ice with less of multiyear ice. This means that there are reductions in thicker ice with easier navigation operations. But he emphasized the need for additional data to better assess ice thickness changes. Ice coverage during the winter periods is not expected to decrease much but this may be very different during the summer periods with up to 80% reductions.

Extensive research activities in the Arctic will take place during the IPY 2007-2009 with many field expeditions. He informed participants that an Arctic Global Observing Ocean System (GOOS) will be formally established in 2007. Arctic GOOS will be a part of GOOS, which is a global system for sustained observations of the ocean. The main objective of Arctic GOOS is to develop operational oceanography for Arctic and Sub-Arctic seas and deliver information products for users which will come from in situ observing systems, satellite remote sensing and modeling/forecasting systems.

He noted the challenge in misinterpreting the data and cautioned any “dooms day” messages.

Technological Developments

Mr. Mikko Niini, Aker Arctic Technology, Finland, gave an overview of navigation through ice from the perspective of technological developments. He informed the Conference that ship designers have made important advances in ship design that have improved performance, efficiency and economics as a response to the increased demand for navigation through ice. This has called for tailored technological developments and solutions to winter Arctic conditions and operations. A new generation of large arctic ships with icebreaking capability have been developed by Aker Arctic Technology and can go through ice using much less energy than icebreakers with traditional icebreaking design. The opportunities for such new developments are primarily driven by increased resource developments in the Arctic.



Double Acting Ship Aker Arctic DAS™

The main technological challenges in ship design must take account of the following:

- Ice fields are very dynamic thus both fixed structures and ships need to be designed taking account of this dynamic movement.
- Channels through ice for navigation, which may freeze as a result of frequent traffic, have to be reopened.
- Ridge formation and their growth in density - Ridges may reach thickness of 20 meters with high density.
- Shipping routes may be difficult for navigation due to extensive ridging and pressure of ice.
- The performance requirements - Future needs for ice model tests in offshore activities.
- Recent developments for cost efficient Arctic navigation include a new way of operation and Ridge destruction with the propeller.
- Offshore loading terminal operation.
- New types of activities in offshore operations lead to unknown phenomena, which need to be studied with model tests.

The Politics of Arctic Shipping

Professor Willy Østreng, Ocean Futures, Oslo, summarized the politics of legal definitions such as the sector theory and the legal regime of the NSR. He noted the controversy over sovereignty question of the Arctic Ocean and the Russian Arctic sector claims and the politics of sea ice occupation. He further explored the question of the nature of the Arctic, i.e. it is defined as land and water, but operations are very different, and the apparent controversy over the status and definitions of ice. He concluded that this situation might call for an international law on sea ice?



Panel Discussion

Introductory notes: Björn Erlingsson, Physical Oceanographer.

Panelists: Björn Erlingsson, Stein Sandven, Mikko Niini, Willy Østremg.

The question of adequacy of current institutional setting was raised, i.e. do we need more cooperation or institutions for research and monitoring and then what kind?

- Additional research and monitoring: It was argued that what is most urgently needed today is that the focus be on economic research as none has been done as of today. Until now the primary focus has been on scientific research. Even so, there is still a need for better observing systems and networks and there is a need for field monitoring.

The ice conditions in the eastern region of the Northern Sea Route (NSR) require more monitoring. There is a need for regular ice monitoring by all Arctic States. INSORP (International Northern Sea Route Programme) concluded overall that although there was a need for more research in all fields then it is easier to overcome scientific research than social research and how it is linked. It was argued that the most under-researched factors were related to social factors.

- There is a need for intensive mapping of the economic activities (on and offshore resources) as that is what makes Arctic interested – not the ice. We do not know how much resources are contained in the Arctic region but today the economic drivers are focused on oil and gas (first Arctic Shuttle systems coming to service) and nothing will stop that development.
- It was suggested that an international conference be convened to address the ice and the need to establish a group of e.g. international ocean lawyers to work out joint position on law of sea ice. There are huge resources but the economic viability needs to be explored.
- Iceland is in an ideal location to become the Atlantic transshipment center for Trans Arctic container shipments. Iceland is in a key location to help redefine the world's trading patterns.
- Russia has traded in the NSR region with great success for over 30 years and their experience and expertise is important in developments in the Arctic.
- The economic question was raised if shipping companies are ready to take the risk on apparent high cost investments in the Arctic and if the icebreaker fees are compatible with other routes



Improved Emergency Prevention and Reaction

Oil Spill Infrastructure Challenges

Mr. Mark Meza, the U.S. Coast Guard, noted that rapid changes in Arctic environments present greater challenges for oil spill response planning and operations.

Ice coverage and scientific models consistently suggest that seasonal sea lanes through the formerly ice-locked Arctic may appear as soon as 2015. It is postulated that summertime disappearance of the Arctic sea ice could be possible by 2050 if this trend continues. Submarine data reveal a 40% decrease in arctic sea ice volume. Satellite passive microwave data since the 1970s demonstrate a decrease in sea ice extent of 3% per decade. Model data suggest that a sea ice thickness decrease of 30% and an ice volume decrease between 15% and 40% by 2050.

