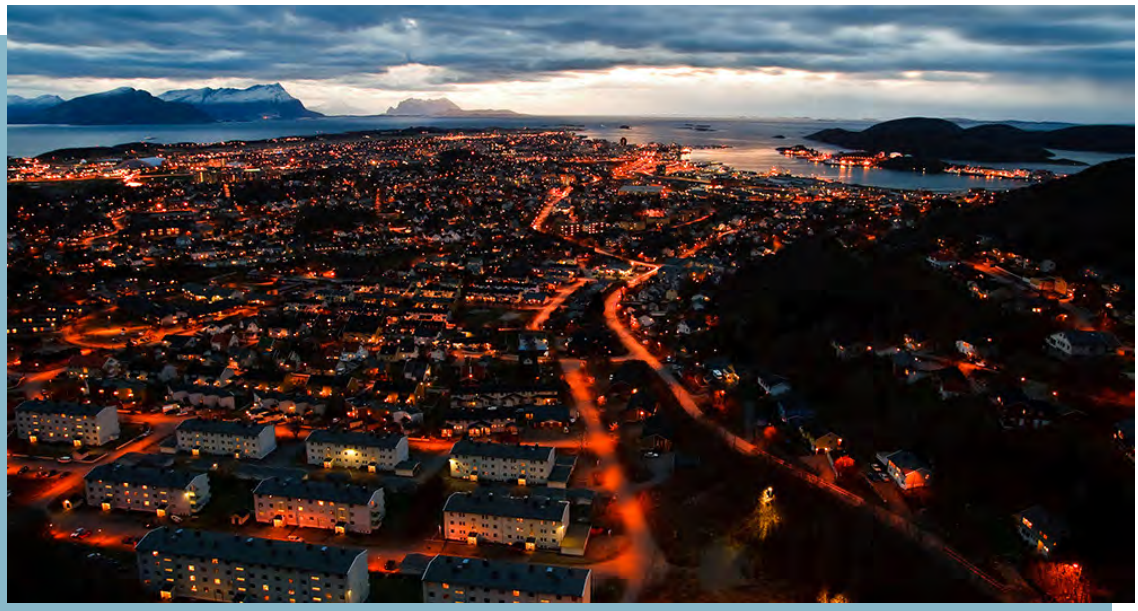
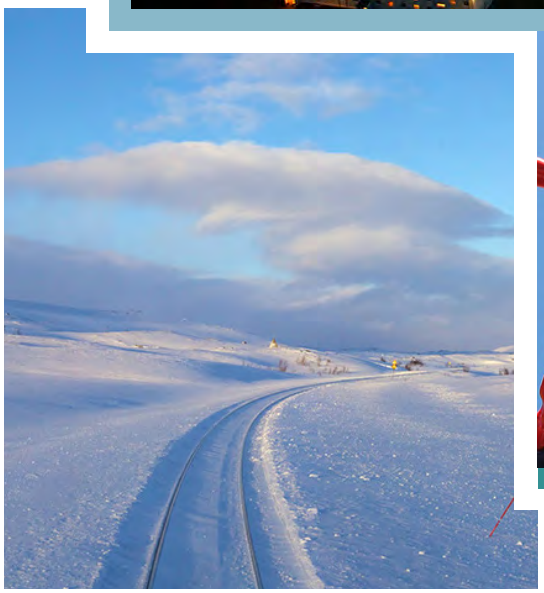
THE BARENTS EURO-ARCTIC REGION

Joint Barents Transport Plan

Proposals for development of transport corridors for further studies





September 2013

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FOREWORD

The Barents Region is filled with exciting possibilities. The increased attention being paid to the region is a positive force in bringing us together to find good solutions and to realize the potential for growth and development, and to cooperate on good and sustainable solutions as strategies are being carved out for the transport system in the region.

It has been a pleasure to work with the knowledgeable members of the Expert Group from Russia, Finland, Sweden and Norway. We have had a short time in which to complete our work, barely eight months. But it has been an instructive and interesting collaboration, which now it is important to continue. Our work represents the commencement of what I hope will create new projects in several forms. We have many joint challenges in the Barents Region, and these require a perspective that transcends borders if we are to succeed in developing effective, safe and sustainable transport corridors in our region.

I would like to thank the Expert Group, the secretariat and all who have contributed along the way for their efforts, and I wish you every success in the further work.

Torbjørn Naimak
Regional Road Director and Chair of the Expert Group

SUMMARY

Background and mandate

In light of the greater attention being paid to the High North, and the expected growth in key industries in the Barents Region, the Barents Euro-Arctic Transport Area steering committee took the initiative for a Joint Barents Transport Plan. An Expert Group were appointed in late winter 2013 to present a document to the steering committee by early autum 2013.

Economic and social development in the Barents Region requires better transport connections, and the aim for the work has been a joint approach to look at the future need for transport in the Barents Region. Norway, Sweden and Finland have prepared strategic studies on the need for transport infrastructure in the High North. Russia has federal plans to develop the infrastructure on their territory in the Barents region. These studies and plans are mainly focused on national priorities, but also emphasize the need for a Barents approach in planning future transport solutions and interventions in this region.

The mandate from the Barents Euro-Arctic Transport Area (BEATA) underlines that:

- The plan should reflect the national priorities
- The plan should cover all modes of transport and focus mainly on border-crossing transport corridors between Russia, Finland, Sweden and Norway
- The transport system should be assessed in the light of the anticipated development of relevant industries
- The plan should pinpoint bottlenecks and barriers to border-crossing transport, both of a technical and administrative nature
- Proposed measures in the plan may be divided along a timeline, e.g. on a medium-term basis (12–15 years) and long-term basis (30 years)
- Choice of measures should take into consideration environmental and resource aspects using the so called "Four-stage principle"[1]

Proposed objectives for the transport system in the Barents Region

All the countries involved each have their own national objectives for the development of their national transport systems, and they are not broken down to specific objectives for the Barents Region alone. Therefore, the national objectives must be the basis for a joint objective for the Barents Region. The common effort to develop a joint objective for the plan has revealed that although the national objectives are somewhat differently formulated, they are surprisingly similar in their key elements. On this basis the Expert Group proposes the following joint objective for the four countries based on the national objectives:

Russia, Finland, Sweden and Norway have the ambition to develop an efficient transport system in the Barents Region with good internal connectivity between the Barents countries and with good external links to world markets. The transport system should facilitate Barents regional development and create new opportunities for important industries. The transport system should be developed in a manner that safeguards the environment and improves safety and accessibility for all.

1 Step 1: Measures which affect the demand for transport and the choice of modes of transport
Step 2: Measures that provide more efficient utilization of the existing transport network
Step 3: Improvement of infrastructure
Step 4: New investment and major rebuilding measures

Important developments

The Barents Region is Europe's richest region as far as natural resources are concerned.

The global demand for ores, metals and minerals is increasing rapidly and the Barents Region is one of the very few areas of Europe where there is a potential to find and develop new occurrences. The area holds rich deposits of iron ore, base metals (copper, zinc, lead, tin and aluminium), industrial minerals, precious metals and special metals including rare earth metals. The metal industry has good conditions for growth because of its proximity to the mines and the rising demand for steel.

Large quantities of fish and shellfish are produced in the Barents Region, both wild-caught and farmed. The production mainly takes place in Norway, which is one of the world's largest producers of seafood. In the Barents Sea, Russia and Norway together administrate one of the world's richest areas for cod and other marine species.

The forest industry is of great economic and sociocultural importance in the Barents Region, especially in Russia, Finland and Sweden. There is a growth potential as large areas of forest in the eastern parts of Barents have not yet been harvested due to lack of transportation. It is estimated that global climate change will increase forest productivity by some 20 – 50% in the future. Further refining of products in the industry may also lead to growth.

The Norwegian Sea, the Barents Sea, the Kara Sea and the Timan-Pechora province in Nenets and Komi are areas of rich oil and gas resources. Russia and Norway are both major exporters of oil and gas and are planning for an increase in petroleum industry in the Barents Region that is expected to have a positive economic impact on regional development. Barents Sea south-east is an area with great opportunities for Norwegian-Russian cooperation and industrial development.

Tourism is a rapidly growing industry, and nature-based tourism is increasing the most. The entire Barents Region has large and untapped resources in this sector. The northern lights, the midnight sun, arctic climate and wilderness are selling points all over the region. To take advantage of the growing market, increased international access to the area is needed.

Main border-crossing corridors

The Expert Group has defined 14 multimodal border-crossing transport corridors which are important from a Barents perspective. In comparison the EU has defined the TEN-T network with a broad European perspective. Transport in the Barents Region must have a denser network and enough efficient transport corridors to improve the competitiveness of trade and industry, and to ensure that the Barents Region will be attractive for both people and business. Therefore the Expert Group has defined several corridors in addition to those defined in the TEN-T[2] network.

The proposed network of corridors is shown in the map in Figure 1:

2 EU27's Trans-European Transport Networks are a planned set of transport networks in Europe

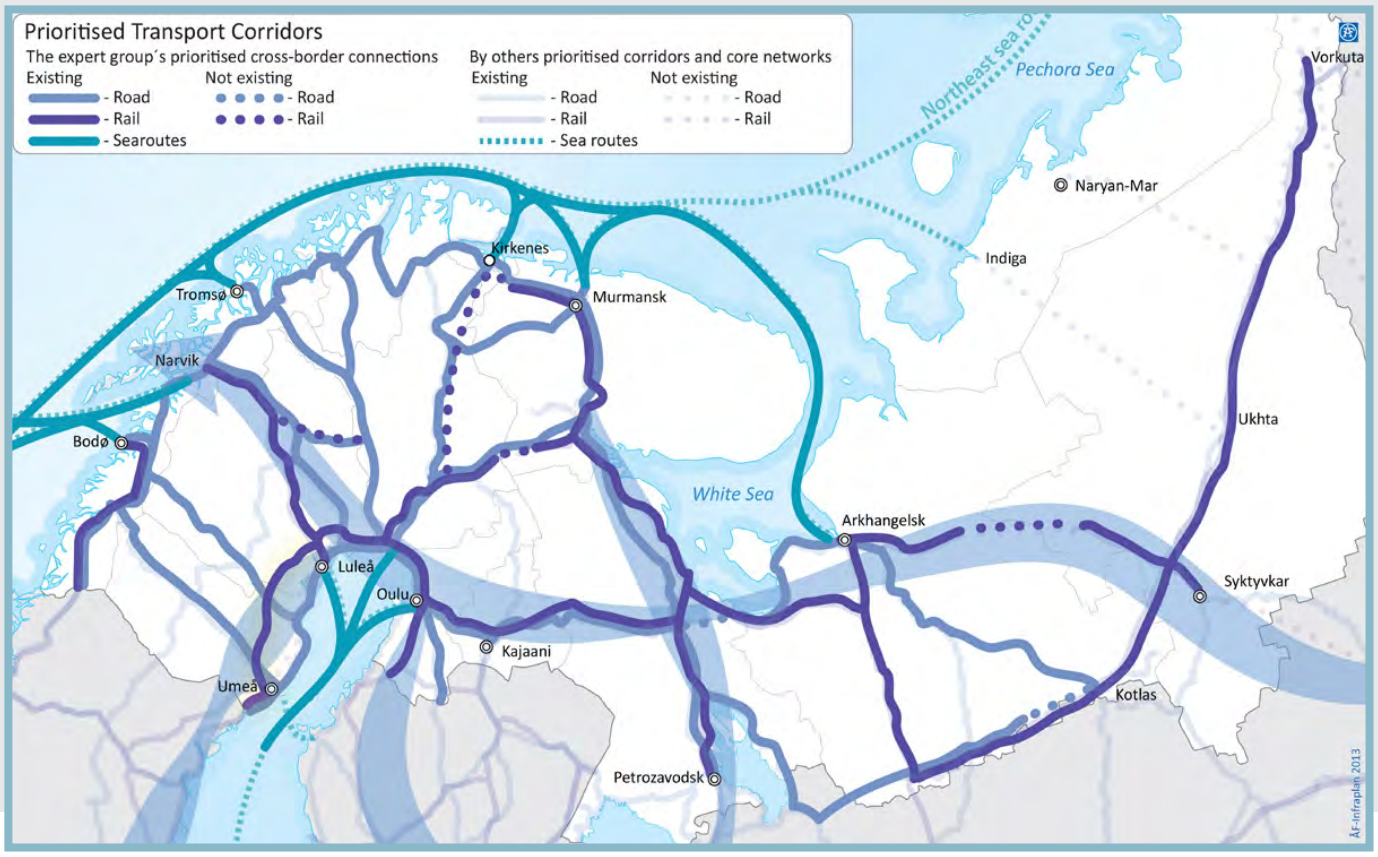


Figure 1: BEATA's Expert Group's prioritized transport network

These corridors include the three transport modes of road, rail and maritime transport. Aviation is described separately, because air transport is difficult to include in the defined corridors.

The technical and functional standard of the corridors differs considerably, both within each corridor, and between corridors. It appears that the standard in some cases is lowest close to the national borders. Traffic volumes also differ greatly, both within each corridor and between corridors.

The Expert Group wishes to emphasize the importance of the following three transport corridors:

- The railway connection the Iron Ore line/the Ofoten line (Corridor 5.2)
- The Northern Maritime Corridor with Murmansk as its main hub (Corridor 5.4)
- The Bothnian Corridor (Corridor 5.1)

Bottlenecks, future potential and proposals for the corridors

Historically the transport flows over the borders have been relatively small, with some important exceptions such as the transport of ore between Kiruna in Sweden and Narvik in Norway. This has led to little effort to strengthen border-crossing infrastructure between the countries. Low standard contributes to higher transport costs, and reduced trade between the countries.

There are many challenges concerning transport in the Barents Region and there are many bottlenecks. Some of the these are linked to:

- Low standard on sections of roads and railways
- Arctic winters and winter maintenance
- Lack of deep-water ports and fairways, especially in the Gulf of Bothnia and the White Sea
- Limited opening hours for customs clearance
- Different national regulations on total weights and lengths of vehicles
- Different railway gauges
- Lack of good flight connections east – west in the Barents Region

To tackle these challenges the Expert Group proposes some important measures for the future:

- Further work on harmonizing regulations on vehicle sizes
- Draw up good and if possible harmonized maintenance standards across the borders
- Main border-crossing roads should have an asphalted road width of minimum 8 metres
- More efficient administrative routines and customs clearance at borders and ports
- Development of key ports including good hinterland connections
- Consider feasibility study for new railway line between Nikel and Kirkenes with Russian gauge
- Consider feasibility study for new railway line between Svappavarra (Sweden) and across the border to Kolari (Finland)

Flight connections east – west in the Barents Region

The lack of flight services east – west is a major bottleneck for exchange of business and labour in the Barents Region. There are long distances between the cities, and air transport is necessary to facilitate more cooperation between the countries. The Expert Group has looked at the possibilities of strengthening the east – west flight connections.

There are some institutional barriers hampering the development of Barents cross-border aviation. A kind of Public Service Obligation may be necessary to facilitate new flight services which are not initially profitable. The Expert Group proposes further work to look at the possibility of subsidizing international flights in this area, to achieve a positive development for trade and industry.

The Expert Group has carried out a feasibility study on possible flight connections based on market principles. It concluded that there could be better economy and higher frequency than the current twice-weekly service between Tromsø – Murmansk – Arkhangelsk. This depends on the possibility of feeding passengers to a hub in the Gulf of Bothnia.

