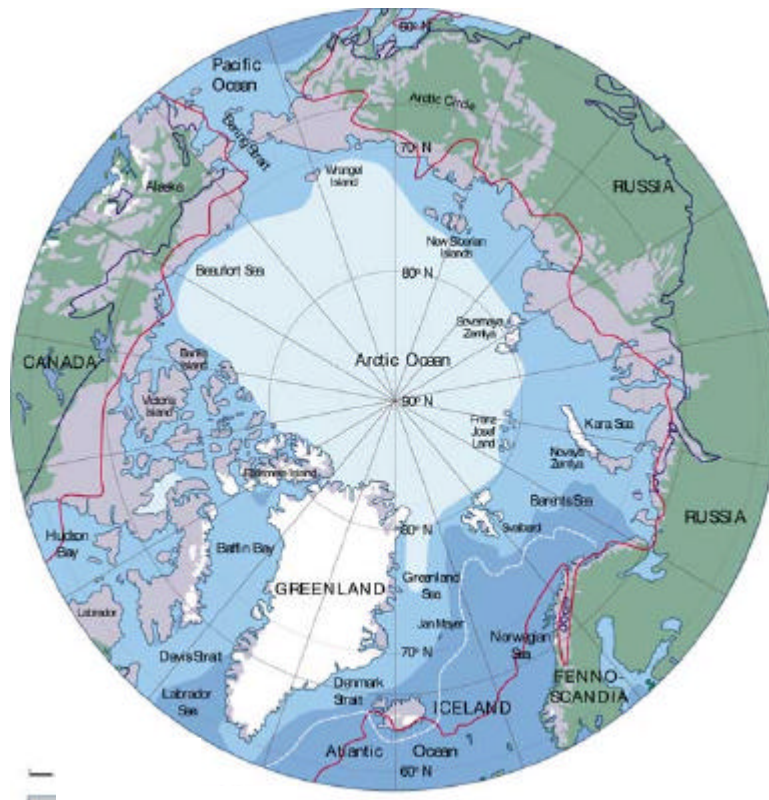


**Circumpolar Cooperation within the Arctic Council  
Concerning**

**SUSTAINABLE TRANSPORTATION AND  
DEVELOPMENT OF INFRASTRUCTURE  
IN THE ARCTIC REGIONS**



**FINAL**

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## 1. Background

The Arctic Council was founded in Ottawa in 1996 following the so-called Rovaniemi process. By approving the Arctic Environmental Protection Strategy (AEPS) in Rovaniemi, Finland, in 1991, the Rovaniemi process started an overarching international cooperation for the protection of the Arctic environment. The Council's key missions came to include the environment and sustainable development in the Arctic Regions.

Until now, the Arctic Council has addressed Arctic transportation issues only marginally. Nevertheless, the Council strongly feels that also transportation development in the Arctic must be seen in the context of sustainable development as defined first in the Brundtland Report in 1987. The Report, also known as *Our Common Future*, provided the key statement on sustainable development defining it as:

*“development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

Further in 1992, the Rio Earth Summit declared that:

*“the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.”*

In the second half of the 1990s, a resolution was prepared within the European Union for integrating the environment with transportation policy. Sustainable transportation was to be based on the OECD description and is defined as one that:

- *allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations;*
- *is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development;*
- *limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes while minimizing the impact on the use of land and the generation of noise.*

There are already considerable efforts underway by a number of parties to develop Arctic transportation and transportation infrastructure. Often these measures are associated with specific natural resources exploration and extraction activities. Improvements of transportation services and expansions of transportation infrastructure also ensure socially and economically equitable living conditions for the circumpolar peoples. As many of these developments transcend national borders, a more general dialogue between the nations has recently been sought.

After taking up the Arctic Council chairmanship in 2000, Finland has decided to bring the questions of sustainable transportation on the Council's agenda. At the same time the Finnish Chair intends to strengthen the role of the Arctic Council as the spokesman for the issues of the North and particularly those of the Arctic.

This paper addresses transportation in all its modes: road, rail, sea, and air. In the Arctic, however, transportation development is highly intertwined with the development of energy resources, including pipelines, and telecommunications. They are presented here only in

passing. At a later date, a workable scope of the transport-energy-telecom regime must be defined.

## **2. Arctic Regions**

The Arctic is not a very well-defined area as it concerns its southern boundaries. By one definition, the marine boundary of the Arctic is formed where the cool and diluted water of the Arctic Ocean meets the saltier and warmer waters of the southern oceans. That boundary ranges from 63° N – 72° N in the Canadian Archipelago and the Bering Strait. In the Norwegian and Barents Seas the boundary moves as high as 80° N.

The land area of the Arctic is a collection of mixed regions, which are characterized by the proximity to the various seas and bays forming the Arctic Ocean. Typically the land areas, classified as Arctic due to the common features such as very cold climate, sparse population and vast natural resources, extend much further south than the Arctic maritime areas. In Canada's Hudson Bay area the boundary is as far south as the 50 parallel.

In terms of regional economies and transportation systems the Arctic, including the marine areas, is composed of three or four distinct regions, which in a further analysis can be divided into smaller zones. The four major regions, defined along the geographic and political boundaries, are the following:

1. Northern Europe composed of the three Nordic countries (Finland, Norway and Sweden), which can also be termed as the Nordic Arctic. This is the smallest but the most densely populated area of all, which is also the most touched and developed by man over the centuries.
2. The Russian Arctic covering both the European and Siberian parts of North Russia. The Russian North is a very vast area, where a relatively large population is concentrated in few, but very large, cities and towns located sparsely across the area, mostly in its western parts.
3. The North American Arctic, both northern Canada and Alaska, is also a vast area and the least populated of the three Arctic land masses.
4. The North Atlantic maritime area including Iceland and Greenland is the fourth area that must be included in the analysis. This area has, however, close ties with the Nordic countries, particularly Denmark and Norway.