These changes will drive significant marine traffic development. Within five years, the Northern Sea Route (NSR, a.k.a. the Northeast Passage) will be open to non-ice strengthened vessels for at least two months each summer. Within 5-10 years, the Northwest Passage will be open to non-ice-strengthened vessels for at least one month each summer. Within 5-10 years, the Sea of Okhotsk and the Sea of Japan could potentially remain ice-free throughout the year.

Ice coverage and scientific models consistently suggest that seasonal sea lanes through the formerly ice-locked Arctic may appear as soon as 2015. It is postulated that summertime disappearance of the ice cap could be possible by 2050 if this trend continues. Submarine data reveal a 40% decrease in arctic sea ice volume. Satellite passive microwave data since the 1970s demonstrate a decrease in sea ice extent of 3% per decade. Model data suggest that a sea ice thickness decrease of 30% and an ice volume decrease between 15% and 40% by 2050.

However, in the intermediate future instead of discussing an ice-free Arctic, it should be noted that a more correct term is a navigable Arctic with ice infested waters. This rapidly changing environmental picture presents new challenges for us in oil spill response in addition to those traditionally presented by the ice and snow conditions of the Arctic. Three potential scenarios sketch these oil spill operational challenges

- Substantially increased marine traffic with increasingly larger vessels to carry the cargo sizes needed to off set the costs of ice operating ship's structures and navigational requirements.
- Substantially increased off shore petroleum and gas exploration.
- Substantially increased resource recovery from shore side and near shore environments whether this is mining for nickel or copper or refining aluminum and steel.

These scenarios and the unique response environments in which they may occur will complicate oil spill response in seven different ways as noted below:

- Weather and Ice Intervention
- Ship and Response Vessel Structures, Equipment and Operations
- Navigation



- Distance and Remoteness
- Multi Use Capabilities
- Sensors for Locating Oil
- Personnel and Training
- Multinational Agreements

Three main technological response capabilities will be applied: mechanical response, dispersant usage, and in situ burning. Each has strengths and significant weaknesses in ice and snow conditions, resulting in the need for carefully risk analysis, thorough preparedness and planning and thoughtful pre-positioning of equipment.

Accidents can be expected to increase with larger ships, more traffic and the formation of ice-channels causing aggregation of vessels (e.g. during the summer period on the NSR). Risks can be both vessel and process related for shore based or near shore resource operations. The characteristics of oil threats will change due to greater through put, year round response. Further, the remoteness mean that ships do not have the benefit of going easily to ports which calls for navigational aid in case of oil spills to navigate ships away from oil spills that are being cleaned up. Thus emergency response capacity must be increased and technology improved in view of resource development and increased shipping in the Arctic.

Monitoring of Shipping Activities in Icelandic waters

Mr. Gísli Viggósson, Icelandic Maritime Administration, gave an overview on monitoring of shipping activities in Icelandic waters and state of preparations with expected increases in traffic of cargo vessels due to new aluminum smelter operations.

In 2006, the number of tankers transiting was about 225 vessels and about 30 LNG tankers are expected to transit through Icelandic waters (Norway / USA) in 2008. In 2015 expected transit of oil (from the Murmansk region to USA) through Icelandic waters approx. 50 million tons with tankers of 100 000, 160 000 and 280 000 DWT and in 2015 up to 500 passages of fully loaded tankers per year and part of them back in ballast.

He illustrated the Automatic Identification System (AIS) coverage around Iceland and informed participants of agreement with Norway to establish a connection for mutual exchange of AIS data and data of Safe Sea Net together with weather and sea state data. Also, Denmark is interested in monitoring vessel traffic around Greenland, and in particular the strait between Greenland and Iceland. But if the AIS reception from space is to be successful, the traffic may not be too dense, which is the case in the North Atlantic Ocean.



Panel Discussions

Introductory notes: Ásgrímur L. Ásgrímsson, Icelandic Coastguard and Kristján Geirsson, Environment Agency of Iceland.

Panelists: Ásgrímur L. Ásgrímsson, Kristján Geirsson, Mark Meza, Gísli Viggósson.

Participants agreed that emergency response capacity must be increased and technology improved in view of resource development and increased shipping in the Arctic. Emergency field repairs are challenging tasks and drills that imitate real life situations are very important.

- The Arctic Council needs to take a more vigorous focus towards emergency responses and reaction in light of the Arctic Marine Shipping Assessment.
- There is an urgent need for risk analysis and common strategies and standard mechanism of operations. This calls for increased cooperation between countries in both real response circumstances and exercises. The time of response is important and to ensure the fastest response, the logistics need to be in tact such as response stations (equipment etc) and also the mobility of the equipment is important.
- Multi-national arrangements must be made with the establishment of the unified command system for response, including increased towing capacity, contingency plans, sensitivity maps, increased surveillance etc.
- There is a need to focus on the prevention question (command and control). Spill response complexity is such that there is an advantage for a number of countries to be involved. Large spills in the Arctic are likely to call on global interest and assistance.
- Do we have sufficient legislation and infrastructure to prevent and react to emergency situations relating to transarctic shipping?