Financing Infrastructure

National budgets are the main resources for financing transport infrastructure in the Barents Region. But there are also other possibilities:

- Public Private Partnership, including funding by industry
- International funding
- Road tolls

There are many different sources of international funding, such as international capital markets and loans, grants and guarantees from international institutions and the EU. There is also a Support Fund for the Northern Dimension Partnership on Transport and Logistics which can be used in the Barents Region.

The Kirkenes Declaration dated June 2013 welcomes the proposal by the Russian Federation to investigate the possibility of establishing a financial mechanism in the Barents Region to support project activities and to facilitate making full use of the region's investment potential. Such a financial mechanism could be a good solution for financing new or upgraded infrastructure in the Barents Region.

The Expert Group proposes that all border-crossing projects, or projects near to the border, be handled with extra awareness of the possibilities of cooperation on financing. Although most projects will probably be financed by each country from national budgets, other possibilities should always be considered.

Joint planning in the Barents Region

The Expert Group proposes synchronized and harmonized planning whenever one of the national states wishes to develop the infrastructure close to one of the borders. Each project has its own characteristics, and planning in these areas should be handled with extra awareness regarding plans and standards on the other side of the border. Joint planning should always be considered. It might also be a good idea to plan joint operational and maintenance standards on important border-crossing infrastructure. It may be considered whether a first step to joint planning for the development of a particular corridor could be a bilateral agreement on a joint development strategy for the corridor in question.

The Expert Group proposes that planning should be analysed in accordance with the four-stage principle:

- Step 1: Measures which affect the demand for transport and the choice of modes of transport
- Step 2: Measures that provide more efficient utilization of the existing transport network
- Step 3: Improvement of infrastructure
- Step 4: New investment and major rebuilding measures

Proposals for further work

Each national state needs to have ownership of the Joint Barents Transport Plan. As the Expert Group in practice only had a few months to prepare this plan, it has to be followed up by additional work. The Expert Group proposes some further steps:

- Consultations on the plan in each country and presentation to other interested parties at regional, national and international level
- Additional work where pointed out in the document
- Further work on new versions of the Joint Barents Transport Plan

The additional work proposed includes further studies and planning for several of the corridors. The Expert Group suggests that it be considered whether some of these further studies can be conducted as joint cooperation projects between the technical universities of Arkhangelsk, Oulu, Luleå and Narvik on assignment from Barents Euro-Arctic Transport Area.

The follow-up of proposals contained in this document is the responsibility of the Finnish Chair of Barents Euro-Arctic Transport Area from October 2013. The work should be coordinated with other important initiatives in the region. The Expert Group recommends that the preparation of a new version be considered under the Finnish chairmanship (autumn 2015), and subsequently a revised plan every four years as an input to national transport plans in the four countries.

1 INTRODUCTION

1.1 BACKGROUND

In light of the greater attention being paid to the High North, and the expected growth in key industries in the Barents Region, the Barents Euro-Arctic Transport Area (BEATA) steering committee took the initiative for a Joint Barents Transport Plan. Economic and social development in the Barents Region requires better transport connections, and the aim of the work has been a joint approach to look at future transport needs in the Barents Region. Norway, Sweden and Finland have delivered strategic studies on the need for transport infrastructure in the High North. Russia has federal plans to develop the infrastructure on their territory in the Barents Region. These studies and plans are mainly focused on national priorities, but also emphasize the need for a Barents approach in planning future transport solutions and interventions in this region. There are also ongoing studies and projects dealing with different transport-related issues, but a need has been expressed for an overall approach to border-crossing on a national level and with a high-level political focus. The studies have also identified a need for a more integrated approach to the transport system across borders. The Barents Euro Arctic Transport Area has therefore envisaged a Joint Barents Transport Plan as a natural step to follow up the different national studies and plans and create a joint document signalling the direction for the development of the transport system in the Barents Region.

Figure 2: Map of the Barents Region

1.2 OBJECTIVES AND MEMBERS OF THE EXPERT GROUP

The assignment to develop a Joint Barents Transport Plan was given to an Expert Group appointed by each of the countries in the Barents Region. The Expert Group's mandate was to prepare a draft of an overall general plan for the long-term development of the transport infrastructure in the Barents Region. The plan should include general strategies on how an effective and robust transport system should be developed. The proposals by the Expert Group are the basis for a ministerial declaration to be signed at a Barents ministerial meeting in September 2013.

The work of the Joint Barents Transport Plan has been led by Mr Torbjørn Naimak, and the members of the Expert Group are:

Russia	Mr Anatoliy Popov	Deputy Head of the Division on Development of Transport Corridors and Logistics of the Development Programs Department	Russian Federation, Ministry of Transport of the Russian Federation
Russia	Mr Eygeniy Emets	Deputy Head of the Division on International Organizations, Transport Policy and Regional Cooperation. International Cooperation Department	Russian Federation, Ministry of Transport of the Russian Federation
Russia	Ms Anastasiya Mischenko	Head of the Spatial Planning Division of the Department on Property Relations and Spatial Planning	Russian Federation, Ministry of Transport of the Russian Federation
Russia	Ms Artem Smirnov	Chief Specialist-Expert of the Division on International Organizations, Transport Policy and Regional Cooperation of the International Cooperation Department	Russian Federation, Ministry of Transport of the Russian Federation
Sweden	Mr Per Lindroth	Adviser national transport planning – long term	Swedish Transport Administration
Sweden	Mr Krister Palo	International Coordinator and long-term planner	Swedish Transport Administration
Sweden	Ms Elena Vikstrøm	Adviser transport planning	Swedish Transport Administration
Finland	Ms Tuija Maanoja	Senior Specialist	Ministry of Transport and Communications
Finland	Mr Jorma Leskinen	Transport System Planning Manager	Centre for Economic Development, Transport and the Environment for Finnish Lapland
Norway	Mr Jan Fredrik Lund	Head of Strategic Planning	Norwegian Public Roads Administration
Norway	Mr Torbjørn Naimak (chair)	Regional Roads Director	Norwegian Public Roads Administration

Table 1: Members of BEATA's Expert Group

The Secretariat to the Expert Group:

Ms Veronica Wiik
Senior Adviser, Norwegian Public Roads Administration

Ms Ine Hilling
Senior Adviser, Norwegian Public Roads Administration

1.3 MANDATE AND TASKS

The draft mandate for a Joint Barents Transport Plan was presented at the Barents Euro-Arctic Transport Area meeting on 22-23 May 2012. The mandate was later revised with comments from the Swedish and Russian representatives. The draft mandate emphasizes that:

"The work will be carried out by an Expert Group with representatives from Norway, Sweden, Finland and Russia".

Further guidelines from Barents Euro-Arctic Transport Area:

- The plan should reflect the national priorities
- The plan should cover all modes of transport and focus mainly on border-crossing transport corridors between Norway, Sweden, Finland and Russia
- The transport system should be assessed in the light of the anticipated development of relevant industries (e.g. minerals)
- The plan should pinpoint bottlenecks and barriers to border-crossing transport, both of a technical and administrative nature
- Proposed measures in the plan may be divided along a timeline, e.g. on a medium-term basis (12–15 years) and long-term basis (30 years)
- Choice of measures should take into consideration environmental and resource aspects using the so called "four-stage principle". A more detailed description of the principle is given in Chapter 7.

1.4 SCOPE

The geographical scope of the plan is the Barents Region. The time period was defined as long term, but proposed measures in the plan may be divided along a timeline, e.g. on a medium-term basis (12-15 years) and long-term basis (30 years).

- All modes of transport were to be considered in the border-crossing corridors in the light of:
- Development in relevant industries
- Bottlenecks and barriers
- Important objectives regarding environment, climate, regional development and safety

1.5 METHODOLOGY

The work has been carried out on the basis of existing studies. The national priorities and strategies expressed through approved plans have been the working platform for the Expert Group. On this basis the Expert Group has taken a new Barents approach and discussed common strategies which will strengthen the border-crossing corridors by using a more mutual concept.

The process itself has been of great importance and the dialogue within the Expert Group has led to some common recommendations and suggestions as a basis for the best course of action for the development of a robust and effective transport system in the Barents Region. The Expert Group held its first meeting in late January 2013 and its eighth and final meeting in early September 2013.

2 TRANSPORT OBJECTIVES

The Joint Barents Transport Plan will be the basis for common policies through identification of efficient measures from a Barents perspective. These measures should be based on joint objectives for the Barents Region. These objectives and measures must be in line with the national objectives and policies of each country. Otherwise the joint actions and implementations will be undermined.

All the countries involved each have their own national objectives for the development of their national transport systems, and are not broken down to specific objectives for the Barents Region alone. Therefore, the national objectives will be the basis for a joint objective for the Barents Region. The common effort to develop a joint objective for the plan has revealed that although the national objectives are somewhat differently formulated, they are surprisingly similar in their key elements.

2.1 NATIONAL OBJECTIVES

The national objectives for the national transport systems of each country are fairly similar, especially regarding the overall strategic objectives. The strategic objective for the development and operation of the transport sector in **Russia** is to ensure transport-driven economic growth, improve the quality of life for present and future generations of Russian citizens, as well as meet other vital interests of the country. Safe, high-quality transport services should improve mobility of people and provide economic development.

The overall objective in **Norway** is to provide an efficient, accessible, safe and environmentally friendly transport system that covers society's needs for transport and as well as promoting regional development.

In **Sweden** the overall objective is to ensure the economically efficient and sustainable provision of transport services for people and businesses throughout the country.

The mission of the transport policy in **Finland** is to provide people with opportunities for safe and smooth everyday travel, to maintain the competitiveness of businesses and to mitigate climate change by reducing emissions. Transport policy is seen as part of a larger whole comprising businesses, the economy, employment and regional development.

These very similar overall strategic objectives are broken down to some main and sometimes also some secondary objectives in each country. These vary in form and structure, but contain functional objectives such as service level, mobility, reliability and accessibility, as well as impact objectives such as traffic safety and environmental sustainability.

To fulfil the overall strategic objective in **Russia** the following main objectives have been developed:

- Harmonization (single transport space creation on the basis of balanced and effective development of transport infrastructure)
- Competitiveness (availability and competitiveness of transport services for freight owners, logistics companies and other customers)
- Mobility (availability, accessibility and quality of transport services for people)
- Integration (into world transport space and Euro-Asian linkages system)
- Safety and security (increasing the level of transport safety and security)
- Sustainable development (reduction in the harmful influence of transport on the environment)

In **Norway** four main objectives have been developed:

- Improved access and reduced "transport distance costs"[3] to enhance competitiveness for industry and to contribute to maintaining the main features of the settlement pattern.
- Transport policy must be based on a vision that there should be no transport accidents where people are killed or seriously injured.
- Transport policy should help to limit climate gases, reduce the environmental effects of transport, and meet the national environmental objectives and international environmental obligations.
- The system should be accessible for all.

In **Sweden** the main objectives are divided between:

- Functional objective: Accessibility
    - The design, function and use of the transport system will contribute to providing everyone with basic accessibility of good quality and functionality and to developing capacity throughout the country. The transport system will be gender-equal, meeting the transport needs of both women and men equally. Under this objective there are seven specifications.
- Impact objective: Health, safety and environment
    - The design, function and use of the transport system will be adapted to eliminate fatal and serious accidents. It will also contribute to the achievement of environmental quality objectives and better health conditions. Under the impact objective there are five specifications.

The National Transport Plan in **Finland** is guided by the following main objectives:

- Service level objectives (whether the transport system meets the citizens' need for mobility)
- Economic development objectives (transport system development that cuts the transport costs of companies).
- Traffic safety objectives
- Climate and environmental objectives
- Equality objectives
- Cost–benefit objectives

The conclusion is that the overall main national objectives for the development of the transport system in each country are similar and that it should therefore be possible to develop a joint objective for the Joint Barents Transport Plan based on the national objectives.

2.2 EXPERT GROUP'S JOINT OBJECTIVE

The Expert Group proposes the following joint objective for the four countries:

Finland, Norway, Russia and Sweden have the ambition to develop an efficient transport system in the Barents region with good internal connectivity between the Barents countries and with good external links to world markets. The transport system should facilitate Barents regional development and create new opportunities for important industries. The transport system should be developed in a manner that safeguards the environment and improves safety and accessibility for all.

3 Includes not only money, but time and effort related to travelling

3 KEY STUDIES, WORK AND PROJECTS OF STRATEGIC IMPORTANCE

3.0. MULTILATERAL AGREEMENTS AND FORUMS FOR COOPERATION

During the last decade a number of national, bilateral and multilateral initiatives have produced relevant input to a joint Barents transport plan. Some of them have completed their studies and strategic recommendations, while some are still ongoing. This chapter will provide an overview.

Multilateral cooperation has to a large extent taken place through EU programmes such as the Northern Periphery Programme, the Baltic Sea Programme and the Kolarctic ENPI. Because Russia is not part of the eligible area for the first two programmes mentioned, the Russian side have unfortunately not taken part in these projects to the same extent as the Nordic countries. Russian participation has only been possible on associate partner terms.

Other forms of multilateral cooperation that have been important are cooperation through instruments such as the Northern Dimension Partnership on Transport and Logistics (NDPTL), the Barents Regional Working Group on Transport and Logistics (BRWGTL) and of course the Barents-Euro-Arctic Transport Area.

Bilateral cooperation has strategic importance and also offers facts and conclusions that contribute to identifying the priorities and measures in this transport plan.

This subchapter also includes a list of the **national plans and studies** which constitute the main input for the Expert Group.

3.1 MULTILATERAL AGREEMENTS AND FORUMS FOR COOPERATION

The Kirkenes Declaration is an agreement signed in 1993 at the Conference of Foreign Ministers on Cooperation in the Barents Euro-Arctic Region. Among many issues, the declaration focuses on regional transport infrastructure and the importance of improving infrastructure.

Under the leadership of Prime Minister Jens Stoltenberg, the Barents Summit in Kirkenes on 3 4 June 2013 adopted the **New Kirkenes Declaration.** The new declaration emphasizes the need for improved transport networks in the Barents Region, in particular the further development of east–west transport networks.

The Barents Euro-Arctic Council (BEAC) is the forum for intergovernmental and interregional cooperation in the Barents Region. BEAC was established in 1993. The Barents Euro-Arctic Transport Area and the Barents Working Group on Transport and Logistics (BWGTL) are under the aegis of BEAC.

The Arctic Council is the high-level intergovernmental forum that addresses issues faced by the Arctic governments and the indigenous people of the Arctic. It has eight member countries: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States. Sweden has the chairmanship for the period 2011-13.

Northern Dimension Partnership on Transport and Logistics (NDPTL) is a cooperation between the EU, Russia, Norway and Belarus, from 2009, with a secretariat located in Finland. The partnership helps foster economic development and enhances the region's competiveness by developing transport connections and by eliminating bottlenecks at border crossings. Its main function is to facilitate implementation of infrastructure projects by making them "financeable". This comprises the necessary technical, economic, financial and environmental assessments and analyses. The partnership has produced an infrastructure map where projects in the partnership portfolio are combined with the TEN-T. NDPTL is a cooperation between transport ministries.

The Conference of Peripheral and Maritime Regions (CPMR) is 160 regions from 28 countries that work together to ensure that EU institutions and national governments take account of their common interests. They also cooperate on practical projects. The transport working group of CPMR Baltic Sea Commission are focusing on challenges connected to the EU's new Sulphur Directive which will be effective from 2015. They will also prioritize efficient rail transport and look into the possibilities for subsidized international air services as well as investigate further the possibilities for "fly on demand" routes in peripheral areas.