Interaction between the first three areas is very limited, as the national (hence cultural and institutional) and economic ties invariably go north and south. As a consequence, also the transportation connections run north and south and are often only extensions of the main national transportation networks concentrated in more southern latitudes. East-West links are weak, if they exist at all, excepting Scandinavia and the North Atlantic region.

### 2.1 Nordic Arctic

In the Nordic part of the Arctic area (Sweden, Finland and Norway) the northern counties of the Nordic countries are typical peripheral areas that are struggling economically and in many parts losing gradually jobs, services and population. As a result, the governments are trying to implement forceful regional policies, which in all the countries are aimed at maintaining the northern regions socially and economically at par with the rest of the countries. In this

respect, however, the hands of the EU country governments (Finland and Sweden) are increasingly tied, since the EU regulations forbid direct assistance if it distorts freedom of movement, competition and markets. Nevertheless, there are spots of more favorable developments and even successes, typically in university towns and in communities along the Norwegian coast.

In the Nordic countries the share of indigenous people is possibly the smallest and even they have largely been integrated in the economic and social fabric of each nation over the past centuries when the influx of more southern people has taken place. That is however not to say that there would not be conflicting interest, which affect particularly those adhering more to traditional livelihood.

The Nordic countries have one of the widest range of cross-border co-operation, which now increasingly includes also NW Russia. With the exception of Russia, transportation connections between the countries are good and crossing borders is very easy.

For historic reasons the transportation systems of the Nordic countries are seen as integral parts of the national networks. Therefore, the network of roads, railways, seaports and airports is dense relative to the population, the quality of infrastructure is good and it is well-maintained. National/regional equality dictates that a bulk of (public) transportation services are run on subsidies due to low passenger/freight flows.

In the past couple of decades, vast oil and natural gas resources have been put to production offshore the Norwegian coast. Further development of production fields northwards, as well as the utilization of marine resources, will gradually change the demand for transportation also in the Arctic part of the region.

## 2.2 Russian Arctic

The Russian northern regions are characterized by isolated centers of population built often on a single mineral field. Development has largely taken place during the Soviet times by massive transfers of people to the northern mineral rich regions, partly forcefully and partly using considerable economic incentives. Invariably these towns have large populations running in hundreds of thousands of people and exceeding well the sizes of the cities and towns in other similar regions. Only a few major cities have a longer history of existence. Outside these urban centers, rural areas are nearly vacant, populated only sparsely by indigenous peoples. Local native peoples have had little involvement in the above described process.

Russian northern towns, relatively prosperous during the Soviet times, have suffered heavily from the economic decline of the 1990s. Many towns largely lost their economic bases, and at the same time lost all other preferential treatments including higher than average wages. Only a few oil producing regions have fared comparatively well, such as Tyumen in West Siberia. Also some more centrally located areas can do better. An example is Murmansk, which is managing due to the major seaport and production of goods (metals, minerals, fish) for the world market. Many other regions have stayed stagnant and ranking low even among the other Russian regions. Some mining towns are doing particularly poorly due to current difficulties in getting their produce to markets. A major reason has been the rapidly increasing cost of transportation, which has eroded competitiveness and job opportunities in northern communities in general.

The existing transportation infrastructure in the Russian North reflects the historic St. Petersburg / Moscow centered governance. This has later been reinforced by the Soviet style production system comprising mostly the exploitation of its resources in the North. An important development factor has been the needs of national defense.

Today, available transportation services do not meet adequately the demands of the new market economy and changed patterns of trade. Much of the existing system of railways, seaports and airports is under-utilized and lacking maintenance. New investments are difficult to justify, if they are not directly catering to natural resources extraction (oil, gas, minerals and timber).

## 2.3 North American Arctic

### 2.3.1 Alaska

In Alaska the last century saw a vast increase in human activities in the Arctic driven mainly by technological capability and strategic/military, and economic/natural resource exploitation needs. A large influx of non-indigenous people to the region was accompanied by the development of infrastructure to provide access/transportation, to sustain the military/industrial activities and to support the required living conditions for the new populations. Thus, often with great urgency, an infrastructure was developed to suit particular needs of the time, without the necessary planning to achieve the best possible solutions, nor the integration of the existing Arctic native populations. To wit, urban centers only a few decades old have emerged as major hubs of human activity, while villages that sustained Arctic Natives for centuries or more have been abandoned. Furthermore, the existing infrastructure is reaching the end of its useful life in many instances and is in dire need of costly maintenance or replacement.

National policies for the support of arctic infrastructure have shifted greatly, from high priority strategic/military spending to commercial investment in exploitation of natural resources. In either case, the magnitude, timing, and terms of investment are often beyond the control of the Arctic regional political and economical entities. Any return in taxes from the private sector to the regional entities can vary widely with world market prices for commodities.

### 2.3.2 Canada

The 93,000 people of Canada's North populate a very large land mass encompassing the Yukon, the Northwest Territories, and Nunavut. These areas comprise 40% of Canada's land mass or roughly 4 million square kilometers. The 46,500 indigenous peoples living in the North make up between 17-90% of the population in the various territories/regions, and include the Inuit, First Nations and Metis. The amount of territory, particularly coastline, the wide range of environmental conditions, and the dispersion of communities present great challenges to development.

The Canadian Arctic can be divided into two regions from a transportation network perspective, the Western Arctic and Eastern Arctic. Of the two regions the Western Arctic has the most developed transportation network which includes all weather roads, seasonal winter roads, railway, air and marine service; in addition, the Mackenzie River serves as a fairly important transport corridor for barge traffic. However, the majority of communities in the Western Arctic do not have year-round road access.