The Viability of Transarctic Transportation

Legal Considerations

Dr. Douglas Brubaker, the Fridtjof Nansen Institute, discussed the Arctic Ocean Marine Routes, Arctic EEZ's and the Continental Shelf within the framework of likely changes of the juridical map of the Arctic Ocean over the next few decades. The five littoral States, Canada, Denmark/Greenland, Norway/Svalbard, Russia and the U.S. seek to extend jurisdiction on the shelf beyond the usual 200 nautical mile (nm.) limits.

Under the United Nations Convention on the Law of the Sea (UNCLOS) Article 76 and related Articles extensions will include jurisdiction over the living and nonliving resources of the seabed and subsoil; control over the emplacement of submarine cables and pipelines, control over artificial islands, installations and structures; regulation of drilling; control and prevention of marine pollution; and regulation of marine scientific research. Most of the activities associated with these rights involve the use of vessels, either as operating platforms or as carriers of cargo and passengers.

With the prospect of thinning ice cover in the central Arctic Ocean an increase in the number and variety of vessels in the region related to these purposes can be expected. UNCLOS Article 78 requires that the rights of the coastal State over the continental shelf not affect the legal status of the superjacent waters or of the air space above; and the exercise of the rights of the coastal State over the continental shelf not infringe or result in any unjustifiable interference with navigation and other rights and freedoms of other States as provided for in the UNCLOS. Vessels are currently subject to relatively few legal hindrances on the high seas in the Arctic beyond 200 nm., yet eventually they may have to comply with coastal State regulations governing the environment and safety over extended continental shelves. This is due not to UNCLOS Article 76, regulating the continental shelf, but rather due to *port State* prescriptive and enforcement *jurisdiction* under customary international law and wide jurisdictional discretion for port States under the UNCLOS.

Included, among other Articles, is UNCLOS Article 234 (unilateral pollution control in ice-covered exclusive economic zones) as well as the extensive coastal State regimes already implemented by Canada, Russia, the U.S. and recently Norway/Svalbard. It is expected Denmark/Greenland will follow suit during this period. A designation of a special area under MARPOL 73/78 prohibiting discharges of oil, hazardous chemicals and garbage on the Arctic high seas and enforced by port States may be an additional possibility.

Arctic environmental and safety standards are being developed under Article 234. Iceland may be seeing an increase in cruise and cargo ships and hence taking on additional responsibility. Iceland thus could, in cooperation with the Arctic littoral States, implement and apply Article 234, including port State jurisdiction.

The Russian link via the Northern Sea Route

Mr. Nikolay A. Monko, Federal Agency for Marine and River Transport, Ministry of Transport of the Russian Federation, informed participants that the demand for ship transport for the oil and gas operations is increasing annually. Approximately 1200 billion tons of resources are sited in the Arctic. About ½ of transport goods from western region (Barents and Kara Seas) of the NSR is oil and exploration activities are increasing. This calls for



increase in shipping with new vessels and building of icebreakers to become into operations. Transportation routes for exporting natural resources from the western region of the NSR are both to ports of north-western Europe and to local ports in Russia which are operating as both trans-shipments points and transferred through an on-land pipeline-systems.

Transport routes for exporting natural resources from the Western Region of the Russian Arctic



Transportation:

- crude oil from
 - Arkhangelsk
 - Vitino
 - Indiga
 - Varandey
 - Prirazlomnoye
 - Dikson
 - Obskaya Guba
 - nickel, copper, platinoids from Dudinka (Norilsk Nickel)
 - timber from Arkhangelsk Igarka
- Oilfields of the Western Siberia
Timano-Pechorskye oilfields
Vankorskoye oilfield

European Maritime Policy Perspective

Mr. Malcolm Colling, Maritime Policy Task Force, Directorate General for Fisheries and Maritime Affairs of EC, noted the numerous multi-lateral environmental rules and many international laws of relevance to the Arctic area. The application of integrated approach is the way forward as addressing the wide-ranging demands on the Arctic in a piecemeal fashion is more likely to lead to tensions and challenges to the currently prevailing peace and security.

The Arctic Marine Shipping Assessment is necessarily a dynamic process – not a snapshot of the here and now. The vision that the politicians are able to generate will in large part determine whether the trans-Arctic shipping routes are, or are not, optimally managed in an integrated way.

The Viability of Transarctic Nuclear Shipping

Mr. Jose Femenia, Department Head, US Merchant Marine Academy, talked about the economic and ecological question for the viability of Trans-Arctic Nuclear Shipping which could possibly be answered by a proposed Siberian Arctic Ocean Highway transportation system (Liner Service between four ports: New York, USA - Reykjavik, Iceland - Petropavlovsk, Russia - Bremerton, Washington) which has the potential for global economic and environmental benefits. For acceptance of nuclear powered ships, “cradle to grave” technical and financial security program must be established. But further economic analysis is needed!



Although attractive and appealing to many Arctic shipping must be undertaken in a manner that will result in a net benefit to world. As has been noted by numerous individuals, shipping cargoes via the Arctic Ocean will often result in shorter travel distances, reduced transit time and possibly lower costs to the consumer. These benefits have, up until recently, been out of reach due to the extent and thickness of the Arctic ice cap. In recent years world climate change has changed this situation. The ice cap has diminished in size freeing many Arctic Ocean coastal areas of multi-year ice and opening the possibility of scheduled commercial shipping, not only of oil and LNG but also line service container movements between the Atlantic and Pacific Oceans.