The Council of the Baltic Sea States (CBSS) is a permanent Expert Group on maritime policy and organizes regular conferences for the Ministers of Transport. The Council of the Baltic Sea States is an overall political forum for regional inter-governmental cooperation. Russia, Finland, Sweden and Norway are all members of the CBSS. Russia holds the current presidency of the CBSS for the period 2012-2013.

The Barents Traffic Safety Forum is a stakeholder organization intended to promote the work on road safety in the Barents Region. It was originally founded in 2001 by road authorities in the region and has developed into an umbrella organization for road safety endeavours. All players active in the field of road safety are welcome to become members.

The Barents Regional Road Directors Meeting is a permanent forum for discussions on different road-related issues in the Barents region.

3.2 MULTILATERAL PROJECTS

There is a long tradition for cooperation within transport and logistics between Russian partners and partners in the Nordic countries. With this document a joint transport plan has been formulated for the first time. This is in great part thanks to the foundation laid by previous cooperative projects.

3.2.1 BARENTS FREEWAY

Brief facts: *project period 2012–2014, four countries led by Finland are involved, a Barents Euro-Arctic Council project co-financed by the EU, Russia, Finland, Sweden, Norway, the Kolartic programme and participating partners.*

In this project, regional authorities aim to agree on common Barents strategic priorities through case studies of each transport mode. They also aim to improve regional transport planning and equipment procurement. A cargo flow analysis is included in the project plan.

3.2.2 TRANSBALTIC

Brief facts: *2009–2012, nine countries led by Sweden, partly financed by the European Regional Development Fund.*

Project documents represent a substantial amount of relevant, general and specific knowledge on transport and logistics and the appurtenant development processes. Among issues addressed, the project focuses on the need for a more systemic approach to coordinate results of EU-supported transport development initiatives/projects.

3.2.3 BALTIC TRANSPORT OUTLOOK 2030

Brief facts: *2010–2011, commissioned by EU Strategy for the Baltic Sea Region (EUSBSR), partly financed by the EU TEN-T, Danish led, ten countries involved, including Russian participation.*

Its main contribution was to define a more comprehensive strategic transport network in the region, building on TEN-T and complementing transport links defined by criteria such as:

- Accessibility to functional urban areas
- Integration of peripheral regions and islands
- Access to important raw materials and production sites
- Access to administrative and educational facilities
- Access to important gateways for import and export
- Important transport hubs (nodes) for both passengers and freight, facilitating exchange of transport modes

3.2.4 NORTHERN MARITIME CORRIDOR

Brief facts: *2002–2008, partly financed by the European Regional Development Fund, Norwegian led, nine countries involved, including associated Russian participation.*

In this context the project's work to promote cargo traffic between the western starting point of the Northern Sea Route and the EU is its most relevant contribution. The corridor was acknowledged as a "Motorways of the sea axis" by the EU in 2005.

3.2.5 SUSTAINABLE TRANSPORT IN THE BARENTS REGION

Brief facts: *2002–2008, partly financed by the European Regional Development Fund, led by Sweden, Finnish secretariat, four countries involved: Russia, Finland, Sweden and Norway.*

This is one of two projects described here which has a geographical scope equal to that of the Joint Barents Transport Plan. The projects are closely linked to the Barents Euro-Arctic Transport Area. The project aimed to promote the Barents Region as a single transport area. Numerous project reports on freight flows and passenger flows increased the understanding of transport and transport challenges within this region.

3.2.6 BALTIC BIRD

Brief facts: *2011–2013, partly financed by the European Regional Development Fund, led by Germany, eight countries involved.*

The project analysed passenger potential for international flights between 14 airports in peripheral regions, including the airports of Oulu, Finland, and Bodø, Norway. The "fly on demand" concept has also been considered in this project. Five international airlines are participating in the project.

3.2.7 NORTH EAST CARGO LINK

Brief facts: *2003–2006 and 2010–2013, partly financed by the European Regional Development Fund and European Neighbourhood and Partnership Instrument, Swedish led, three countries involved.*
This is a development project for the Midnordic Green Transport Corridor between Trondheim, Norway and St Petersburg, Russia. The project comprises road, rail, sea and air.

3.2.8 BOTHNIAN GREEN LOGISTIC CORRIDOR

Brief facts: *2011–2014, partly financed by the European Regional Development Fund, led by Sweden, five countries involved.*

The project aims to develop the Bothnian Corridor (Stockholm – Helsinki) and its extension corridors such as the corridors to Norway, Germany, Poland, the Baltic states and Russia. The project anticipates a 50% increase in freight transport between Scandinavia and Central Europe by 2050. More efficient and environmentally friendly transport is needed to transport fish, forestry products and raw materials.

3.2.9 NORDIC LOGISTIC CORRIDOR

Brief facts: *2012–2014, partly financed by the European Regional Development Fund, Swedish led, three countries involved.*

The project aims to develop the corridor between Helgeland, Norway, and St. Petersburg, Russia. The main effort is directed to development of the ports of Vasa, Finland, and Umeå, Sweden. The Nordic Logistic Corridor consists of the E12 and E18.

3.2.10 ROADEX I, II, III AND IV

Brief facts: *1998–2012, partly financed by the European Regional Development Fund, led by Sweden, seven countries involved.*

The project has improved the operational conditions of low-volume roads (fewer than 500 vehicles per day) through the adoption of innovative approaches, methods and technologies. The project has ended, and is today a permanent ROADEX network with a secretariat and partners from six countries in northern Europe.

3.2.11 BARENTS LOW VOLUME ROAD MANAGEMENT

Brief facts: *2007–2013, partly -financed by the European Neighbourhood Programme Institute, Kolarctic Programme, led by Finland, two countries involved, including Russian partners.*

The overall objective is to harmonize regional practices on a voluntary basis rather than by directives. The project wishes to transfer knowledge from the Northern Periphery Programme to the Russian side of the Barents Region. The ROADEX project has produced results since 1998, and the Russian side has not had the possibility to join because of the eligible-area limitation of the Northern Periphery Programme. The regional road administrations of Arkhangelsk and Murmansk are participating in the project from the Russian side.

3.3 BILATERAL TRANSPORT STUDIES AND PROJECTS

Quite a substantial amount of bilateral cooperation has also taken place within different areas such as corridor development, harmonizing infrastructure standards, transport studies, technology development, practical training for students, transport safety, removal of old border-crossing stations, common training within search and rescue, exchange of information from sea traffic control etc.

The E105 project is an excellent example of fruitful bilateral cooperation. Through the improvement of the road connection (E105) between the towns of Kirkenes and Murmansk better international connections have increased cohesion in the border area. Between Kirkenes in Norway and Nikel and Zapoljarny in Russia the distance is only a few kilometres. The road improvement has been combined with simplified procedures at border crossings for the inhabitants of these three towns. E105 Kirkenes – Murmansk represents the main transport corridor between Russia and Norway. The project started in 2008, and will continue on a regular basis until 2016.

Another example is the project to improve the road standard and avoid conflict between the road and industry in the small towns of Haparanda in Sweden and Tornio in Finland, situated only a few hundred metres apart. These two towns are connected by the main road corridor between Sweden and Finland.

A third example is the cooperation between Sweden and Finland on the railway hub in Haparanda. The cooperation includes a common railway terminal and investigations into future solutions to handle the challenge connected to different gauge widths.

3.4 NATIONAL PLANS AND STUDIES

A number of relevant documents comprise the basis for this joint transport plan. These are the main documents taken into account:

3.4.1 RUSSIA

- The Strategy of Development of Railway Transportation in the Russian Federation for the period until 2030[4]
- Federal Target Program "Development of the Transport System of Russia (2010-2015)"[5]
- Federal Target Program "Development of the Transport System of Russia (2010-2020)"
- The Transport Strategy of the Russian Federation for the period until 2030[6]
- Government program of the Russian Federation "Development of the Transport System for the Period 2013-2020"[7]
- Strategy for Socio-Economic Development of the Northwest Federal District in the period until 2020[8]
- The Complex Program of Industrial and Infrastructural Development of the Republic of Komi, Perm Region and Arkhangelsk Region

4 Directive No. 877-r of the Government of the Russian Federation, dated 6/17/2008
5 Directive No. 781-p of the Government of the Russian Federation, dated 6/15/2007
6 Directive No. 1734-r of the Government of the Russian Federation, dated 11/11/2008
7 Directive No. 2600-r of the Government of the Russian Federation, dated 12/28/2012
8 Directive No. 2074-r of the Government of the Russian Federation, dated 11/18/2011

3.4.2 FINLAND

- Finnish Government's Transport Policy Report (2012)
- Finland State of Logistics (2012)
- Transport Needs of the Mining Industry (2013)
- Regional Transport Plan of Finnish Lapland (2011)
- Regional Transport Plan of Oulu Region (2007)
- National traffic and transport statistics (2011-13)

3.4.3 SWEDEN

- National plan for the transport system 2010 2021 (2010)
- Proposal for a new national plan for the transport system 2014 2025 (*will be determined by the government spring 2014*) (2013)
- Forecast of Swedish freight flows in 2050 (2012)
- Freight, summary (2012)
- Transport needs for capacity building - 2025 2050 (2012)
- Railways' need for increased capacity – suggestion for solutions for the years 2012 2021
- Future Capacity Demand (2011)
- Raw material and communications in the Barents Region (2011)
- Investigation of capacity and efficiency in the Swedish transport system – analysis of capacity challenges up to 2025, Trafikverket (2012)
- The Government's Bill. no. 2012/13:25: Investments for a strong and sustainable transport system (2012)

3.4.4 NORWAY

- New infrastructure in the north, the national transport administrations (2010-2011)
    - Part 1: Trends in key industries and transport needs up to 2040 (2010)
    - Part 2: Proposed measures for transport infrastructure (2011)
- Proposal for a new National Transport Plan 2014-2023 from the national transport administrations (2012)
- Maritime Infrastructure Report for Spitsbergen, Finnmark, Troms and Nordland, The Norwegian Coastal Administration (2012)
- Railway study on the Ofoten line, The Norwegian Railway Administration (2012)
- The Government's White Paper no. 26 (2012-2013): National Transport Plan for the period 2014-2023 (2013)

4 BARENTS REGION – DEMOGRAPHY, CLIMATE AND MAIN INDUSTRIES[9]

4.1 AREA AND POPULATION

The total population of the Barents Region is approximately 5.22 million. The surface area of the Barents Region equals the combined area of France, Spain, Germany, Italy and the Netherlands. Average population density is only 3.5 inhabitants per square kilometre. It varies from 0.3 (Nenets) to 8 (Oulu). In comparison France has 106 inhabitants per square kilometre.

The Sámi people make their home in all four states within the Barents Region. Two more indigenous peoples are found in Russian Barents, the Nenets and the Vepsian.

9 The facts in chapter 4 are mainly based on the documents listed in chapter 3.4, national statistics and studies listed in the reference list in Chapter 10

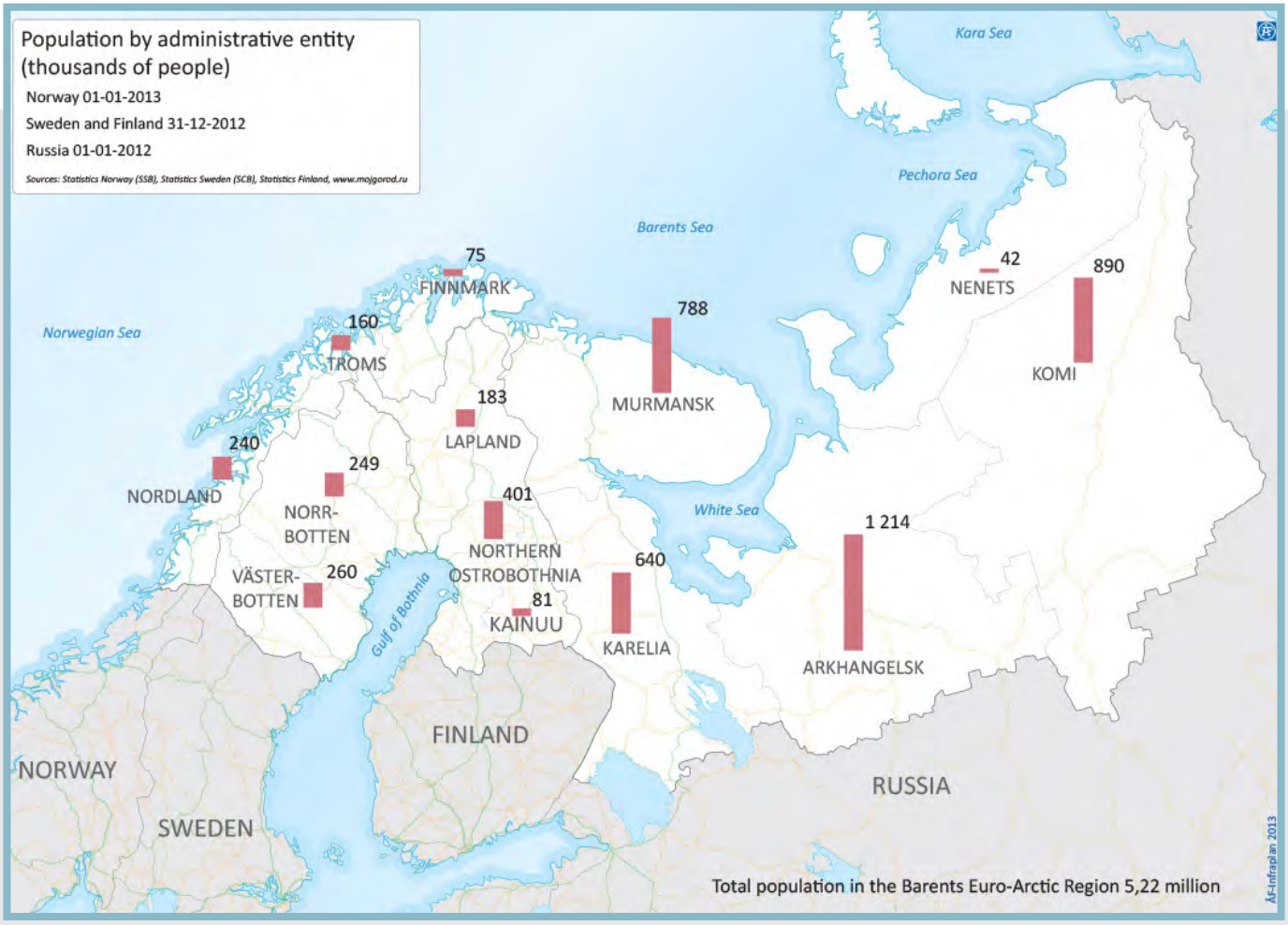


Figure 3: Population by administrative entity

The largest city in the Barents Region is Arkhangelsk with 356 000 inhabitants, followed by Murmansk with a population of 307 000. The largest Nordic city in the region is Oulu[10] with 190 000 inhabitants, followed by Umeå with a population of 114 000. Population development in the past decade has been very positive for the main Finnish, Swedish and Norwegian cities in the Barents Region. However, a few Swedish cities have experienced a reduction in their population, as have the Russian cities of Murmansk and Arkhangelsk.

4.2 CLIMATE AND ENVIRONMENT

The focus on global climate change has led to an increased attention within the Northern regions. This is because these changes were expected to arrive earlier and to be more noticeable than in other regions. A comprehensive study of climate change in the Arctic under the aegis of the Arctic Council helped to develop important knowledge of the link between climate changes regionally and globally. The study made an important contribution to the development of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change in 2007.

All prediction scenarios considered indicate that the annual precipitation and temperature across the Barents area are likely to increase. This, in turn, is likely to result in a range of impacts, such as more rain, disappearing permafrost, a greater frequency of storm events, more frequent freeze-thaw cycles, more frequent and vulnerable floods and landslides, as well as other effects.