Transportation in the Eastern Arctic is primarily by air which is the life line to the south in the winter months. There is no road system in Nunavut between communities. The supply of large goods and bulk commodities is transported primarily by ship during the summer ice-free period, while smaller freight, passengers and fresh commodities are transported year round by air. Travel between northern communities is carried out by scheduled air service and charter air services of smaller carriers; this is becoming increasingly difficult due to costs. In addition, most communities have a local network of roads for commuting purposes.

Policy development and service delivery in the Arctic is a result of consultation and cooperation between the federal government, territorial/provincial governments, and private industry. Within this process indigenous groups play a considerable role.

Infrastructure conditions vary by region; in the Western Arctic the road system is increasingly in need of maintenance and/or repairs, partly due to increased heavy traffic. In the Eastern Arctic, where marine resupply is heavily relied upon, infrastructure and resupply systems have developed significantly in the past several decades. However, infrastructure (e.g. ports, docks) is basic in all but a few communities.

### **3. Arctic Transportation Systems**

The Arctic transportation network is not a single system but rather a collection of systems, which are isolated from each other either by geography or purpose. Transportation of hydrocarbons, other natural resources, and supplies dominate the volumes.

All the modes of transportation: sea, air, road, rail and pipelines are represented, but in very different ways and proportions than in more densely populated areas. With the exception of a limited number of high volume, special purpose transportation connections, the flows of freight and passengers are generally low and present constant problems to the viability of existing services and particularly the feasibility of new investments.

Applications of information and telecommunications technology are potentially more important for the Arctic than the more densely populated areas. As information technology becomes more integrated in the Arctic transportation solution, even the most remote communities have a chance to provide equitable and affordable access to the services and information that are at the disposal of people in more centrally located regions.

#### **3.1 Modes of transportation**

Only few seaports in the Arctic feature high transportation volumes in comparison with more southern areas. They include Murmansk and Dudinka in Russia, Narvik in Scandinavia, Valdez in Alaska, and Churchill in Canada. These ports are used almost solely for shipping of raw materials to main production and consumption centers and are connected with their hinterlands, often only a single mine or oil field, with a heavy rail connection or a pipeline.

There are also smaller ports, typically in Scandinavia, which provide more variable port services, including passenger service and fishing ports, but they are more local in nature and volumes of freight are low.

More recently, construction of new single-purpose seaports can be seen increasing in areas like Norway and Russia due to the transportation needs associated with large scale oil and gas field development.

Railways are very few besides the special purpose ones feeding to the few seaports. Only in NW Russia the railways are still the dominant transportation mode and the backbone of the entire transportation system. Nevertheless, in most places railways are still seen as an important means of communications and plans for new uses or construction of entirely new railways have been proposed at least in Scandinavia, Alaska and Russia.

Road networks are sparse and well-paved roads can be found mainly in more populated areas. Roads cater generally to local needs and are not used much for inter-regional transport, except in Scandinavia. Outside Scandinavia good roads are few. High standard motorways are located only in the vicinity of few urban centers. As roads are essential to modern transportation systems, the networks of roads are expanding in all the regions. Particularly local roads and the field road networks of the natural resource areas are constantly encroaching in new areas.

Air transportation is very important for the Arctic region due to long distances between the destinations. This is particularly true in North America as other modes are few. Canada's Eastern Arctic relies almost entirely on air services in its everyday supplies. Traditionally also Russia has depended heavily on air transportation, but the previously extensive regional and national air services have considerably declined in the 1990s. In the Nordic countries the good road network reduces the need for local air service, but at the national level airlines are indispensable.

The Arctic aviation has three very distinct operation environments:

1. Regional and inter-regional air services in the northern and Arctic areas
2. National services connecting the northern population centers with national centers
3. Intercontinental flights that actually only traverse the Arctic

Regional and intercontinental aviation represent the highly different ends of the spectrum. Intercontinental flights, carrying cargo particularly, are growing fast and seeking new routes. The Arctic is in the cross-roads of the three major economic areas of the world: the EU, North America and Japan. The shortest air routes between them run over the Arctic, which puts pressure on air space as well as creates need for expanding air traffic control facilities on land.

Regional and inter-regional air services are suffering from low passenger flows and shortage of revenues. In order to survive, regional aviation will need new initiatives, operation models and adoption of modern technologies. Among others, application of global satellite navigation systems is called for, such as the GPS is used in the U.S. CAPSTONE project in Alaska.

Pipelines are common and an important means of transportation in the Arctic regions. Often pipelines are in a sense similar to intercontinental flights, as they traverse the area connecting the oil and natural gas fields with centers of consumption outside the region. In some areas, however, pipelines are more local in nature, as they connect the Arctic hydrocarbon fields directly with onshore power plants, refineries and transshipment terminals.