Iceland is in an ideal location to help redefine the world's trading patterns and become the Atlantic transshipment center for Trans Arctic container shipments.

He cautioned that simply using ice strengthened, conventional powered ships may result in significant graying of the ice cap, the consequential accelerated melting of the ice cap and long term disaster for the Arctic region. The use of nuclear power does not create emissions of particulate matter (graying) as when burning fuel oil (carbon).

Industry Perspective

Mr. Guðmundur Nikulásson, Executive Vice President, Eimskip shipping company, talked about the cost effectiveness and the viability of new shipping routes from the industry perspective. Eimskip has been using Iceland as a center point for its North Atlantic maritime system with hub to connect US/Canada services with European services. There are various connection possibilities such as between container vessels, seafood to/from North Norway via Iceland to US/Canada and US/Canada via Iceland to/from Baltic/Russia/Scandinavia and continental Europe. Infrastructure has been developed for such transshipment services. Eimskip has made huge investments in container terminals worldwide and has a fleet of larger container vessels (are not ice-classified). The main questions of economic importance for new Trans Arctic route are focused around time perspective, maximum size of vessels, shorter transshipment time.

Panel Discussions

Panelists: Lawson Brigham, Douglas Brubaker, Malcolm Colling, Jose Feminia, Guðmundur Nikulásson.

- Interface between transit speed and ice conditions – in light of thinner and weaker ice then what can we accomplish? Independently operated cargo ships in the Arctic (without icebreaker support) when adding icebreaker support the transport is likely to become uneconomic. So the question on fee structure is an important issue. It is technically feasible to do this today but not necessarily operationally (need better ice information etc.). There is an extra so called Russian risks due to unknown factors of governmental requirements, fee structures etc.
- The legal regime and requirements of UNCLOS Article 234 allows some flexibility in interpreting the definition and requirements of ice cover.
- AMSA will hold a scenarios development workshop in April 2007 to discuss plausible futures of Arctic marine transport for 2020 and 2050.
- Arctic states should continue to use the IMO for establishment of Arctic maritime standards; special Arctic traffic systems could also be established using bilateral arrangements.



- The effective network and support infrastructure of winter navigation in the Baltic Sea is a good model for regional Arctic operations.
- Arctic states have an opportunity at the end of AMSA to address the policy questions on the legal aspects of increased shipping in ice-infested waters of the Arctic.
- Arctic states could have harmonized discussion on Article 234, but this has been tried before so maybe lot of small movements towards these goals is the best way. Possibly have a forum on marine safety and environmental protection in the region. But in case of a big accident in the Arctic we can expect to see some mandatory requirements from IMO, i.e. firming up of current regulatory regime and/or standards.
- Suggestion to have a protocol under the UNCLOS for Arctic seas – Arctic coastal states have already comprehensive systems so this will not necessarily solve anything.
- The indigenous people's concerns from the sustainable development point of view must be taken into account.
- Air pollution: Do we have the technology to remove particulate matter from the exhausts of the ships? – Current systems are more for land use and have not been adjusted for the application on ships.

Transportation trends

Mr. Alfred Baird, Head, TRI Maritime Research Group, Napier University, talked about trends in container shipping and prospects for a transarctic trade route. He summarized global container traffic growth and growth forecasts, global container ship fleet trends, global container port trends and transarctic container routes. There is a massive continuing growth in container traffic expected, which calls for increased demand for more ships and ports and trends towards more transshipment.

A world trade growth and trade growth forecast is a key driver in terms of current and future development in container shipping. Of course this is also very much related to the globalization of industry, and container shipping represents one of the critical enablers of globalization. Essentially, without technological innovations like containerization, trade globalization on the current scale would never have been possible.

Shipping lines have introduced much larger capacity ships in order to handle the unprecedented cargo growth. Larger vessels also provide significant economies of scale advantages, lowering transport costs, which in turn help drive further trade developments. Rapid technological change means the life cycle of ships is shorter than ever on major trade routes, with frequent cascading of ships to secondary routes essential as new builds continue to be introduced.

Much larger ships and greater cargo volumes place added pressure on ports. In some respect there is also a life cycle for ports, as traditional ports creak under the pressure, and new ports are created, often as offshore transshipment facilities. The growth in transshipment has been phenomenal, following closely the growth in size of ship. Hub and spoke networks are now the order of the day in container shipping, and no longer is it the case that a seaport must have a large local hinterland in order to survive.

Carrier strategy in this fast moving environment involves paying close attention to optimised service networks. End-to-end, pendulum, and round-the-world service networks are offered, sometimes all three by the same operator. As ships upsize even further, we are now coming very close to the hypothesized 'necklace' concept of global hub ports at which the mega ships will call, with regional markets served by feeder ships also of large scale. But industry



developments also through up other trends as liner operators still pursue some form of differentiation, for example through complementary fast transit direct services.

Strategic canals (Suez and Panama) currently play a pivotal role in global container shipping. There will be consequences for these canals if an Arctic channel opens a new route between the Pacific and Atlantic Oceans. Northern Europe and the eastern seaboard of United States of America is where much of the consumption lies, with Asia the producer.