Managers of infrastructure should be aware of these threats, and be ready to meet them to mitigate their impacts on the land infrastructure. These will probably lead to new and at times more expensive solutions for both construction and maintenance.

The Arctic Ocean has for centuries been of interest and explored by polar travellers. The melting of the ice is leading to increased access to resources in the Northern regions and new opportunities for shipping traffic. This results in an increased interest in exploiting the resources in the Arctic and increased maritime activity. In recent years we have seen the first commercial shipping between Europe and Asia through the Northern Sea Route.

The fisheries in this ocean region are among the world's richest. It is a challenge to ensure that existing fishery activity along with a new and expected increase in shipping traffic and petroleum activity do not constitute too great a burden on the environment.

Requirements for maximum sulphur content in vessel fuel

From 1 January 2015, all ships in SECAs (Sulphur Emission Control Areas), which include the English Channel, North Sea and Baltic Sea, will be obliged to use fuel with a sulphur content of less than 0.1 %. To comply with this new requirement, the ships will either use diesel with low sulphur content or other alternatives such as LNG as fuel. Alternatively scrubbers will be installed. This increases the cost for shipping lines, thus making it more expensive for cargo owners to use sea transport. The forest industry in Sweden has estimated that the extra cost for them will amount to EUR 140 million per annum.[11]

Consequences for shipping in the Baltic Sea

The impact of the new regulation on the transport system of the Baltic Sea is still uncertain, but in the short term it is likely to lead to shifts in modes and routes. Sea ports in neighbouring countries could be an alternative for cargo exported from Sweden and Finland.

10 For Oulu and Umeå the population given is for the municipality
11 Source: ÅF Infraplan AB

4.3 OVERVIEW OF RESOURCES AND KEY INDUSTRIES

The Barents Region is Europe's richest region as far as natural resources are concerned. The figures for unexploited and exploited minerals, gas and oil deposits are staggering.

The industrial structure of the Barents Region is dominated by base industries such as petroleum and petroleumrelated industries, mining, metal manufaturing, seafood, tourism and forestry. Processing rates are highest in the Nordic countries. As the map below illustrates, the seafood, petroleum and tourism industries dominate in the Arctic coastal areas of Barents, while mining and in particular forestry dominate in the inland areas and along the Gulf of Bothnia.

4.4 ORES AND MINERALS

The Barents Region is one of the very few areas of Europe where there is a potential to find and develop new occurrences. The Barents region is part of the geological region called the Fennoscandian Shield which holds rich deposits of iron ore, base metals (copper, zinc, lead, tin and aluminium), industrial minerals, precious metals and special metals including rare earth metals.

The global demand for ores, metals and minerals is increasing rapidly. [12] The strong economic growth in the BRICS countries (Brazil, Russia, India, China and South Africa), and particularly China, is an important driver for the increased demand for minerals. China is the destination for almost two-thirds of the world's

12 Raw material and communications in Barents, 2011:42

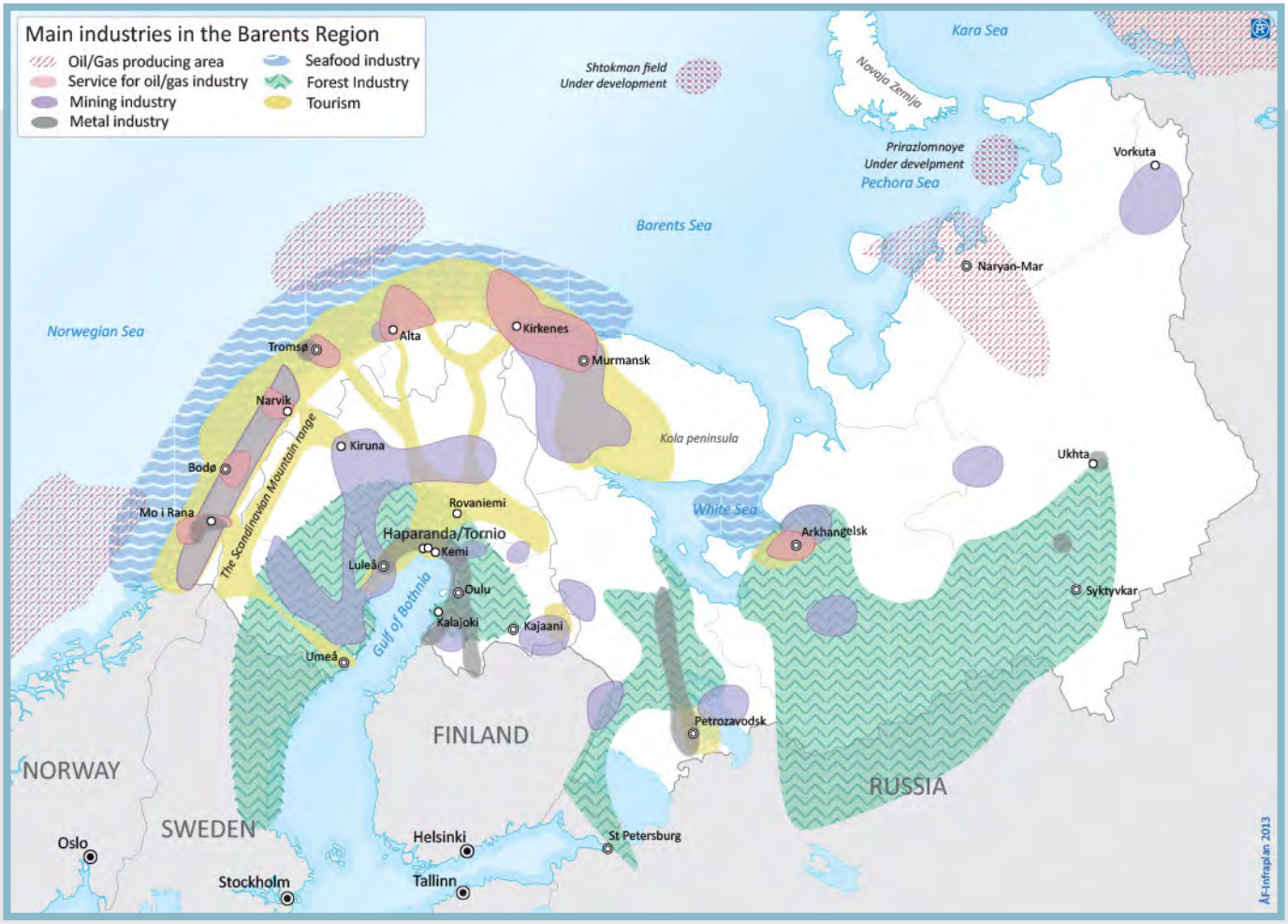


Figure 4: Rough illustration of raw materials and main industries in different parts of the Barents Region

total exports of iron ore and is responsible for 60% of global pig iron production. Chinese consumption and demand are therefore decisive for the further development of this industry. Moreover China represents an estimated 40% of the global demand for copper, aluminium, zinc and nickel.[13]

Europe consumes 20% of the world's ore and minerals, but produces only 3–4%[14]. The EU countries have a large industrial production compared with their raw material production. This is the background for the EU Raw Materials Initiative of 2008 in which the long-term sustainable access to raw materials from European sources and recycling of metals are main elements. In 2011 the European Commission followed up with a strategy to deal with the lack of stability in the markets for raw materials. Following the EU's raw material initiative, several countries have designed strategies to ensure access to raw materials for their own industries and to facilitate increased mineral extraction.

4.4.1 RUSSIA

Several industrial minerals are located in the Russian area of the Barents Region (diamonds, vanadium nepheline, nepheline syenite, potassium salts, magnesite) and metal ores (nickel, platinum, rare-earth metals, wolfram). The county of Murmansk, and the Kola Peninsula in particular, has enormous mineral resources. Industrial minerals such as apatite and nepheline, and metal ores containing iron and copper-nickel are the most commercially important mineral resources recovered here.[15] In 2008 over 8 million tonnes of ore were produced and over 110 000 tonnes of nickel.[16] Arkhangelsk and Komi have important bauxite and fluorite deposits as well as valuable diamond deposits. Most of the mineral exports are by ship. Northwest Russia has long traditions of mining and there are several projects under planning.

4.4.2 FINLAND

In Finland gold, chromium, zinc, copper and nickel are mined. Finland has 100% of the EU27's production of chromium. All of the mined chromium is transported directly to Outokumpu in Tornio where a large part is used in the production of steel. Other minerals are exported to EU countries. It has been estimated that in the Finnish bedrock there are minerals worth about EUR 300 billion. Finland also possesses internationally valued competence and equipment manufacturing for the mineral industry.

Several new mines are being planned for Northern and Eastern Finland. Mining projects that have advanced far in the planning and that have significant transport volumes include Savukoski (Sokli), Kolari (Hannukainen), Ranua (Suhanko) and Taivalkoski (Mustavaara). In addition, the extension of the Kemi mine will be completed in 2013. In Sotkamo (Talvivaara) and Sodankylä (Kevitsa) there are plans to expand the production. In the coming years the most significant impacts on transport demand can be expected at the Kolari and Sokli mines. In the long term, new transport needs will emerge in the ore zone of central Lapland.

The Finnish report primarily assesses the capacity of the road network to serve current production. In the Northern Finland railway network, the most significant lack of capacity occurs in the section Kokkola–Ylivieska. Between Ylivieska–Iisalmi and Kontiomäki–Oulu the capacity also places limitations on increasing the transport volume.

Maritime transport plays an important role, especially in the transport of raw materials and products of heavy industry. Challenges related to ice and depth are relevant to the Baltic Sea.

13 Sources: USGS, http://www.usgs.gov/. UNCTAD, http://unctad.org/en/Pages/Statistics.aspx/
14 Source: Norwegian geological survey, http://www.ngu.no/no/
15 Source: Ocean Futures (2005), http://www.ocean-futures.com/Publications/NHO-Horisont-3-3005-Sawhill-2005-10-05.pdf
16 Source: Norilsk Nickel's website, http://www.nornik.ru/en/

4.4.3 SWEDEN

In Northern Sweden there are two main ore provinces: the ore field in northern Norrbotten with large deposits of iron, copper and gold, which extends some way into Northern Finland and Norway; and the Skellefte field which is the second important ore province, with base-metal containing ores, as well as some gold ores. South-east of the Skellefte field there is also the so-called "Nickel belt" and south-west the so-called "Gold line". In Northern Sweden there are plans to expand the current production and open several new mines with significant transport volumes. The current annual transport volume of a little under 30 million tonnes is expected to grow to about 70 million tonnes by the end of the decade. Recent years have seen increased activity, particularly in the regions of Kiruna, Gällivare and Pajala. The mines in Gällivarre are among the biggest copper mines in the EU27 and alone represent 9% of EU production.

In northern Sweden a large quantity of iron ore is extracted, which is transported via the Iron Ore line for further shipment. Two-thirds is transported westwards on the Ofoten line to the port of Narvik and then mainly to Rotterdam, and one-third is transported eastwards to the port of Luleå. The transport via Luleå is mainly to the steelmill across the Gulf of Bothnia in Raahe. The Iron Ore line, the Ofoten line, the port of Narvik and the port of Luleå are therefore of critical importance to the industry, along with the road network central to the main areas of the industry. Nine million tonnes of goods are transported through the port of Luleå each year, of which 5.5 million tonnes is iron ore. The port of Narvik handles 18 million tonnes of iron ore a year.

4.4.4 NORWAY

The mining industry in Norway suffered a downturn in the 1980s and the activity in many traditional mines was discontinued.

Today Norway is nevertheless an important producer of several resources that are exported to European and other markets. Examples are titanium minerals, iron ore, coal, chalk, quartz, nepheline syenite, olivine, gravel and natural stone.

Northern Norway still has a large production of industrial minerals and pre-requisites for the mining of zinc, nickel, lead, copper, gold and iron. Both in Kirkenes, Finnmark and Mo i Rana, Nordland, iron ore is extracted from large deposits. The production of minerals is mainly shipped directly from the ports or by a combination of trucks/ships.

The Norwegian parliament has startet a prospecting programme for Northern Norway (MINN – Minerals in Northern Norway) with an annual budget of EUR 3.3 million to increase knowledge about mineral resources in the region and prepare for increased mineral activity.

The port of Narvik will play a key role for Swedish and Finnish mining, as it will be advantageous to transport from the deep, ice-free port in Narvik for the foreseeable future.

4.5 METAL INDUSTRY

The metal industry proximity to the mining industry means that the metal and steel industry can be supplied with ore from the region, although large quantities are imported from Eastern Europe, particularly by the Finnish steel industry. The largest steel industries in the Barents Region are located in Luleå (SSAB), Raahe (Ruukki) and Tornio (Outokumpu). The largest manufacturing output is of steel materials, steel products and stainless steel. The demand for steel is currently rising, and China is an important driver in this.

The Barents Region is also an important region for the production of other metals. One of the biggest copper smelters in EU27 and world leader in the re-use of copper scrap from electronics is situated

in Skellefteå, the second largest zinc smelter in EU27 is situated in Kokkola, Tornio has a ferrochrome smelter, in Mo i Rana (Northern Norway) iron is produced, and aluminium in Mosjøen (Norway). More information on metal mining and the metal industry is found on the map below.

4.6 SEAFOOD INDUSTRY

As the map on the next page showe, the Barents Sea is one of the world's most productive marine areas with large quantities of fish, seabirds and sea mammals. The fishery resources of the Barents Sea are important for world food production. The fish in the Barents Sea are predominantly the bottom feeder types cod, coalfish and haddock in addition to shrimp fishery and capelin fishery. In the Barents Sea, Russia and Norway together administrate one of the world's richest areas for cod and other marine species.

Large quantities of farmed fish are produced in the Barents Region. The production mainly takes place in Norway, which is one of the world's largest producers of seafood. In 2012 Norwegian seafood exports were worth EUR 6.9 billion. A total of 2.3 million tonnes of seafood were exported from Norway, which is a drop of 339 000 tonnes compared with 2010. Russia and France are the largest markets, while Japan is the market with the fastest growth. Salmon and trout are the largest exports, their export value in 2012 amounted to EUR 4.1 billion.