### 3.2 Dependency of the Arctic from other regions

A specific feature of the Arctic transportation systems is that they can be seen functionally as parts of each national system, which are mainly located outside the Arctic areas. In a wider context also other linkages are easy to point out:

- From the transportation operations point of view the Nordic Arctic, the Baltic Sea area and the North Sea can be seen as a more or less connected transportation market. E.g. the huge oil and gas developments in the Barents and Pechora Seas will require a year round maritime supply chain based on the ports of the Kola Peninsula and the coast of Northern Norway. The maritime transportation in this chain is likely to be carried out by vessels of various quality.
- The Russian Arctic in the European part displays similar dependencies. The development of the oil ports in the Baltic Sea and pipelines from the North of Russia to Baltic Sea only strengthen these functional ties in the coming years. The same is true with the planned oil ports in the Barents, Pechora and Kara regions as they at least partially feed to the major North Sea oil ports and refineries.
- Canadian Eastern Arctic marine transportation is part of the larger national system; vessels used in southern operation during winter months ply Arctic waters from June to October. Western Canada road and rail systems are primarily oriented north-south, connecting with the national network. Regular air service, particularly critical in Nunavut, also operates on a north-south axis, connecting northern communities with southern supply and population centers. Almost everything consumed in the Canadian Arctic comes from elsewhere. The cost and availability of transportation is thus the main factor determining development.
- Since the end of the cold war, the Siberia/Russian Far East (RFE) Arctic region has developed significant transportation links with Alaska. These are primarily aviation links connecting major cities in the RFE with Alaska for development of trade and commerce, exploration and development of natural resources, health and social sciences, and humanitarian purposes. Not insignificant are the expanding aviation links, including development of new air routes and airports in the RFE to support visa free travel of the indigenous peoples of Chukotka Region of Russia and Northwestern Alaska.

## **4. Needs and Challenges**

The Arctic cannot be protected fully from the current developments taking place globally. A variety of changes ranging from the rapidly evolving patterns of international trade to information society to warming of climate underpin the more direct driving forces that cause traffic either to grow or to decline. In areas where the need of wider access or pressures of personal and goods movements increase, the need to post limits and mitigate impacts also grow stronger. The challenge is in creating a proper framework for identifying and evaluating the trade-offs in a rational way often in politically and emotionally charged situations.

### 4.1 Global changes

Global changes will not leave the Arctic untouched in spite of its relative remoteness. On the contrary, the climate change will be the most pronounced in the northern latitudes of the

globe and is assumed to raise the annual average temperatures by several degrees. Whether this will impact transportation in the region is unclear. However, it can be envisioned that climate change could bring about prolonged shipping seasons and possible increases in shipping through the main maritime routes such as the Northwest Passage. Certainly warming temperatures will create problems for the existing infrastructure in the areas of permafrost, and have also implications for ice road systems across the Arctic. Considerable restructuring and rebuilding of transportation facilities will eventually be needed. For investigating the potential effects of climate change the Arctic Council has recently established the Arctic Climate Impact Assessment task force with a work agenda until 2004. The task force will publish an interim paper this year.

Strong demand for energy in Europe and the US seems to notch up gradually the world market prices to the levels that extraction of crude oil and natural gas becomes attractive also in the less hospitable parts of the Arctic. In the next decade or so, this is likely to be the single most forceful factor shaping transportation and its infrastructure in the Arctic.

The catch words of the 1990's have been globalization, opening of all possible markets to competition and entry of the information society. Also rapidly evolving e-commerce, be it business-to-business or business-to-consumer, is linked with these developments. In this process speed and cheap access are increasingly important, as companies resort more and more to outsourcing in the global scale. One consequence is that goods transportation is increasing and logistics is becoming more and more important.

These changes can be seen as shifts between shipment sizes, selection of routes and transportation modes. Obvious beneficiaries are polar air routes between North America, Europe, and Far East. A number of transit ATS routes linking North America with the Far East as well as South and South East Asia through the Russian airspace were established in 2001 within the framework of ICAO. These routes, which are available for regular use, are attracting considerable interest. Additional bilateral agreements to equip and open up new and much shorter flight corridors across Canada and Russia have also been reached.

Furthermore, it is estimated that 80% of the world trade in future will take place through the use of containers. Russia is far behind in these figures. Taking into account the restrictions on sea transport in alternative routes, such as the Bosphorus Strait, a large part of the growing demand must be met in the northern ports.

#### 4.2 Driving forces

Global changes are the root of two categories of forces, external and internal, that have distinctly different rationale for transportation and transportation investments in the Arctic. The needs coming from outside the area are by far the strongest. External factors are typically deriving from the development of either new natural resource deposits or new transportation routes. Owners and beneficiaries of the projects come from more populated areas well outside the Arctic areas. The driving forces of transportation development can be broadly classified as follows:

1. Exploration and extraction of natural resources, particularly crude oil and natural gas onshore and offshore the coastline of the Arctic Ocean, which invariably necessitates accessing virgin areas and eventually result in heavy construction of transportation facilities. For example, the foreseen increase in transport demand will create the Northern Maritime Corridor as an international transport alternative between western mar-

kets, Northern Norway and North West Russia. In the long run, this will enhance the eventual use of the entire Northwest Passage.

2. Transiting the region by air, namely polar flights, which are currently subject to intense negotiations between the governments.
3. Transiting the region by sea, such as the Northern Sea Route from the Barents Sea to the Bering Strait, or the use of Hudson Bay seaports (Churchill) for trade between North America and Russia are the types of projects that are now being explored.
4. Major new land connections (road and rail) in east-west (sometimes north-south) direction. Currently there are modest projects underway between the Nordic countries and Russia, as well as a rail line under consideration from Canada to the lower United States. Very large scale schemes, such as rail connections between Russia and Japan and across the Bering Strait from Russia to Alaska, have recently been proposed but are likely to be realized only in a very distant future.
5. Emergence of large scale tourism in some regions, such as increasing of cruising activity in the Arctic waters or spreading of ski resorts in Lapland of the Nordic countries.

Internal forces for transportation development are more subdued; for one, as none of the regions is facing a strong population growth, rather in many areas a decline is evident. The forces are nevertheless there:

1. Changes of lifestyle and increase of living standard.
2. Commercialization of traditional food production; fish farming in Norway and reindeer herding in other Nordic countries which will depend increasingly on fast and reliable transportation connections to their southern markets.
3. More extensive and efficient utilization of existing natural resources, such as timber harvesting which has necessitated the building of extensive networks of forestry roads in previously inaccessible areas.
4. Regional policies which try to guarantee equal services even in the most remote areas of the countries.