Container industry consolidation (amongst carriers, terminals and logistics service providers) is leading to global transport entities that control vast cargo flows and routing decisions. Perhaps the evolving global logistics corporations are the ‘new empire, and within which container hubs offer the prospect for vast added value ‘interception’ of global trade. Ultimately the immense scale and market power of global transport/logistics corporations means these decision makers are the leading entities when it comes to identifying new routing opportunities, related service networks, and optimal port and added value locations.

Arctic Shuttle Container Link from Alaska to Europe

Commissioner Mead Treadwell, Chair, U.S. Arctic Research Commission and Senior Fellow, Institute of the North, summarized the main activities on Arctic issues at the USARC and the Institute of the North. He informed participants of a Shuttle study conducted for Adak, Alaska with financial support by the State of Alaska.

- Thinning Arctic ice and increasing technological capability may allow mankind to finally rely on transarctic shipping for global commerce.
- A “shuttle” between Adak, a mid-Pacific port, and Iceland, a mid-Atlantic port, may be an appropriate realization of this opportunity.
- Dedicated icebreaking vessels would travel between ports which are near to regularly occurring trans-Atlantic and trans-Pacific service, allowing cargoes easy access between oceans in competition with Suez, Panama, and land bridges (Trans-Siberian, North American rail).

The goal of this investigation is to undertake pre-feasibility investigation of a container shipping program between Adak and an Icelandic port via the Arctic Ocean. The focus will first be on technical feasibility, then markets and organizational issues. This study will provide scenario/information to the Arctic Marine Shipping Assessment and Arctic policy makers

Aker Arctic studied two options: 750 and 5000 TEU vessels, with 815 and 5000 container capacities. The smaller vessel closely matches a new vessel, “Arctic Express,” owned by Norilsk Nickel, now in operation. The larger vessel would require longer route in deeper water but has greater efficiency. Both vessels employ “double acting” concept for ice and open water, with rotating “azipod” drive. Ice conditions were estimated for year-round operation on routes appropriate to vessel size. Port requirements, Shipping routes and timing, estimated vessel voyage times, transport capacity, Costs of service and sensitivity analysis were included in this study.

The Russian vision of a Transarctic Shuttle Route

Mr. V.V. Mihajilichenko talked about non-commercial partnership of the coordination of the Northern Sea Route usage and summarized Russian proposals for “Arctic Shuttle” project. He informed participants of a “Noncommercial Partnership of the Coordination of Northern Sea Route Usages” with the aim to improve management structure and to increase effectiveness



of Northern Sea Route usage. The Partnership's aims are to coordinate activities of its members in the sphere of effective usage of Northern Sea Route, to assist in trade navigation and in solving property, economic, technical, legal and Arctic environment protection problems.

Impact on Socio-economic Trends

Mr. Trausti Valsson, Professor of Planning, University of Iceland, noted that the Arctic sea routes are going to be the key to an extensive socio-economic development in the Arctic and Sub-Arctic regions. These sea routes are also going to have an impact on economic development on a global scale, in particular in the North Atlantic and also to a certain extent in the North Pacific.

It's well known from planning theory that on all scales the intensity of transportation has a decisive impact on where settlements and economies can prosper. The first step in visualizing where areas will get a spur to develop in the Arctic is to put the sea routes on a map.

The sea route at the Siberian coast has been kept open by Russian icebreakers for a long time. Here the size of ships has been severely constrained by narrow and shallow sounds between islands and the mainland. Reduced sea ice will make this traditional operation easier, spurring socio-economic developments in Siberia. Out of the islands there is another traditional sea route that allows large ships to operate. Also here the retreating of the sea ice is making sea traffic easier. It is this route that is going to link the areas on both sides south of the Bering Strait to areas in the North Atlantic as the Arctic Ocean opens to shipping.

On the global scale the main impact of the Arctic sea routes will be in the North Atlantic. This is because the Pacific is going to be the area where most of the global interactive economic development is going to take place in the future. This is very important for the North Atlantic space because there are already signs that the Atlantic region is falling behind the Pacific region.

The distance from Iceland to the Pacific through the Bering Strait is for instance about 3,500 nm whereas the distance from Rotterdam through the Suez Canal to Shanghai is about 9,600 nm. If ships are too large to pass the canal they have to go beyond The Cape of Good Hope in South Africa a distance of 13,900 nm. Both the Suez and Panama canals are close to their maximum capacity but modifications are planned so that a greater number and larger ships can pass them in the future.

Of course there is a long distance from the Bering Strait to today's large harbors of the Pacific space but with ever progressing global warming, areas further north in the Pacific will become more inhabitable. Some of these North Pacific areas are, surprisingly, closer to the North Atlantic space than to areas in the Southern Pacific.

In addition to the more benevolent climate in the North Atlantic and Pacific spaces these areas will get a better position in terms of economic development because of the new shipping lanes through the Arctic Ocean. Of a very significant importance is that today's sea routes in these two northern spaces are kind of "cul-de-sac"s where the areas that are placed further towards the end of these shipping lanes today get ever less important.

The Arctic sea routes could also, in the case of conflicts at sea routes in central and southern areas of the globe, become very important as sea routes "north of conflict" and thus geopolitically be routes that the world powers bordering the Arctic Ocean might want to advance.