A report[17] forsee a potential for value creation within the marine sector in Norway in 2050 of EUR 73 billion. This estimate is based on global trends such as an increased need for food production as a

17 "Value creation based on productive oceans in 2050" Report of a working group appointed by the Royal Norwegian Society of Sciences (DKNVS) and the Norwegian Academy of Technological Sciences (NTVA)

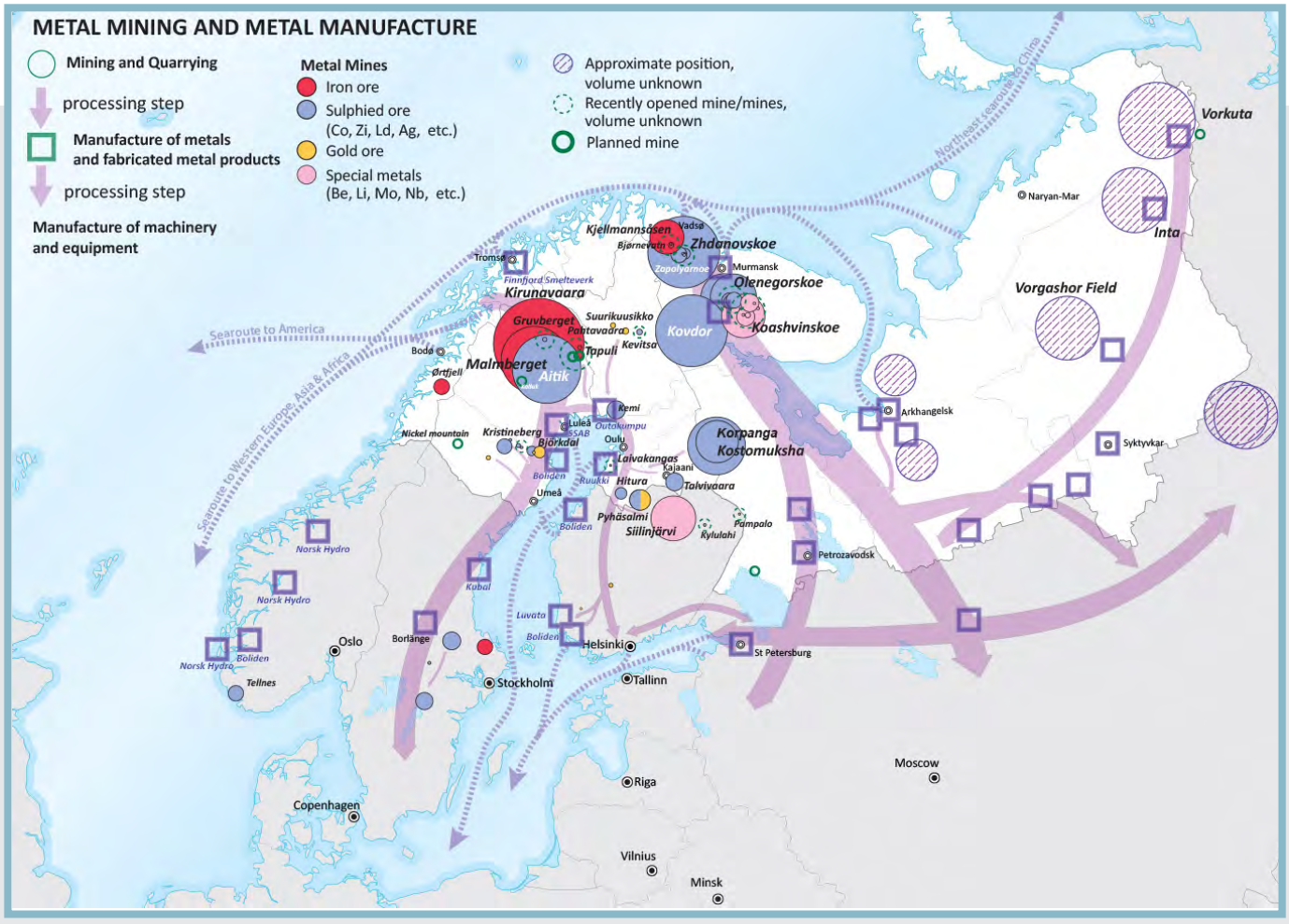


Figure 5: Metal industry and main export routes

result of general population growth, and an increased demand for seafood and other marine products in particular. These will be important drivers for increased production and value creation also in Northern Norway and the Barents Region. If the estimated increase in the aquaculture industry becomes a reality, the exports from Northern Norway alone will amount to 2.4 million tonnes of farmed fish in 2040.

A large propotion of the catch volumes and the fish farming in Norway are from the sea areas off Northern Norway and along the coast.

4.6.1 NORWAY

Fisheries have historically been a dominant industry in Northern Norway. Cod and other white fish have had the greatest impact, but pelagic fishing has increased significantly over the last 20 years. In 2012 the total amount of landed catch in the counties of Nordland, Troms and Finnmark was approximately 1.1 billion tonnes. In 2012 the sales of slaughtered fish from fish farming in the counties of Nordland, Troms and Finnmark amounted to 474 000 tonnes.

The export of pelagic fish is mainly by ship, while the export of white fish is by lorry, train and ship, depending on the market and product. For the markets in Europe there is a tendency to use road transport to a greater degree.

The export of fresh salmon from Northern Norway to the markets in Europe is by lorry and/or rail. The bulk of the salmon destined for the Russian markets is sent by lorry via Finland and crosses the border via St. Petersburg or is sent by airfreight to Moscow. There is some seafood transport crossing the border via Storskog/Borisoglebsk.

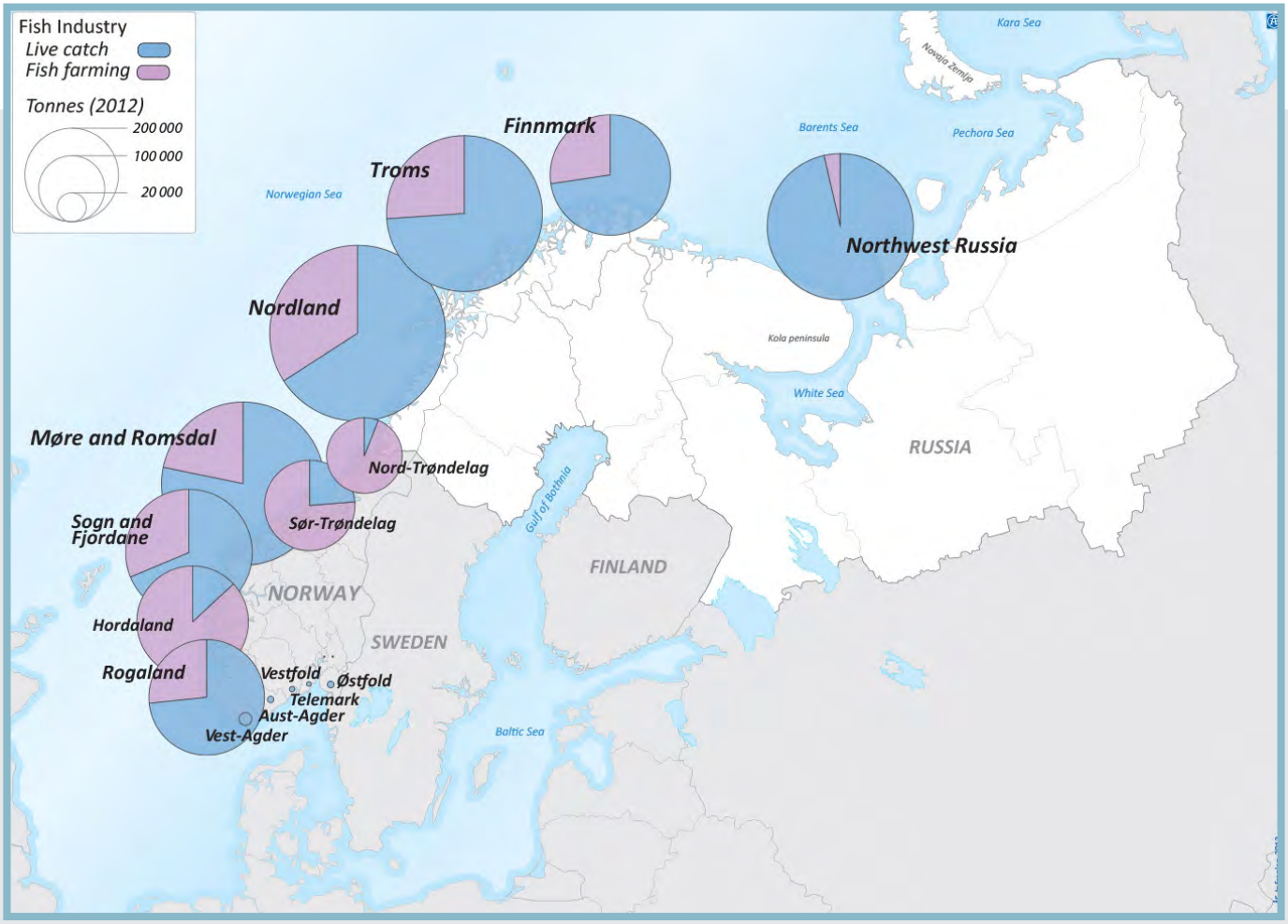


Figure 6: Volumes of seafood (wild and farmed) in Northwest Russia and Norway

For the counties of Troms and Finnmark, the border crossings at Kivilompolo (Fv 93) and Kilpisjärvi (E8) are important. In Nordland county the regions of Helgeland and Vesterålen are the main clusters for fish farming. The largest proportion is transported south on the E6 to southern Sweden and the rest of Europe. A large proportion is also transported on the Nordland and Ofoten lines. A significant volume of fish is transported by lorry on the E10 to Sweden and a smaller volume via the R77 and E12.

Transport of fish by train from Northern Norway (the Iron Ore line, the Ofoten line and the Nordland line) to Oslo has shown strong growth in recent years.[18] The amount of fish exported by road compared to rail is approximately 50%.

Transport to the overseas markets in Asia and the USA is by air, either from Gardermoen, Oslo, or from Frankfurt in Germany. There is also a seafood transport corridor from the large production on Skjervøy island that uses the road corridor E6/E8, and the cargo is reloaded for departing flights from Helsinki to Japan. Increased export volumes from Northern Norway may make direct air transport from Northern Norway or neighbouring countries of more interest.

The transport of seafood from Northern Norway to the markets is largely dependent on the standard and capacity of the road and rail networks in neighbouring transit countries (Sweden and Finland). A significant increase in the production and export of seafood from Northern Norway will require efficient transport to markets, sufficient capacity and a high level of traffic safety in the corridors used.

4.6.2 RUSSIA, SWEDEN AND FINLAND

Fisheries and farmed fish in Russia, Finland and Sweden are mostly for national consumption. Russia does, however, have plans for a major increase in the production of farmed fish which can change this in the future.

4.7 FOREST INDUSTRY

Country	Forest resources
Russia	6 000 million m^3
Finland	730 million m^3
Sweden	590 million m^3
Norway	50 million m^3

Table 2: Forest resources

The forest industry is of great economical and sociocultural importance in the Barents Region, especially in Russia, Finland and Sweden as shown on the map on the next page. In Northern Norway forestry is more limited and of merely local importance.

The forest area of the Barents Region amounts to more than 100 million hectares. Only 20% of this forest area is in the Barents part of the Nordic countries, but these 20 million hectares correspond to 70% of the forest area of the EU. The Nordic countries' role as a supplier to the EU is therefore important and needs to be developed further. Figure 8 shows net export values to the EU.

The most significant tree species in Barents are pine, spruce and birch. The slow growth in this northern location gives high quality timber.

The forestry industry in Northern Sweden and Finland is located along the Gulf of Bothnia. The production consists mainly of pulp, paper, saw timber and bio-energy products. In northwest Russia the forest industry is located in Murmansk and Arkhangelsk Oblasts and in the Republics of Karelia and Komi. The products are timber, pulp and paper. Four out of five of the largest forest industry plants in Russia are located in the north-western provinces. More than half of Russia's forest-based industrial products come from the north-western provinces.

18 In 2012 approximately 120 000 tonnes, source: The Norwegian Railway Administration

Markets

Most of the forest-based products in the Barents Region is exported. Sweden, Finland and Russia are among the world's largest exporters of pulp, paper and sawn timber in terms of volume, next to Canada. Sweden exports about equal shares of sawn timber and paper, while Finland exports relatively larger volumes of paper and Russia larger volumes of sawn timber. Both Sweden and Finland have imported large volumes of timber from Russia for use in industrial production. The most important market for forestry-based products is the EU.

Export flows for timber and manufactured timber products are often rail or sea, but domestic transports are often by road. Manufacturing in Sweden and Finland is normally carried out in factories on the coast, often with port facilities.

Arkhangelsk is the largest cargo port for timber and products from Northwest Russia to western markets. For domestic transport in Russia rail and rivers/canals is used to a large extend.

There is a growth potential for the forest industry in the Barents Region in spite of the fact that most recent investments in the forest industry globally have been made in South America and Asia.This is firstly because large forest areas in the eastern parts of Barents have not yet been harvested due to lack of transportation, and secondly because it is estimated that global climate change will increase forest productivity by some 20-50% in the future. Finally, further refining may lead to growth.

In order to maintain the economic competitiveness of the forest industry in the north, logistics costs must be minimized. Railways are used for transport where it is economical. To reduce road transport costs, there is a need to use larger and heavier lorries for the transport of round timber and other raw materials as well as for manufactured products.

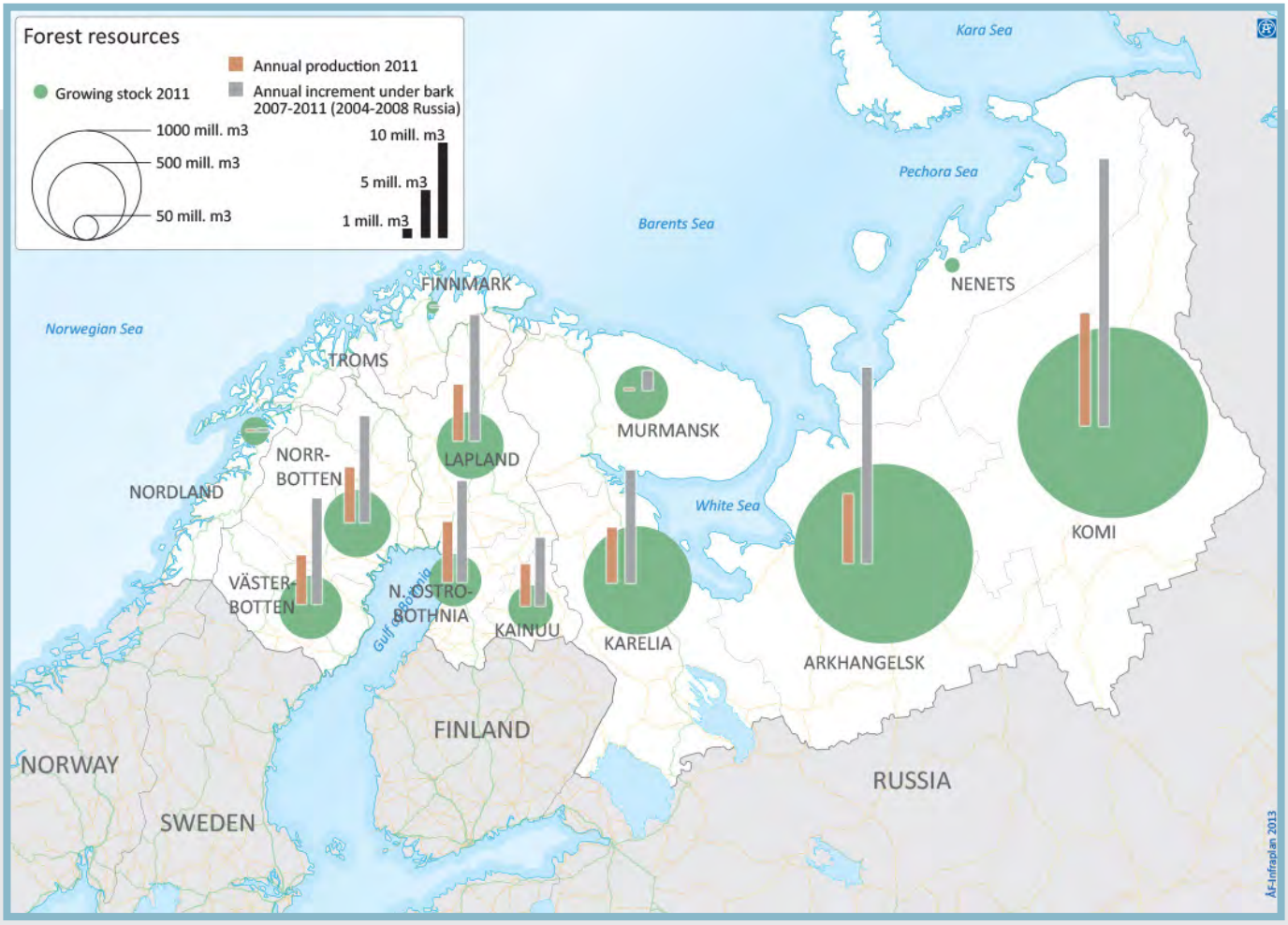


Figure 7: Forest resources, annual growth and production

Finland allows the use of 76 tonne lorries on all roads. Sweden has allowed 90 tonne lorries on selected routes. Timber lorries up to 100 tonnes will also be tested on several routes in Finland. Norway recently permitted heavier lorriesto be used by the timber industry on selected routes, but only up to a maximum of 60 tonnes. Larger and heavier loads set new challenges for the load-bearing capacity of roads and bridges as well as road maintenance, especially in winter.