#### 4.3 Non-transportation issues

Stable political and regulatory infrastructures are prerequisites for sustainable development. Among others, support for the IMO Guidelines for Arctic Shipping, including use of qualified crews and a set of uniform rules for the construction and operation of ships in ice-covered waters, is essential to instill confidence in shipowners and to lower insurance rates, two major obstacles for further development.

In addition, there are several administrative and institutional factors that strongly influence future trends in transportation in the Arctic. The two most difficult issues that frequently are cropping up are the following:

- Customs procedures have grown into a considerable problem, which hinder the regular transportation of goods and people particularly between the EU and Russian Arctic areas.
- Subsidies are subject to constant debate when preparing northern transportation policies at least in the Nordic countries and possibly in Russia. This is an issue concerning all the modes of transportation. An example is regional air services in the Nordic countries, which are currently scarce. Locally the solution is considered to lie in national subsidies, which however are contrary to the current EU regulations.

#### 4.4 Problem statement

Most parties seem to agree that the intrusion of traffic and new infrastructure in the Arctic must be seen in the context of sustainable transport. To this end, the objectives of sustainable arctic transportation flow naturally from the background description above suggesting that the Arctic Council, particularly its working groups addressing transportation issues, take up measures and promote practices which:

- pay particular attention to environmental concerns, be it locally, regionally, nationally or globally;
- promote the development, dissemination and use of sound and environmentally friendly practices of design, construction and operation of arctic transportation facilities, and
- in the end, will guarantee the perpetual use of the transportation system and services in a sustainable way.

Here we are, after all, faced with a traditional transportation planning dilemma, albeit with opposing views frequently wide apart. On one hand, the measures to improve transportation services and infrastructure in the Arctic clearly coincide with the Arctic Council objectives, as they support economic, social and cultural well-being of the Arctic peoples and regions. But at the same time, these measures will invariably pose a threat to the Arctic nature and the way of life.

At the moment, there is no tested model for carrying out a sustainability analysis in the sense depicted above; nor have we any good understanding of the changing patterns and needs of transportation in the more global sense.

A separate problem is that, excepting a few major natural resource haulages, practically all flows of transported people and goods are very modest, hardly providing economic justification for new investments. Public transportation development, and even maintaining existing services, must frequently be based on considerations which are political in nature.

### **5. Goals and objectives**

There are a few key documents which outline the policies as well as measures proposed and implemented by the countries and other entities in the region. Extracts concerning the Arctic transportation are presented in the following paragraphs.

#### 5.1 EU Commission on Northern Dimension

At the request of the Helsinki European Council, December 1999, the EU Commission was invited to prepare an Action Plan for the Northern Dimension. In February 2000, a working document was produced for “Action Plan for the Northern Dimension in the external and cross-border policies of the European Union 2000-2003”. In June 2000, the Action Plan was endorsed by the Feira European Council. The Action Plan contains the following:

Situation. A number of factors are unique to the region: demands of winter transportation (use of ice-breakers, expensive road maintenance etc.), long EU external frontiers and associated customs procedures, and the proximity of the Arctic and sub-Arctic areas which means

high logistics costs to industry. TACIS, ISPA, INTERREG and the TEN-transportation budget, provide support for feasibility, environmental and financial studies and for infrastructure at border crossings on EU territory. They also co-finance investments with the EIB and IFIs.

Objectives. The development of the region's transportation infrastructure and services is central to the development of the economy in general. The overarching objective is to promote the development of a multi-modal transportation system improving connections within the region and with neighboring EU States. This includes development of Trans-European transportation networks (TEN) on EU territory, the extension of the TENs towards the acceding countries (TINA network) and the implementation of Pan-European Transport Corridors and Areas in adjacent countries, including the Barents Euro-Arctic Transport Area.

Cooperation with Russia in the transportation sector is also envisaged under the PCA (Art. 70), and in Articles 39.3 and 40 on 'Cross-border supply of services'. TACIS assistance will focus on the maintenance of available freight infrastructure and the improvement of its productivity with particular emphasis on the Trans-European Networks and inter-modal transport.

Actions. Priority areas of action concern:

- Further development of guidelines for the TEN, including the special investment project "Nordic Triangle" and its extension to the EEA and the Northern Sea route.
- Planning and construction of Pan-European Transport Corridors and Areas in particular corridors I, IX and the Barents Euro-Arctic Transport Area (BEATA), each with a steering committee and action plan. The Commission is actively involved in this work.
- The elimination of bottlenecks at border crossings, the improvement of safety record in all transportation modes and the harmonization of transportation legislation and regulations on the basis of international agreements.
- In the framework of the Accession Partnerships initiatives aim to improve transportation planning in the border regions (e.g. links between public transportation systems). Also foreseen are joint feasibility studies for the modernization of existing infrastructure (e.g. border crossings, port facilities, connecting roads of regional importance), and improvements and innovations in transport-related services (e.g. common telecom and translation facilities for small and medium-sized transportation operators).

## 5.2 Russia's EU strategy 2000-2010

In October 1999, Russia issued its own strategy of the Russia-EU relations for 2000-2010. The strategy is based on the Partnership and Cooperation Agreement (PCA) of 1994 and does not explicitly deal with the issues of Arctic transportation. Nevertheless, the strategy mentions Northern Dimension as a possible framework for regional and cross-border cooperation. In the Russian view, the Northern Dimension should not only be focused on exploitation of natural resources, but also contribute to the development of the regions of NW Russia.