Summary and Discussions

From the transportation perspective, Arctic Transportation is an attractive alternative to using the world's two principle canals for inter-continental movement of cargo from Northern Hemisphere manufacturing centers to consuming centers. Although attractive and appealing to many, Arctic shipping must be undertaken in a manner that will result in a net benefit to the world.

As has been noted by numerous individuals, shipping cargoes via the Arctic Ocean will often result in shorter travel distances, reduced transit time and possibly lower costs to the consumer. These benefits have, up until recently, been out of reach due to the extent and thickness of the Arctic sea ice. In recent years world climate change has changed this situation. The Arctic sea ice has diminished in size freeing many Arctic Ocean coastal areas of multi-year ice and opening the possibility of scheduled commercial shipping between the Atlantic and Pacific Oceans.

As to the three key policy issues:

- Future of research and monitoring is important component of viable, sustainable and safe shipping in the Arctic and there is a need for a more research in all fields. But focus should be now on the social factors that seem to be under-researched and no economic research has been done for the region (need for scenario development – AMSA starting this work in April).
- Emergency prevention and reaction becomes a very challenging subject if all the apparent changes will take place in the Arctic. Larger ships carrying more cargo and oil/gas cause risks to the region in addition to the inherent risk of sailing in ice-infested waters of the Arctic.
- Viability of transarctic shipping is primarily an economic question as the power of free markets with increased demand for global transport and logistics corporations are the decision makers when it comes to identifying new routing opportunities.

Following is a short summary of observations, conclusions and recommendations made by the participants:

- Fixed day arrivals on cargo need to be secured.
- Energetic pioneers in this field are needed with new investment capacities
- Working with rural indigenous populations that will be impacted, e.g. in instances of oil spills – we need to involve them more.
- Arctic shipping as a holistic operation which needs moral incentives from governments and the legal certainty is important.
- Regulatory framework must be in place regarding safety and security issues.
- Arctic area could become more densely populated within 100-200 years.
- Evolution will continue as we know today and many things have to be taken care of and will happen sooner then later.
- Pioneering shipping company to inform about the shorter Arctic routes.



- Arctic routes provide new routes to South of Asia (but a volatile region) hence will contribute to the stability of the world.
- Risk analysis and sensitive mapping are necessary; otherwise we do not know what we are going into.
- Need for common understanding of the rules of the area – universally accepted rules.
- Search and Rescue (SAR) are important and need to be reliable and ready to respond quickly.
- Arctic and the other parts of world are interacting, e.g. Persistent Organic Pollutants (POPs) ending up in the Arctic. Need for more cooperation with countries outside Arctic (e.g. Japan).
- If companies are going to invest they should be certain about the outcome. Thus there is an urgent need to solve some of the uncertainties (legal).
- Direct efforts make the Northern Sea Route (NSR) reliable in all aspects. We must take into consideration the harsh winter conditions which call for the need for reliable vessels and icebreakers. Need for special navigation service on the NSR with qualified specialists that know icebreaking in the Arctic – both an environmental and security issues.
- All measures should be taken to increase our competitive advantage within the framework of UNCLOS.
- Experimental voyages are important and insurance aspects need to be further developed and/or explored as sailing in ice is more risky.
- Safety of navigation important component. This could be further advanced by e.g. supplementary education, supporting system routing etc. which could be done within the framework of AMSA.
- So many areas under-research. But we need to get consensus on UNCLOS otherwise the Arctic region could become an area of conflict instead of area of cooperation. The NSR is defined within 200 nm but what if the route is out of the 200 nm? We have not even decided on limits of the NSR – what exactly is the outer limit of the NSR?
- Feasibility, liability and viability – there is a need to reduce the costs.
- If we want to develop Arctic shipping routes, the biggest problem is not the technical issue but rather economic and reliability issues that must address shipping.
- More research and expeditions expected during IPY (and hopefully beyond IPY).
- An academic exercise has been done to benchmark the real situation in the Arctic from the perspective of technical capabilities of the ships. To get a real full scale experience we need to start with a shipping company and a private-public partnership (benchmark the regulations etc.).
- The International Polar Year (IPY) will bring unprecedented attention to the Arctic and research conducted during IPY will add significant understanding of the changing Arctic environment.
- Noted is the international cooperation among the world's ice centers under the International Ice Charting Working Group, a body essential to the future of Arctic navigation.
- Need to better understand the merging of different regional economies (e.g. Europe/Asia).
- Governance is a big issue and we need the infrastructure in place to guide the navigators.



Chairman's Summary

The chairman's summary was presented by Mr. Ragnar Baldursson, Department of Natural Resources and Environmental Affairs, Ministry for Foreign Affairs, Iceland as follows:

Decreasing ice

- The extraordinary 50-year retreat of Arctic sea ice has increased marine access throughout the Arctic basin and coastal seas.
- There are indications that the ice is decreasing faster than previously estimated. Some specialists are predicting that the entire Arctic Ocean could be ice-free in summer (at least for a short period of time) by 2040, if not sooner.
- The Arctic Ocean will be covered by ice in the winter for foreseeable future.
- The continuing and rapid decrease in multiyear sea ice in the central Arctic Ocean will improve the possibility of marine navigation in all seasons.