4.8 PETROLEUM INDUSTRY

As Figure 9 shows, Russia and Norway are major suppliers of energy in the form of oil and gas to the European Union. Worldwide, Russia is the world's second largest exporter of oil and the largest exporter of gas. Norway is the seventh largest exporter of oil and the third largest exporter of natural gas.[19]

Finland and Sweden import crude oil, refine it and export petroleum products. Finland imports mainly from Russia, and Sweden mainly from Norway, Denmark and the UK.

A relatively large proportion of the existing production takes place in the Barents Region. The region is, however, still considered an immature petroleum province, and oil and gas exports from the Barents Region are expected to increase in years to come. The Norwegian Sea, the Barents Sea and the Timan-Pechora province in Nenets and Komi are all areas of rich petroleum resources.

The regions east of Barents in the Kara Sea and on the Yamal Peninsula also have large deposits. Much oil and gas from these areas is transported via the Barents Region.

19 Statistics for the year 2011

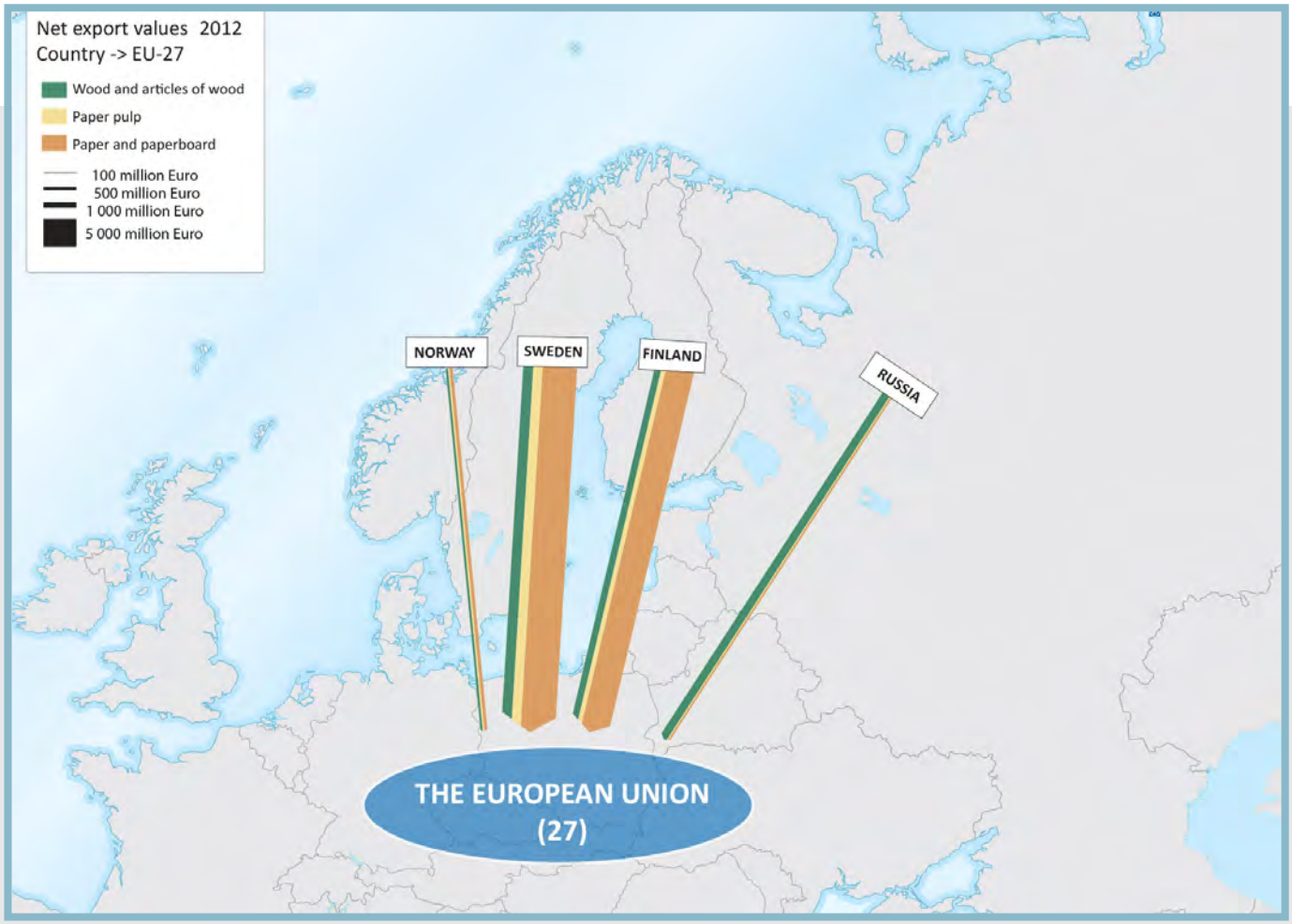


Figure 8: Export from the forest industry from Russia and Nordic countries to the EU

The Norwegian Petroleum Directorate recently updated their prognosis for the undiscovered resources in the Norwegian Barents Sea, and the new prognosis strengthens their earlier conclusions regarding large reserves of oil and gas in these areas.

Actual production based on the existing resources in Barents is dependent on various external factors such as price and politics, but this will not be elaborated upon in this context. The Treaty signed between Russia and Norway in 2010 on the delimitation line in the Barents Sea is, however, one factor that widens the possibilities of oil and gas production in Barents.

Well-known petroleum fields in the Barents Region are the **Prirazlomnoye** offshore oil field which is the first oil-producing field on the Russian continental shelf in the Barents Sea (to start production in 2013), the **Snøvit** offshore gas field which is the first gas-producing field on the Norwegian Barents continental shelf (opened in 2007), the **Goliat** oil field which is the first offshore oil field on the Norwegian Barents continental shelf (opened in 2013), the onshore oil fields in Timano-Pechora in Nenets and Komi and the enormous **Shtokmanovkoye** offshore gas and condensate field on the Russian continental shelf which may come into production in the future.

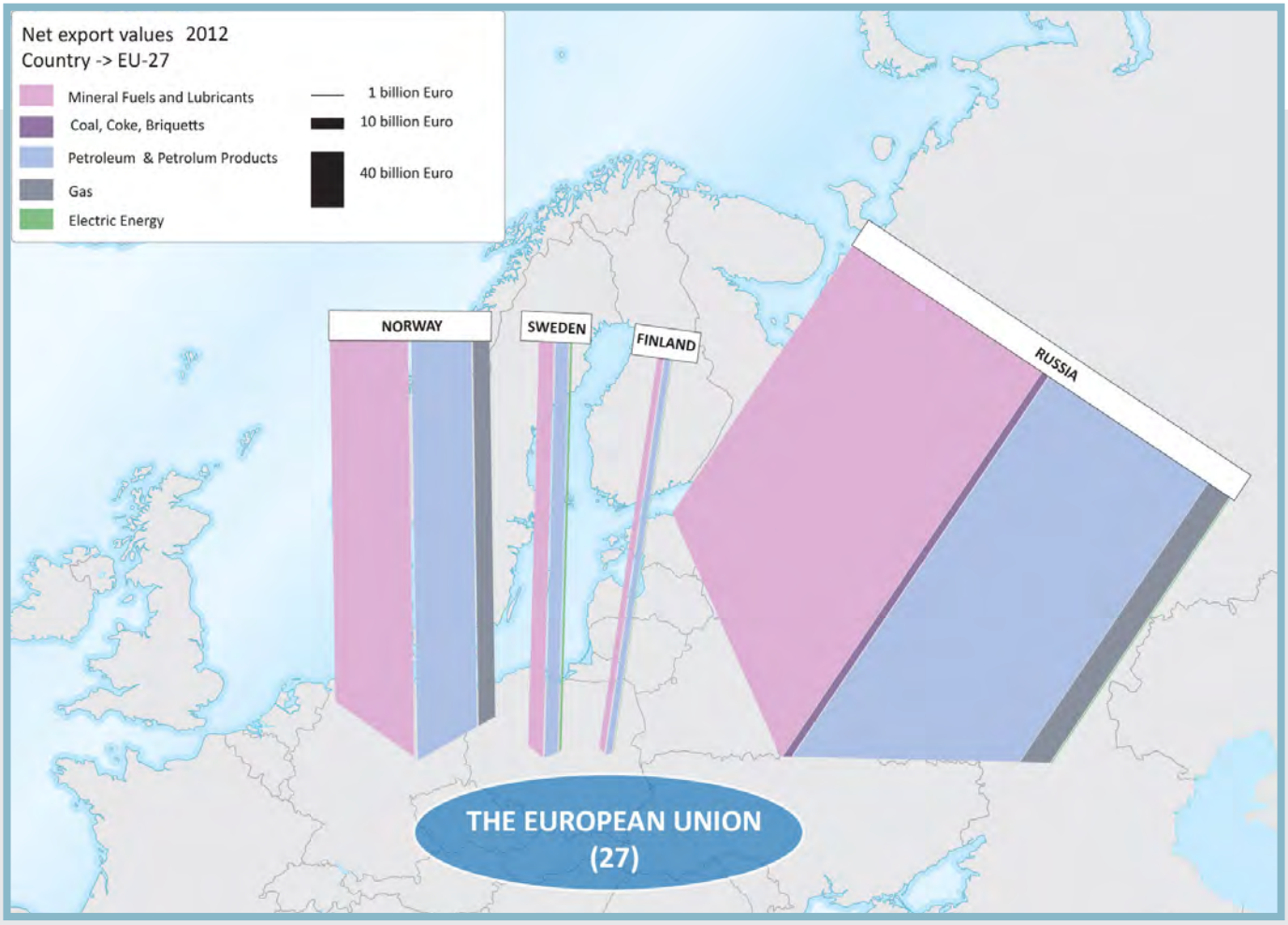


Figure 9: Export values of energy from Russia and the Nordic countries to the EU

The table[20] shows oil and gas reserves, current production and expected future production.

Petroleum region in Barents	Reserves	Annual production 2012	Annual production 2020 (expected)
Barents Sea			
- offshore gas field Shtokmanovskoye	3900 billion Sm^3 gas and 56 million tonnes condensate	0	23,7 billion Sm^3 gas,0,2 million tonnes condensate
- offshore gas field Snøhvit	172,8 billion Sm^3 gas, 21,8 million tonnes condensate, 8,7 million tonnes NGL	5,85 billion Sm^3 gas, 0,98 million tonnes condensate, 0,3 million tonnes NGL	5,85 billion Sm^3 gas, 0,98 million tonnes condensate, 0,3 million tonnes NGL
- offshore oil field Goliat	30,2 million Sm^3 oil, 7,3 billion Sm^3 gas, 0,3 million tonnes NGL	0	6,4 million tonnes oil
- offshore oil field Johan Castberg	55-80 million tonnes oil	0	not defined
Timan-Pechora province			
- offshore oil field Prirazlomnoye	77 million tonnes oil	0	6,5 million tonnes oil
- onshore oil fields connected to Varandey	~300 million tonnes oil	5 million tonnes oil	10 million tonnes oil
Norwegian Sea (Barents part)			
- offshore gas and oil field Norne	90,8 million Sm^3 oil, 11,8 billion Sm^3 gas, 1,8 million NGL	0,9 million tonnes oil, 0,16 billion Sm^3 gas, 0,02 million tonnes NGL	0
- offshore gas field Aasta Hansteen	45,4 billion Sm^3 gas, 0,9 million Sm^3 condensate	0	not defined

Table 3: Petroleum reserves and production in the Barents Region

The petroleum industry is a major factor for the economy of the Barents Region. It also has a positive impact on industries supplying various products needed in the exploitation and production of petroleum. This impact is not limited to the areas adjacent to the production fields, but to the whole Barents Region.

Efforts are being made to open new areas for petroleum activity on the Norwegian and Russian continental shelf in the Barents Sea. "Barents Sea south-east" is an interesting area for opportunities for Norwegian-Russian cooperation, as well as in terms of industrial development. Cooperation agreements have been concluded between Russian Rosneft, ENI and Statoil for development of the areas along the Russian side of the delimitation line. Depending on the commercial discoveries and methods of operation, the business is expected to provide significant spillover effects in the Finnmark - Murmansk area.

Development of the area south-east of the Barents Sea represents a major challenge in terms of efficient logistics and requirements for developing infrastructure in border areas, transportation and energy. To accommodate future activities in the eastern Barents Sea there will be a need to develop ports and supply bases, heliports for transporting personnel to the fields and upgrading of airports in the area. The power supply to Finnmark will be crucial for the development of petroleum activities on the Norwegian continental shelf in the Barents Sea.

Apart from pipelines, the Northern Maritime Corridor is currently the main corridor for the transport of oil and gas from the Barents Region. The Northern Sea Route will possibly acquire a greater importance as a corridor for petroleum shipments to Asia than it has today. The Norwegian island of Spitsbergen may play a future role as a supply base and search and rescue centre in the Barents Sea.

20 Source: Akvaplan Niva, http://www.akvaplan.niva.no/no/resource_centre/document_archive/filter/0/0/11/date

Cargo volumes exported through the Barents Sea are 19 million tonnes annually, of which 15 million are Russian oil and petroleum products and 4 million are Norwegian liquefied gas[21] . In a ten year perspective, Russian Arctic terminals will be able to reach the capacity of 100 million tonnes a year. In 2010, 326 oil tankers and gas carriers used the Northern Maritime Corridor for transports. The current onshore and offshore oil and gas terminals operating in the Barents Region are:

- Pechora Sea
    - o Varandey
    - o Kolguev
- White Sea
    - o Arkhangelsk (Talagi)
    - o Vitino
- Barents Sea
    - o Murmansk
    - o Kola Bay (Belokamenka, Mokhnatkina Pakhta, TBK-1)
    - o Melkøya

Although much of the goods and freight transportation related to petroleum activity will be by sea, a not insignificant proportion will be over land. Norwegian studies have found the following transport infrastructure and transport services to be of importance to the petroleum industry[22]:

- Robust and good road connections to the relevant ports
- Flight services for personnel and for special deliveries of time-sensitive cargo
- Efficient ports that can serve as supply bases, transhipment hubs and service centres for offshore installations
- A high level of safety at sea including efficient emergency preparedness and efficient search and rescue

4.9 TOURISM INDUSTRY

Tourism is an important and rapidly growing industry. Information on current volumes of commercial guest nights is shown in Figure 10. Nature-based tourism has experienced particularly high growth in recent years . The entire Barents Region has large and untapped resources in this area. The northern lights, the midnight sun, arctic climate and wilderness are among the spectacular selling points of the region. To take advantage of the growing international tourism there is a need for increased international access and direct flights to and from Europe.