In the strategy Russia promises to assist the EU in finding solutions for Europe's long-term fuel and raw material supply problems, among other things, by integrating Russia's transportation, pipeline, power and telecommunications networks with those of the EU. The strategy mentions projects such as the Yamal – Western Europe gas pipeline and its branches to Scan-

dinavia, and the Pan-European transport corridors. The broader focus is on the Euro-Asian transport corridors, particularly how to link the Trans-Siberian transportation corridor (railway) with the EU supported transportation corridors no 1, 2 and 9.

The strategy recommends the EU companies to start large investment projects for developing oil and gas fields and energy transportation systems in Russia. The EU Tacis program is expected to support foreign investments and the participation of the EIB in Russia is particularly hoped for.

For the economic benefit of Russia it is found necessary to cooperate in drafting transportation policies, adopting new technologies in transportation, approximating legal frameworks and simplifying border formalities.

### 5.3 Northern Dimension of Canada's Foreign Policy

In June 2000, Canada announced its new northern policy specifically aimed at circumpolar affairs: "The Northern Dimension of Canada's Foreign Policy" (NDFP). The rationale for the renewed Policy flows from the fact that the circumpolar world was long a front line in the Cold War, but recent trends and developments have created new challenges and opportunities. The challenges are seen to take the shape of trans-boundary environmental threats, while the opportunities are in the areas of sustainable economic development and circumpolar cooperation.

The NDFP of Canada is aimed at four long-term objectives: enhancing the security and prosperity of Northern Canadians; asserting and ensuring the preservation of Canadian sovereignty in the North; establishing the circumpolar region as a vibrant entity integrated in a rules-based international system; and promoting the human security of Northerners and sustainable development of the Arctic. These objectives are being pursued through four priority areas for action over the next several years:

- Strengthening and promoting the central place of the Arctic Council in circumpolar relations and policy coordination.
- Helping to establish a University of the Arctic.
- Assisting Russia in addressing its northern challenges.
- Developing sustainable economic opportunities and trade across the circumpolar region.

The issues of Arctic transportation are addressed principally in the last item above, as the development of economic opportunities will require, among other things, the following:

- Discussions within the Arctic Council regarding the expansion of circumpolar transportation infrastructures and reduction of transportation costs. The Policy singles out the following project proposals:
  - Arctic bridge
  - Polar air routes
  - Intra-Arctic shipping
- Greater participation of Northern businesses in international trade and work with Arctic Council partners to facilitate trade and investment flows in the circumpolar region.
- The promotion of ecological and cultural tourism, in cooperation with territorial governments.

Canada has allocated CAD 10 million for the 2002-2005 period for the implementation of the NDPF.

#### 5.4 Northern Europe Initiative of the US

In August 2000, President Clinton signed an act "Cross-Border Cooperation and Environmental Safety in Northern Europe Act of 2000", which will allocate at least four million dollars in FY 2001 for projects of the Northern Europe Initiative (NEI). The NEI is primarily directed at the three Baltic States focusing on projects which emphasize the protection of the environment. In addition, the risks of nuclear waste in the Murmansk area of Russia are particularly singled out. The Act mentions the Northern Dimension of the EU as the primary form of cooperation which is then supplemented by the NEI.

### **6. Activities underway**

International cooperation in Arctic transportation has mostly related to marine activities in resupply or R&D projects. Dominant part of the cooperation is being carried out between private companies in connection of natural resources development. Increasingly also public sector, particularly the governments, are intensifying their cooperation either through already established international organizations or specific agreements of cooperation. An example of international efforts is the development of marine guidelines, which is done either by the PAME Working Group (Offshore and the proposed Oil Transfer Guidelines) or under the auspices of the IMO (Arctic Shipping Guidelines).

#### 6.1 Europe and Northwest Russia

In the European and Northwest Russian northern areas many of the initiatives are politically driven, which include the Northern Dimension, the Barents Euro-Arctic Council and the Regional Council, which are established more or less under the auspices of the EU-Russian cooperation framework. The forums of these sort have often fixed organizational arrangements in the form of rotating chairmanships, rotating/permanent secretariats and limited memberships.

More specific international co-operation for developing transportation and transportation infrastructure in the European and Russian Arctic areas is composed of the following:

- Barents Euro-Arctic Transport Area (BEATA) is an EU initiated joint effort between Norway, Sweden, Finland and Russia focusing on improving road, rail, airport and seaport infrastructure in the region. The BEATA co-operation was established in 1997. The BEATA backbone network for transportation was defined in 1999.
- ARCDEV, an EU sponsored project, and INSROP, a joint Norwegian, Russian and Japanese project, carried out scientific studies in the Northeast passage in the 1990s.
- The new ARCOP is intended to follow up on ARCDEV and INSROP projects. ARCOP will be an EU sponsored research project for exploring the issues and possibilities of waterborne transportation operations in the "Northern Sea Route".

There has been considerable activity and co-operation in developing east-west transportation links on land (road and rail) at the Russian border with Norway and Finland. Concrete results are not extensive so far: a couple of border crossings and some new (gravel) roads. Never-

theless, these improvements, while less costly and glamorous, are important for the regional coherence, trade and cultural exchange.

In addition, there are local activities to develop ground infrastructure servicing international polar air routes. A particular effort is focused on cargo flights which might utilize the not congested northern and arctic airspace and establish air cargo hubs in the region for further intercontinental haulage and distribution. A recent example of this is the Luleå airport in Sweden.