New technologies

- Remote sensing provides real time information on ice coverage.
- New methods for providing real time information on ice thickness and ice ridges are being developed.
- The emergence of ice forecast services can be used for plotting sailing routes through the ice.
- A new generation of double acting Arctic ships with icebreaking capability has been developed by Aker Arctic Technology. The bow is built for navigation on open sea but the stern is used for icebreaking.
- Double acting Arctic ships navigate through ice without ice-breaker assistance using less energy than ships with traditional icebreaking design.
- A number of double acting tankers and containerships are operating in the Arctic and more are being built for Russian operators.

Environment

- Care must be taken to minimize environmental effects of increases shipping activity in the Arctic.
- The Arctic Council can play a role in reporting the potential environmental, social and economic impacts of increased Arctic marine activity within the findings of the Arctic Marine Shipping Assessment (AMSA).
- It should be considered, whether an effort should be made to get the IMO to proclaim the Arctic Ocean a Protected Sensitive Sea Areas (PSSA).
- Transarctic shipping may save energy in the future by shortening the transportation distance between major harbors in East Asian and the North Atlantic region, which would decrease greenhouse gas emissions.



- One presenter proposed the use of nuclear ships for transarctic shipping for decreasing the release of greenhouse gasses and preventing the “graying” of the ice as a result of increased traffic. Furthermore, nuclear ships would be relatively cheaper to operate in view of high and rising fuel cost. The Arctic Ocean is one ocean today where nuclear surface ships operate in all seasons.

Emergency response

- The capacity of the Arctic States for emergency response must be increased to cope with intensifying resource development and shipping in the Arctic.
- Technology must be improved with appropriate equipment, materials and sufficient towing capacity made available for various situations close to development sites and shipping routes.
- International cooperation and multi-national arrangements must be made with the establishment of a unified command system for response, including common contingency plans, the availability of sensitivity maps, increased surveillance, etc.
- The Arctic Council can play a role in coordinating response to emergencies related to the shipping through the EPPR on the basis of the Arctic Marine Shipping Assessment.

Legal issues

- While voluntary or recommended guidelines for Arctic shipping have been adopted by IMO, the movement towards mandatory rules for arctic shipping has been slow.
- International cooperation is needed for solving complicated legal issues. An international IMO convention should be developed for setting mandatory rules for Arctic Shipping. However, such a convention or set of rules will take time to evolve and will eventually require the further detailed work of the ship classification organizations.
- With increased Arctic traffic the probability of an accidents increases, which may accelerate the adoption of mandatory rules.
- Russia controls the Northern Sea Route in the Russian Exclusive Economic Zone and Russian laws apply for shipping on that route.
- Customary international laws have been developing for at least 30 years through actions of the large Arctic rim states, which have been setting their own regulatory regimes with reference to Article 234 of the Law of the Sea Convention.
- It was suggested that Iceland might cooperate with Norway and Denmark/Greenland for adopting parallel legislation for ships passing through its ports and exclusive economic zone into ice-covered waters.
- A long term vision is needed in order to avoid duplication of efforts. Addressing the demands of the Arctic in a piecemeal fashion is more likely to lead to tensions and challenges to the prevailing peace and security.

Economic Factors

- Increased shipping activity in the Arctic is presently driven by resource development.
- Many see a need for increased transportation capacity between the North Pacific and the North Atlantic Oceans with marine transportation increasing at the double the rate of world economy which has led to capacity constraints of the Panama and Suez Channels.



- The slow economic growth and stagnation of the North Atlantic economies calls for better connections with the growing economies in East- and Southeast-Asia.
- Leading shipping companies have invested heavily in present transportation routes with specially designed ships that will not be diverted into the Arctic.
- Transarctic shipping will not substitute present transportation routes, but rather supplement them by providing increased capacity for increased transportation volume.
- High investment cost for developing a new generation of icebreaking cargo ships makes it difficult for smaller shipping companies to start shipping on the transarctic route.
- The development of icebreaking commercial carriers is driven by the marine transportation requirements of oil, gas and other resources coming out of the Arctic.
- Insurance cost for arctic transportation must be decreased to make transarctic transportation economically feasible.
- Fuel prices are increasingly important for the economic viability of the transarctic route.
- Changing ice conditions may make it challenging to maintain tight transportation schedules and ensure the punctuality of certain cargoes. Enhanced monitoring, improved sea ice information and more efficient icebreaking carriers can significantly improve the situation.

Research

- More information is needed on ice conditions including seasonal and annual ice variability to increase the reliability of ice forecast and the plotting of shipping routes through the ice.
- Data from local monitoring and remote sensing must be coordinated in order to improve their interpretation.
- The International Polar Year provides an opportunity for intensified research which can support transportation development in the Arctic.
- A comprehensive feasibility study is needed to estimate the commercial viability of transarctic shipping taking into account a wide range of economic and natural variables, including vessel cost, ice conditions, sailing speed on different routes etc.
- New shipping routes and technologies should be pioneered with experimental voyages in order to gather better information on the shipping conditions and viability of new shipping routes. Russia is preparing a partnership for an experimental voyage of existing high capacity ice class container vessel or a tanker.