The Barents Region has great potential as a tourism destination in Central Europe. Lapland, North Cape, the fjords of Northern Norway, the Arctic Ocean and the Lofoten Islands are fairly well known. However, many parts are yet to be discovered, e.g the northern parts of Russia.

Tour operators are interested in new destinations. Travellers want new experiences when most of the main European destinations are already well visited. The North is interesting because it is exciting, exotic and different. From the European angle its attractions are the ice and snow, the wilderness and unique Arctic nature with all its attractions and activities.

There are different forms of tourism in the Barents Region. Finnish Lapland is a winter product whereas in Finnmark, Norway, summer is the high season especially for North Cape and the Hurtigruten. However, winter tourism is an increasing trend also in the northern part of Norway. Popular products in the Nordic countries include ice-hotels, fjords and islands, wilderness, wildlife, indigenous people, arctic coast and coastal culture, skiing and ski-resorts, kayaking, ocean, river and inland fishing, arctic expeditions, snowmobiling, hiking, etc.

21 "Oil transport from the Russian part of the Barents Region, status per January 2011", A. Bambulyak and B-Frantzen (2011)

22 "New infrastructure in the North", The national transport administrations (2010-2011)

The Kola Peninsula and Murmansk area have developed tourist strategies with the aim of increasing the number of tourists visiting the Russian part of the Barents Region. Fishing camps, wilderness, skiing and sport are some of the elements of these strategies.

Border crossings to/from Barents-Russia have increased rapidly since 2009[23] . The number of border crossings at Storskog/Borisoglebsk reached 250 000 in 2012 and Salla had 225 000 border crossings in the same year. Increased tourism, in addition to an increase in both commuting and cargo transports, is the reason for the growth in the number of border crossings. This assumption is supported by studies such as a study on the impact of Russian tourism to Finland. The study shows that about 350 000 Russian tourists spend EUR 6-700 million a year in Finnish Lapland. The impact of Russian tourism in Northern Norway and Northern Sweden seems more moderate but is increasing rapidly.

Improved accessibility and efficient transportation infrastructure are two key preconditions for the development of tourism in the Barents Region. Although the state of transport infrastructure has achieved a certain level, there is still a lot of room for improvement.

A recently published report, the "Barents Tourism Action Plan", emphasized some main issues to improve. Among the most important challenges and development needs is the lack of high-quality air connections in an east-west direction. The Barents Joint Working Group on Tourism has raised the issue of developing the east-west flight connections as the most important development challenge. Better east-west connections would improve tourism in the whole region by enabling better co-operation and building joint tourism products. With good connections the Barents Region would become an even more attractive destination for international tourists. Combining together the tourism products from several countries through east-west flight connections would attract new customer segments, especially from Asia.

23 Martti Hahl, Economic Cooperation in the Barents Region 2003–2012

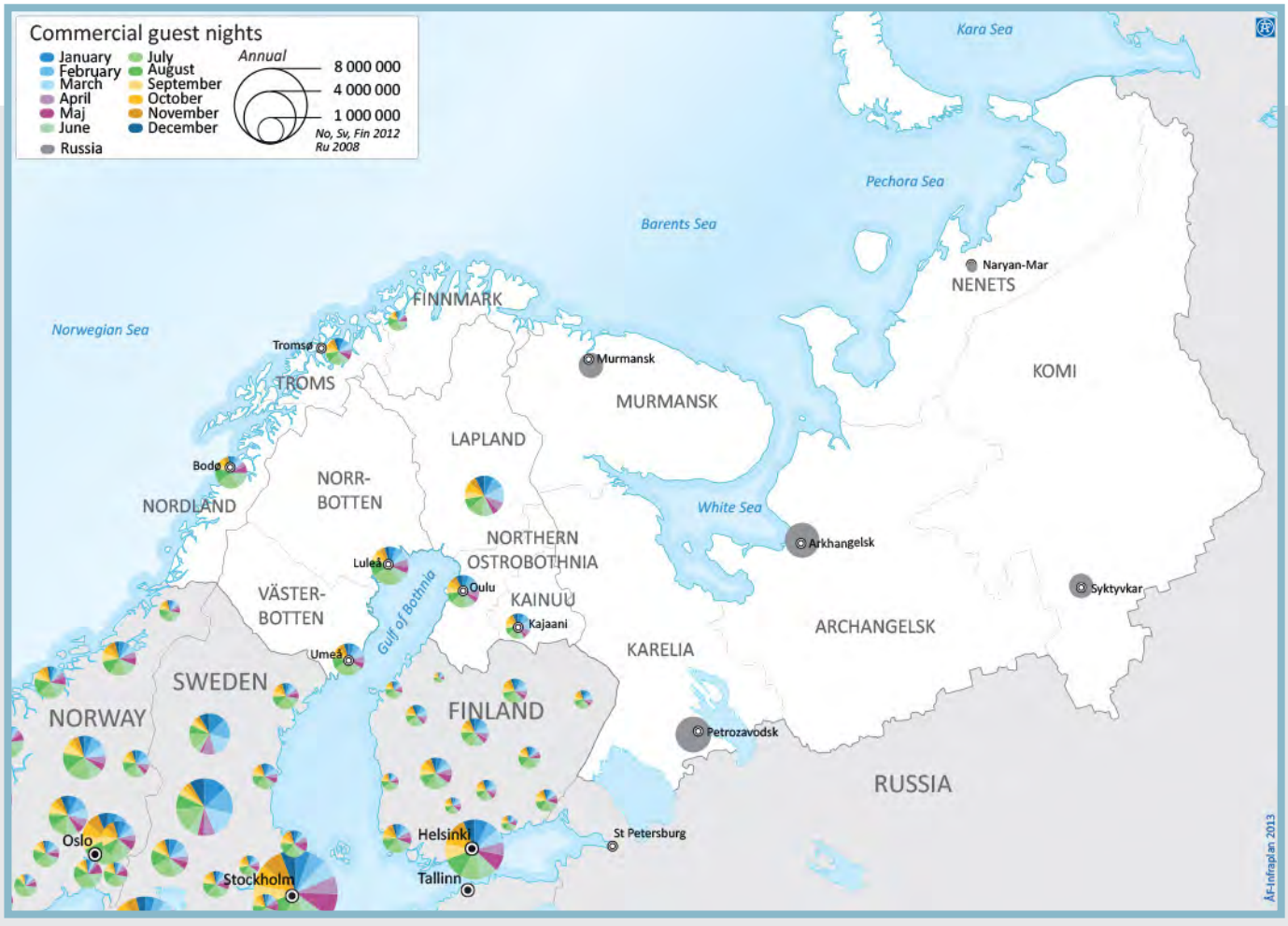


Figure 10: Commercial guest nights and tourist seasons

The transport costs in the Barents Region are high and road conditions vary considerably within the Barents area. Infrastructure needs improvement, especially in the Russian municipalities. There is a lack of rest areas, petrol stations and other roadside facilities along many of the roads, and very few are considered as meeting the needs of travellers with physical limitations and disabilities.

To boost the development of tourism between Russian and the Nordic countries there is a need to simplify the visa regime between Russia and the Schengen area of the Barents Region.

There are common interests in developing the tourism industry in the Barents Region. In this context it is important to maintain and intensify bilateral and multilateral frameworks for business cooperation at the regional level.

4.10 OVERALL TRANSPORT FLOWS

Export flows out of Barents

Population density in the Barents region is low, and main markets for the rich raw materials and refined products based on these raw materials need to be found in other parts of the world. EU27 and the central regions of Russia are the closest and most important markets. Large quantities of time-sensitive seafood are destined for both western and eastern Europe. Europe is also the main destination for exports of raw materials and manufactured products from the mining, metal and forest industries that are to be further processed. Raw materials also have important markets in Asia and America.

National flows between Russia, Finland, Sweden and Norway

The table below shows exports between the neighbouring countries in million tonnes. These are total national figures, not figures for Barents. Statistics for the Barents part of each country are unavailable.

Million tonnes	TO - Import				
FROM - Export	Norway	Sweden	Finland	Russia	TOTAL
Norway		13	2	1	17
Sweden	7		8	1	17
Finland	1	6		3	10
Russia	2	12	28		42
TOTAL	10	32	38	5	86

Table 4: Million tonnes of export/import between Russia, Finland, Sweden and Norway, cargo in transit is not included

Intra-Barents flows

Some raw materials and manufactured products are traded between the Barents parts of the four countries. Examples are ore from Russia and Sweden for processing in Finland, or seafood from Northern Norway to northern parts of Russia, Finland and Sweden.

The largest intra-Barents flows are, however, transit flows. Half of the farmed salmon produced in Northern Norway transits Northern Sweden and/or Northern Finland on its way to the market.[24]

For instance, a volume of farmed salmon is transported by road all the way from Northern Norway to Helsinki for further transport by plane from Helsinki to Asia. Other examples are the iron ore from Northern Sweden transiting Northern Norway on its way to EU27 and beyond. Russian oil and gas are transported along the coast of Norway, but mainly through international waters.

24 Mathisen m.fl. "Fresh fish transports from Northern Norway to the European continent- cargo flows and challenges related to intermodality" (2009)

Cargo flows by rail

The map below (Figure 11) shows cargo volume by rail in the Barents Region and beyond. Main flows are on the October Railway, along the Bothnian corridor and on the Iron Ore line/the Ofoten line.

Passenger and cargo by car

The map below shows the number of vehicles (cargo and passenger vehicles) between the countries[25]. The map does not provide as good an overview of road transport flows as the rail map does for rail, but still gives some information on the volume of people and cargo crossing borders. It can also be used to monitor developments. Compared with statistics of annual daily traffic a few years back, traffic over the border point between Russia and Norway has considerably decreased.

4.11 TRANSPORT HUBS

There are a number of different hubs in the Barents transport system where re-loading between different types of traffic can take place. In larger places there are strategic cargo nodes which are intermodal, and in other places there are railway stockyards or port facilities. The Figure 13 map on the following page shows cargo turnover in the largest ports in the Barents Region. The intermodal transport system linked to these key ports will be further described in the following chapter on transport corridors.

25 The map includes local traffic by road over the borders. Local traffic is substantial on some of the border points. Local traffic in the form of commuting and shopping is particularly high on the border point at Haparanda/Tornio, but also on some of the border points between Norway and Sweden/Finland there is some local traffic.