In the European Arctic there are also other major projects that impact the EU as well as Russian Arctic areas. The main projects are:

- The Baltic Pipeline System from the Pechora Region (Russia) to the Gulf of Finland (Baltic Sea), which is currently being studied by large western and Russian oil end energy companies.
- The proposed natural gas pipeline from the Russian sector of the Barents Sea to Central Europe, which is likely to be constructed only when the demand for energy in Europe will justify it.
- Transportation infrastructure development programs in the Baltic Sea area, such as the construction of the new Primorsk oil port near St. Petersburg, will influence freight flows and routes to/from northern Russia.
- A crude oil loading terminal in the Pechora Sea aiming at serving the onshore and offshore fields in Timan-Pechora Area.
- The Linnihammari transshipment terminal and refining complex in the Pechenga fjord
- The LNG-terminal at Hammerfest serving the “Snøwhit” field and adjacent gas fields.

## 6.2 North America

Canada and the US have vital interests in the entire Arctic and there are a number of major projects being investigated jointly. Some North American examples would be:

- Logistic support and cooperation through Canada’s Polar Continental Shelf Project
- SHEBA-JOIS project (Surface Heat Budget of the Arctic Ocean/Joint Ocean Ice Study)
- Pacer Goose Operation (annual resupply of U.S. base in Thule)
- USCGC Healey Arctic Ship Technology R&D Program
- Several other marine R&D projects with Russia, Finland, Sweden, and the U.S.

In Canada resource extraction such as mining provides impetus to many transportation initiatives; for example, the general increase in activity in the Canadian Arctic can partly be attributed to diamond mining. Furthermore, there are several proposals currently to improve transportation ties between various parts of the Canadian Arctic:

- The Keewatin Transportation/Power Corridor, linking the Keewatin region of Nunavut with Manitoba. This would make mining in the area economic.
- The Highway Investment Strategy in the Western Arctic, to improve the road system.
- Improving port facilities at Bathurst Inlet to facilitate resource extraction in Slave Geologic Province is also being studied.
- The possibility of new road corridors connecting the Western Arctic to the Arctic Ocean is also being studied.
- The Mackenzie Valley Transportation Corridor is another proposal, which would follow the proposed natural gas pipeline bringing gas to southern markets. A further



pipeline, known as the “over-the-top” route, bringing natural gas from Alaska to join the Mackenzie Valley Pipeline, is also under proposal. Another possibility is the Alaska Highway pipeline, which would carry Alaskan and Yukon natural gas to points south.

- The port of Churchill, Manitoba, has seen considerable growth recently in cargo traffic, looks to increase its share of grain shipments, and acts as the gateway for the Arctic Bridge initiative with the Russian Federation.

In Alaska there are projects that impact also Russia, Canada and potentially other Arctic nations. These include:

- Collaboration on airport management and development
- Addressing market economy and environmental concerns
- Development of the supporting airport infrastructure in the Russian Arctic associated with operations on transpolar routes
- Cooperation between the US, Canada, and Russia on Arctic search and rescue
- Development of small aviation companies to provide more affordable and reliable air service to remote villages of the Russian Far East (RFE)
- Development of low level VFR routes for use by general aviation between Alaska and the RFE

A specific project proposed by Alaska concerns Aviation Infrastructure, namely the US CAPSTONE initiative currently under demonstration in Alaska. The CAPSTONE program is a joint industry and FAA Alaskan Region effort to improve aviation safety and efficiency by putting cost effective, new technology aviation avionics equipment into aircraft and providing the supporting ground infrastructure. Using space-based technology, such as GPS and data link, CAPSTONE is particularly efficient and transferable to non-radar environments such as exist throughout much of the Arctic. CAPSTONE has increased the number of airports served by IFR approaches and now enables radar-like IFR air traffic control services in a non-radar environment.

In the political side the most advanced and fruitful have been the negotiations and accomplishments under the US/RFE Ad Hoc Working Group (formerly Gore/Chernomyrdin AHWG) in restoring and building aviation links between the US West Coast (including Alaska) and the Russian Far East.

## **7. New needs**

### 7.1 Prospects for resource exploration and production

The exploitation of natural resources in the Arctic, primarily various mining operations, started already in the 19<sup>th</sup> century. Early 20<sup>th</sup> century, large mines were opened in the Scandinavian countries, many of which are still operating. In the past decades, the activity has been most pronounced in Russia and Canada and, particularly in Russia, large mines were opened even in the most remote areas. Now the Russian mines are suffering from a drop of domestic demand, difficulties in exports, and increasing transportation costs. Canada has several potential mining sites, but their development is often being hampered by local opposition.

While mining is important, the high level of exploration activity started anew only after finding the Arctic hydrocarbon deposits. The first Arctic oil field was opened in Alaska in the

1980s. In the subsequent decades interest waned away due to weakness of crude oil prices. The 21<sup>st</sup> century has brought again high oil prices making the Arctic oil and natural gas production feasible once more.

Alaska has about 24% of the US oil reserves. There are two main production regions in the area: Cook Inlet and Pruhoe Bay (North Slope). Currently new fields are being developed in Prudhoe Bay. Future development is expected in the Alaskan National Petroleum Reserve and the Arctic National Wild Life Refuge areas.

Northern Canada has several potential oil and gas fields. The current production area is located offshore Newfoundland, where additional fields are being developed. Other areas, which have been subject to extensive exploration activity during the past decades are: Mackenzie Valley and Delta, Arctic Islands (Nunavut) and Labrador. Due to extremely difficult conditions and lack of transportation infrastructure the identified fields have been developed only limitedly or not at all.

Both in West and East Greenland seismic studies have been carried out. These are expected to be potential production areas, where conditions are easier than in Northern Canada.