Security of supply

- Present transportation links between the North Atlantic and the emerging economies in the Far East are precarious.
- They are subject to delays because of accidents, mechanical breakdowns, maintenance and renovation.
- They are vulnerable to disruption because of terrorist activities, social unrest, regional conflicts and piracy.
- This carries risk for economic development at the time of global economy with production lines stretching throughout the world.



- The opening of a transarctic route would enhance economic security of the world.

Timeline

- During the coming 10 – 15 years the focus will be on the western part of the Northern Sea Route (NSR) in connection with resource development and tourist use.
- Experimental and limited transarctic commercial voyages could start during the summer navigation season within 10 – 15 years if environmental and economic trends are favorable.
- An all-year transarctic marine transportation route between the North Atlantic and the North Pacific oceans could plausibly open within three decades time depending on key security, economic and environmental change factors.
- In case of an early opening, the transarctic shipping route will probably pass through the Russian Exclusive Economic Zone part of the way, but later it may move further from the coast with decreasing ice.
- A combination of public and political support on one hand and technical and economic feasibility will be decisive in deciding the timing of the opening of the transarctic sea route.
- International cooperation for the development of transarctic shipping should include stakeholders outside of the Arctic. Chinese delegates at the conference expressed willingness to cooperate with the Arctic States in research and development of Arctic shipping.

Iceland's role

- The participants agreed in general that Iceland could play a role in the opening of a Transarctic Sea Route because of its location in middle of the Northern Atlantic.
- The new shipping routes that pass closely by Iceland (routes of commercial ships from Northwest Russia and northern Norway sailing to North America) could be linked by Iceland serving as a hub for container traffic in the northern Atlantic region.
- An Icelandic shipping company, Eimskip, expressed its intention to play a role in the opening of new shipping routes through the Arctic, using its experience and shipping network as a leading shipping company in the Northern Atlantic.
- Iceland can play leading roles in the research and practical maritime studies on the economic feasibility of future transarctic shipping routes.



BREAKING THE ICE

Annex I - Conference Agenda

March 27 - Arctic Development

9:00 - 10:00

Registration, tea and coffee

10:00

**Address by H.E. Valgerður Sverrisdóttir
Minister for Foreign Affairs**

Keynote Speech

Lawson W. Brigham

Chair of the Arctic Marine Shipping Assessment

10:40

Presentations

Ice Monitoring and Ice Decrease

Stein Sandven

The Nansen Center, Director of Special Projects

Navigation through Ice

Mikko Niini

Aker Arctic Technology

The Politics of Arctic Shipping

Willy Östreng

Ocean Futures & Centre for Advanced Study

11:40

Panel Discussion

Future research and monitoring

Opened with an introduction by Björn Erlingsson, Physical Oceanographer

Panelists: Björn Erlingsson, Stein Sandven, Mikko Niini, Willy Östreng

12:30 – 14:00

Lunch

14:00

Presentations

Emergency prevention and reaction

Mark Meza

US Coastal Guard

Monitoring of Shipping Activities in the Icelandic waters

Gísli Viggósson

Icelandic Maritime Administration



BREAKING THE ICE

15:00 – 16:00

Panel Discussion

Improved emergency prevention and reaction

Introduction by Ásgrímur L. Ásgrímsson, Icelandic Coastguard and Kristján Geirsson, Environment Agency of Iceland

Panelists: Ásgrímur L. Ásgrímsson, Kristján Geirsson, Mark Meza, Gísli Viggósson,

March 28 – Transarctic Shipping

8:30

Presentations

Legal Considerations

Douglas Brubaker
The Fridtjof Nansen Institute

The Russian link via the Northern Sea Route

*Contemporary situation on the Northern Sea Route
- Rules of navigation on NSR. Icebreaking fees*

Mr. Nikolay Monko, Federal Agency for Marine and River Transport,
Ministry of Transport of the RF: "".

European Maritime Policy Perspective

Malcolm Colling, Maritime Policy Task Force,
Directorate General for Fisheries and Maritime Affairs of EC

The Viability of Transarctic Nuclear Shipping

Jose Femenia,
Department Head, US Merchant Marine Academy

10:30 – 10:50

Coffee/Tea break

10:50 – 11:10

Industry Perspective

Guðmundur Nikulásson, Executive Vice President,
Domestic Icelandic, North Atlantic (Eimskip)

11:10

Panel Discussion

The viability of transarctic transportation

Panelists: Lawson Brigham, Douglas Brubaker, Malcolm Colling, Jose Femenia, Guðmundur Nikulásson

12:20 – 13:30

Lunch



BREAKING THE ICE

13:30

Presentations

Transportation trends

Alfred Baird

Head, TRI Maritime Research Group, Napier University

Arctic Shuttle Container Link from Alaska US to Europe

Mead Treadwell

Commissioner, US Arctic Research Commission

The Russian vision of a Transarctic Shuttle Route

V.V. Mihajilichenko

Non-commercial Partnership of the Coordination of Northern Sea Route

Usage

Impact on Socio-economic Trends

Trausti Valsson

Professor of Planning, University of Iceland

15:30 – 15:50

Coffee/Tea break

16:00 – 17:00

Summing up and discussions



BREAKING THE ICE

Annex II - List of Participants

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