The Russian Arctic areas possess extensive hydrocarbon deposits, most of which are only now being brought to production. After decades of exploration the first field opened to production in Sakhalin as recently as 1999. Other fields will follow in 2001. In the second major region of Yamal Peninsula and Ob River Estuary vast natural gas deposits are already past their production peak. New fields are being now developed. These gas deposits contain also large volumes of condensates, which have been difficult to ship out to markets. The third major area in the Russian Arctic is Timan-Pechora, where production is growing fast and exceeded 10 million tons in 2000. Offshore there is the Barents and Pechora Sea continental shelf, which have considerable potential for hydrocarbon production. The first production licenses were granted there in 2000.

## 7.2 Transportation needs

There is no comprehensive forecast of traffic demand in the Arctic region, which any rational policies or program/project decisions can be based on. What can, however, be said is that the future development of the transportation infrastructure in the Arctic areas depends, first of all, on the exploration and extraction of natural resources, which is always taking place in a large scale. Other developments of transportation that touch the region heavily will be transit needs both by air and sea, as well as tourism, which each have quite different impacts.

In the Barents Sea Region, transportation connections are believed to develop within the following frameworks:

- Northern Maritime Corridor, that is the western stretch of the Northern Sea Route, including the offshore loading and land-based transshipment facilities for crude oil produced in Northwestern Russia.
- New land connections (roads and railways) between northern Scandinavia and Russia (BEATA)
- Baltic Pipeline Project connecting the oil production regions in the Northern Russia with a port in the Gulf of Finland.
- Proposed natural gas pipeline from the Barents Sea (Russian sector) to Central Europe probably through Karelia and along the Baltic Sea bottom.

- Increase of air traffic, particularly intercontinental flights, over the polar region.
- Development of regional air services, which presently barely exists due to low passenger volumes and high costs.

Related, non-infrastructure problems in the Barents Region are the following, where constant focus on improvements are needed:

- Customs procedures
- Administration of the Northern Sea Route
- Vessel fleet and icebreaker services will need strengthening

As to the Canadian Arctic, the transportation framework will continue to follow a largely north-south axis. However, some changes can be expected such as:

- The increase in intercontinental flights over the polar region may lead to changes.
- Shipping through the Northwest Passage may also possibly increase, as climate change could soon lead to a prolonged shipping season.
- Increasing resource extraction requires continuous development of marine infrastructure that addresses the issue of sovereignty while meeting the demands of commercial development and inhabitants.
- The growing, often dominant, position of indigenous peoples in private industry in the Canadian Arctic must also be considered as significantly affecting the development framework.

Arctic Alaska shares common transportation infrastructure challenges with vast portions of the Russian Far East and Canadian Arctic. They share an absence of surface or maritime infrastructure to serve small remote communities; tremendous similarities in vast geography, environment, terrain, weather, telecommunications, and other technology, as well as challenges for financing infrastructure development.

- Establishing links between North America and the Russian Federation is a high priority.
- In addition, Alaska is very much interested in pursuing shipping issues, in particular further advancing INSROP, in connection with anticipated climate change in the Arctic.

### 7.3 Need for safety

The question of safety is of importance to all transportation, not least the operations at sea. A major part of the future Arctic cargo transportation will be by ship. The regions in question are exposed to very harsh climatic conditions representing a high risk for serious accidents. As the industrial development in the Arctic and the new trans-ocean shipping routes will cause a significant increase in the shipping activity, the future activity in the Barents Sea and the North Atlantic is likely to be of considerable size. This will require a major focus on building adequate monitoring capacity over ship movements and establishing procedures to prevent environmental catastrophes related to them. Goods transportation must be conducted in a manner that is based on the highest international level of safety standards and supported with proper safety systems.

## **8. Possible ways forward**

The intrusion of traffic and new infrastructure in the Arctic must be seen both in local, regional and global contexts. The Arctic Council, particularly its working groups addressing transportation issues, has taken the task to explore measures and promote practices of sustainable transportation. This cannot be realized without cooperation at several levels cutting across regions and states, as well as different industries and disciplines. In addition, the relevant works of the Arctic Council's Environmental Working groups ought to be brought to support the process.

Cooperation in the development of Arctic infrastructure can take several forms. The nature of the partners will largely define the areas of interest as well as the speed that any progress can be made. Typically the most advanced and co-operation ready partners can be found in Arctic technology research and development representing both the industry as well as academia. The technology sector has already a long record of completed projects, studies and joint seminars. More are planned. Typical projects in this category are ARCDEV and the new ARCOP.

Cooperation in transportation between the governments has mostly taken place in the well-established international forums such as IMO and ICAO, but any direct discussions concerning the Arctic transportation questions between the countries involved have been slow to start. In recent years, some progress has been made and new forums created, such as the Arctic Council, Northern Forum and the more specifically transportation oriented project BEATA between the Nordic countries and Russia.

The third arena which often is not counted in relates to sustainable development, the core issue of the Arctic Council. The involvement of local peoples and private industry is critical for the long-term development of the Arctic. The Council is making an effort to promote and bring the interest groups, particularly the natives of the Arctic, in dialogue with "hard" project promoters and owners. Undoubtedly there are long ways to go before these relations are well established.

The development of the Arctic infrastructure, be it transportation, energy or telecommunications, will undoubtedly need the participation of all the above three parties: industry and technology developers, government regulators and participation by the people. Involved nations should identify common issues to facilitate cooperation. Eventually the three sectors must be included in some, yet undefined ratios, in the broader framework of Arctic infrastructure development. Special care must be taken to build on, nurture, and further develop such relationships.

A new phase of creating the cooperation framework for Arctic transportation started in the Arctic Transport Workshop held in Tornio, Finland, September 26, 2001, where the representatives of the governments concerned convened for the first time. The subsequent work will, however, depend on the member governments and particularly the Senior Arctic Officials of the Arctic Council and how they see sustainable transportation is to be dealt with in the Council's deliberations.