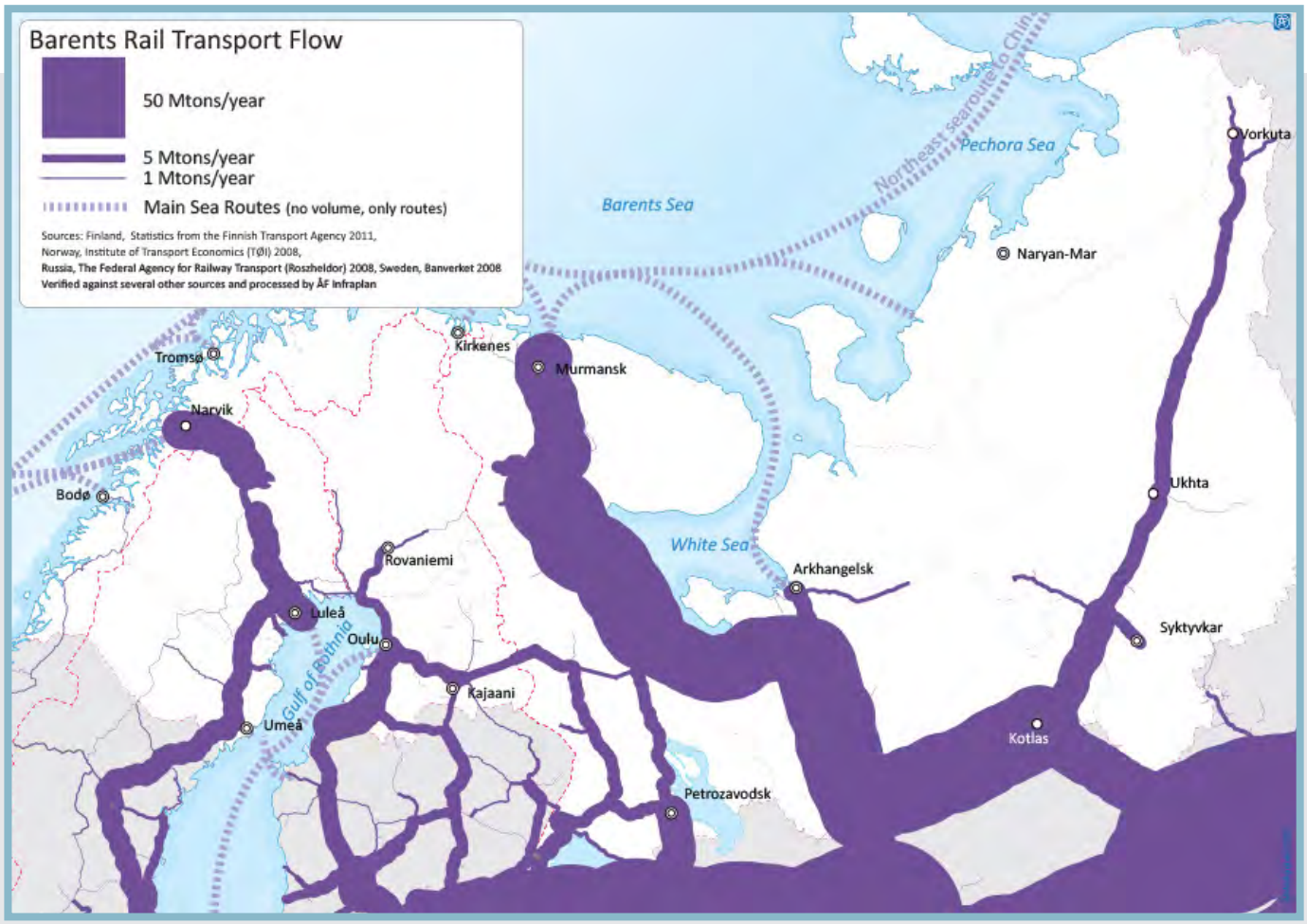


Figure 11: Cargo flows by rail

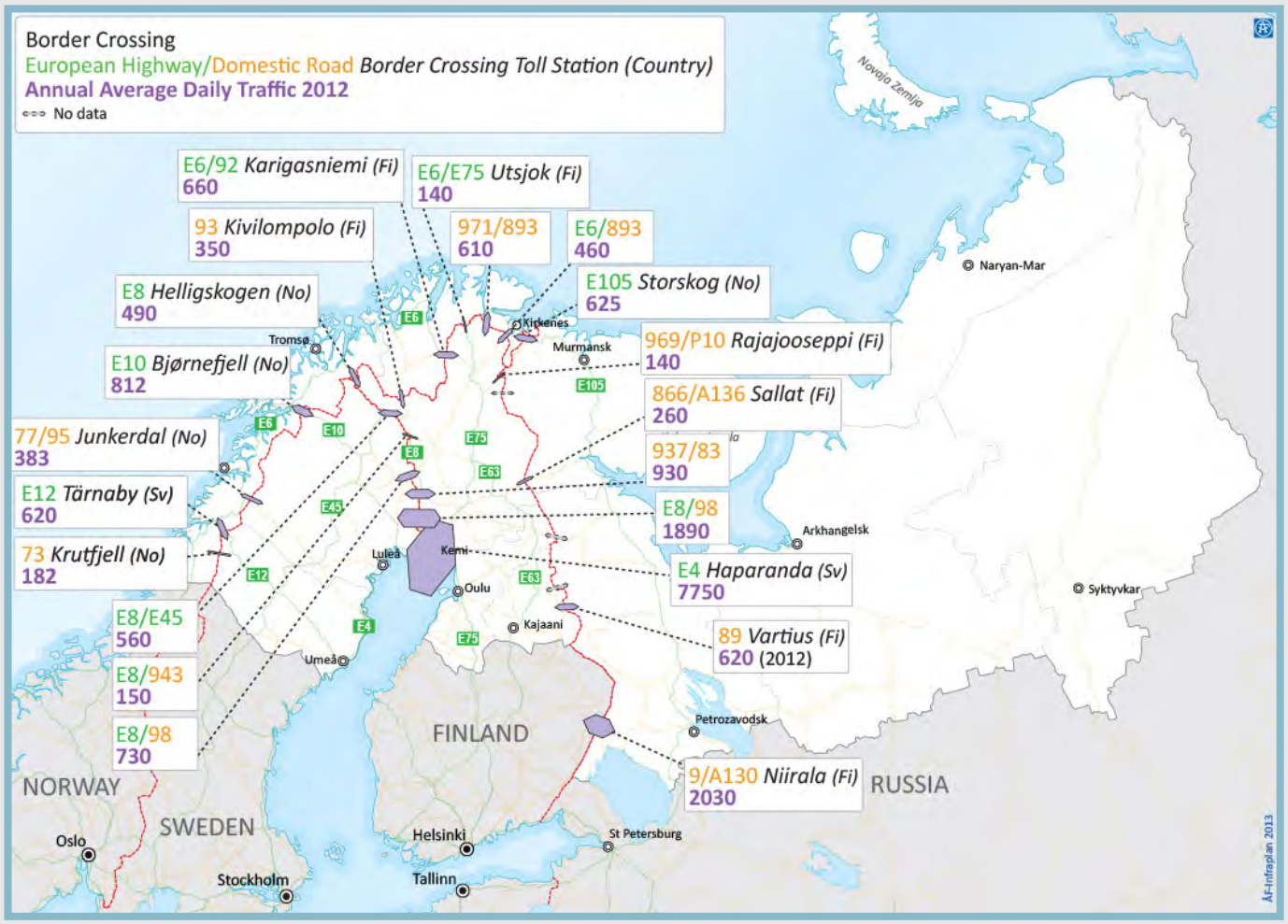


Figure 12: Border-crossing by road per day

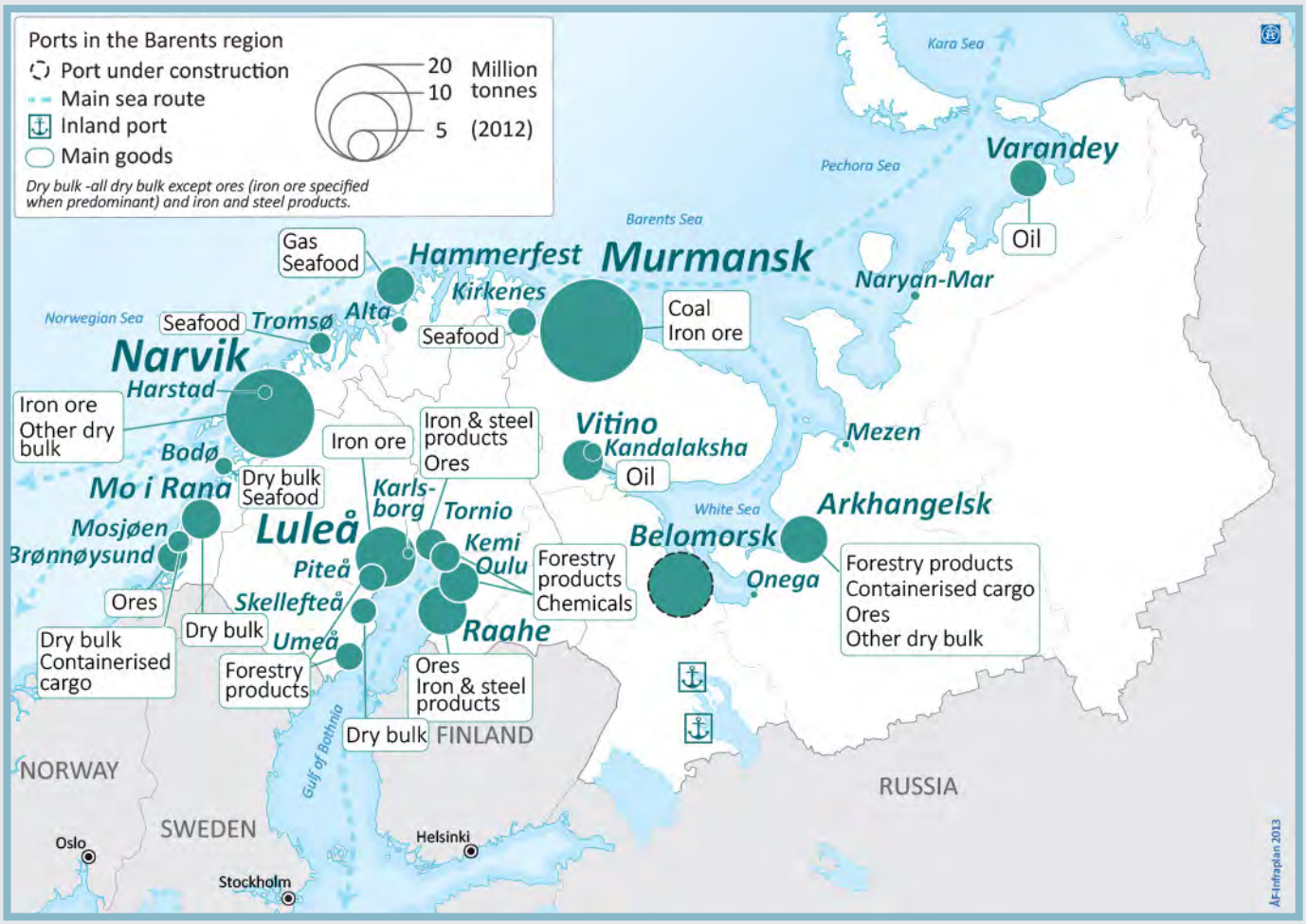


Figure 13: Cargo turnover in ports

5 MAIN BORDER-CROSSING CORRIDORS IN THE BARENTS REGION

Introduction

The first two maps in this chapter covering transport networks prioritized by the EU and the Russian Federation provide an introductory overview.

In the work of the Expert Group, the main border-crossing corridors in the Barents Region have been a focus of attention. The main border-crossing corridors are described in this chapter.

Note that for some of the corridors, such as the Bothnian Corridor encompassing road and rail from Helsinki to Stockholm, only part of the corridor is within the Barents Region. The transport plan focuses on the Barents part of the corridor.

Figure 14: Prioritized road network by the EU and the Russian Federation

Some of the corridors overlap somewhat. In these cases the overlapping part is included in only one of the corridor descriptions. Reference is made in discussions of the other corridor(s) to where descriptions can be found.

The table on the next page provides a brief presentation of the transport corridors considered most important by the Expert Group. The corridors are shown in Figure 16.

The Expert Group would like to emphasize the following three connections:

- the railway connection the Iron Ore line/the Ofoten line (see Chapter 5.2)
- the Northern Maritime Corridor with Murmansk as its main hub (see Chapter 5.4)
- the Bothnian Corridor (see Chapter 5.1)

Figure 15: Prioritized rail network by the EU and the Russian Federation

Corridor / Chapter[27]	From – To	Corridor name if existing	Name of roads and rail sections	Transport mode	TEN-T[29] status or proposed status	Km
5.1	Oulu- Haparanda/ Tornio – Umeå	The Bothnian Corridor	Road: E4, E8, E75 Rail: Bothnia line, Haparanda line and the main line through upper Norrland, Tornio–Oulu line	Road and rail	Proposed included in the core network	Road: 766 Rail: ca. 800
5.2	Luleå – Narvik	-	Road: E10 Rail: The Iron Ore line, the Ofoten line	Road and rail	Proposed included in the core network	Road: 520 Rail: 473
5.3	Vorkuta – Kotlas– Syktyvkar – Arkhangelsk – Vartius – Oulu	-	Road: E 105 (R-21 "Kola", M-10 "Russia"), 89, E8, E4, E10, E6 Rail: -	Road and rail	Proposed included in the core network	Road: 1 729 Rail: 1 517
5.4	Arkhangelsk – Murmansk – The European Continent	The Northern Maritime Corridor	Sea corridor, therefore no number	Sea	"Motorway of the Sea" axis	Approx. 3 500 nm
5.5	Luleå/Kemi/Oulu – the European Continent	The Motorway of the Baltic Sea	Sea corridor, therefore no number	Sea	"Motorway of the Sea" axis	Approx. 1 500 nm
5.6	Petrozavodsk – Murmansk – Kirkenes	-	Road: E 105 (R-21 "Kola", M-10 Russia) Rail: October railway, Murmansk–St Petersburg line, Murmansk – Nikel line	Road and rail	Not included	Road: 1 199 Rail: 1 646
5.7	Kemi - Salla – Kandalaksha	-	Road: E75, 82, E105 Rail: Kemi–Rovaniemi–Kemijärvi line	Road and rail	Not included	Road: 446 Rail: ca. 450
5.8	Kemi – Rovaniemi- Kirkenes	-	Road: E75, 971, 893	Road	Not included	Road: 702
5.9	Kirkenes – Mosjøen	National corridors through northern Norway	Road: E6 Rail: The Nordland line, The Meraaker line	Road and rail	Proposed included in comprehensive network	Road: 1 684 Rail: 803
5.10	Haparanda/ Tornio – Tromsø	The Northern Lights Route	Road: E8, E6, 99 Rail: Tornio–Kolari line	Road and rail	Road proposed included in comprehensive network	Road: 620 Rail: 183
5.11	Karesuando – Alta	-	Road: 93	Road	Not included	Road: 272
5.12	Vasa – Umeå – Mo i Rana	The Blue Road	Road: E12 Rail: Storuman – Hällnäs line	Road and rail	Proposed included in comprehensive network	Road: 492 Rail: 167
5.13	Skellefteå – Bodø	The Silver Road	Road: 95, 77, E6, 80	Road and rail	Not included	Road: 379 Rail: 140
5.14	Murmansk – Raja Jooseppi – Ivalo	-	Road: R-10, A138, 91	Road	Not included	Road: 350
5.15	Svappavarra – Pajala – Kolari	-	Road: E10, E45, 395, 99 Rail: [30]	Road and rail	Not included	Road: 160

Table 5: BEATA's Expert Group's prioritized corridors

27 The corridors are not listed in order of priority
29 Trans-European Transport Network (TEN-T)
30 A possible new rail corridor will be approx. 210 km (110 km in Sweden and approx. 100 km in Finland)

The following subchapters 5.1–5.15 will describe each corridor in detail.

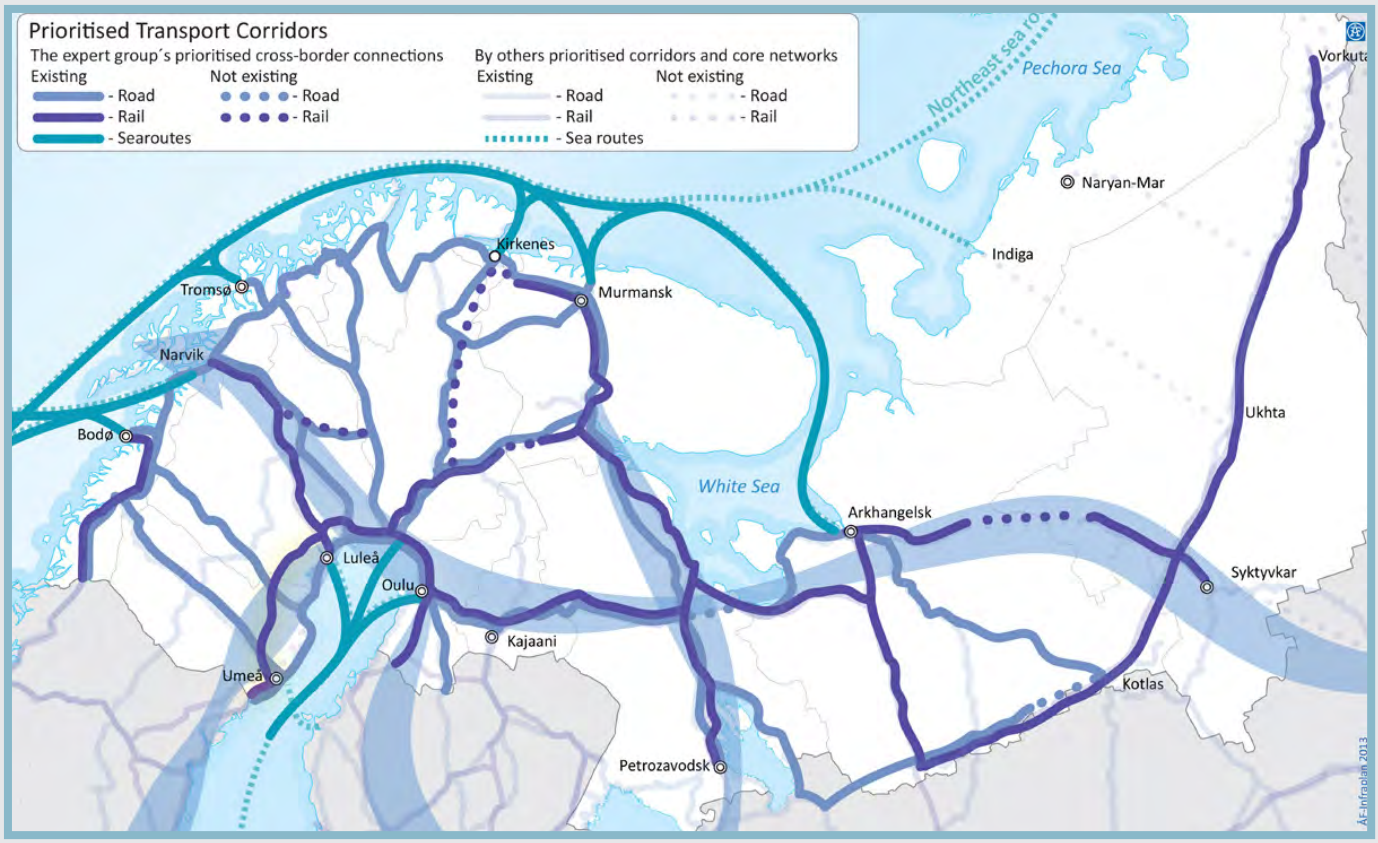


Figure 16: BEATA's Expert Groups prioritized transport network

5.1 **CORRIDOR:** "THE BOTHNIAN CORRIDOR": OULU – HAPARANDA/TORNIO - UMEÅ

Consists of:

Road

E4, E8, E75

Rail

Bothnia line, Haparanda line, main line through upper Norrland and Helsinki – Tornio line

Brief facts:

Road

Sweden (E4) Border Västerbotten/Västernorrland- Border Sweden/Finland

Length: 452 km
Width: 9 – 21.5 m
Speed limit: 90 – 110 km/h
Number of vehicles crossing the border per day: (Haparanda/Tornio): 7 750

Finland (E75, E8) Border Sweden/Finland – Border Pohjois-Pohjanmaa/Keski-Suomi

Length: 314 km
Width: 10 – 12.5 m, about 70 km in Kemi and Tornio and in Oulu it is motorway
Speed limit: 100 km/h, 60 or 80 in some places, 120 on motorways in good driving conditions
Percentage of the road with a width of 8 m or more: 100%

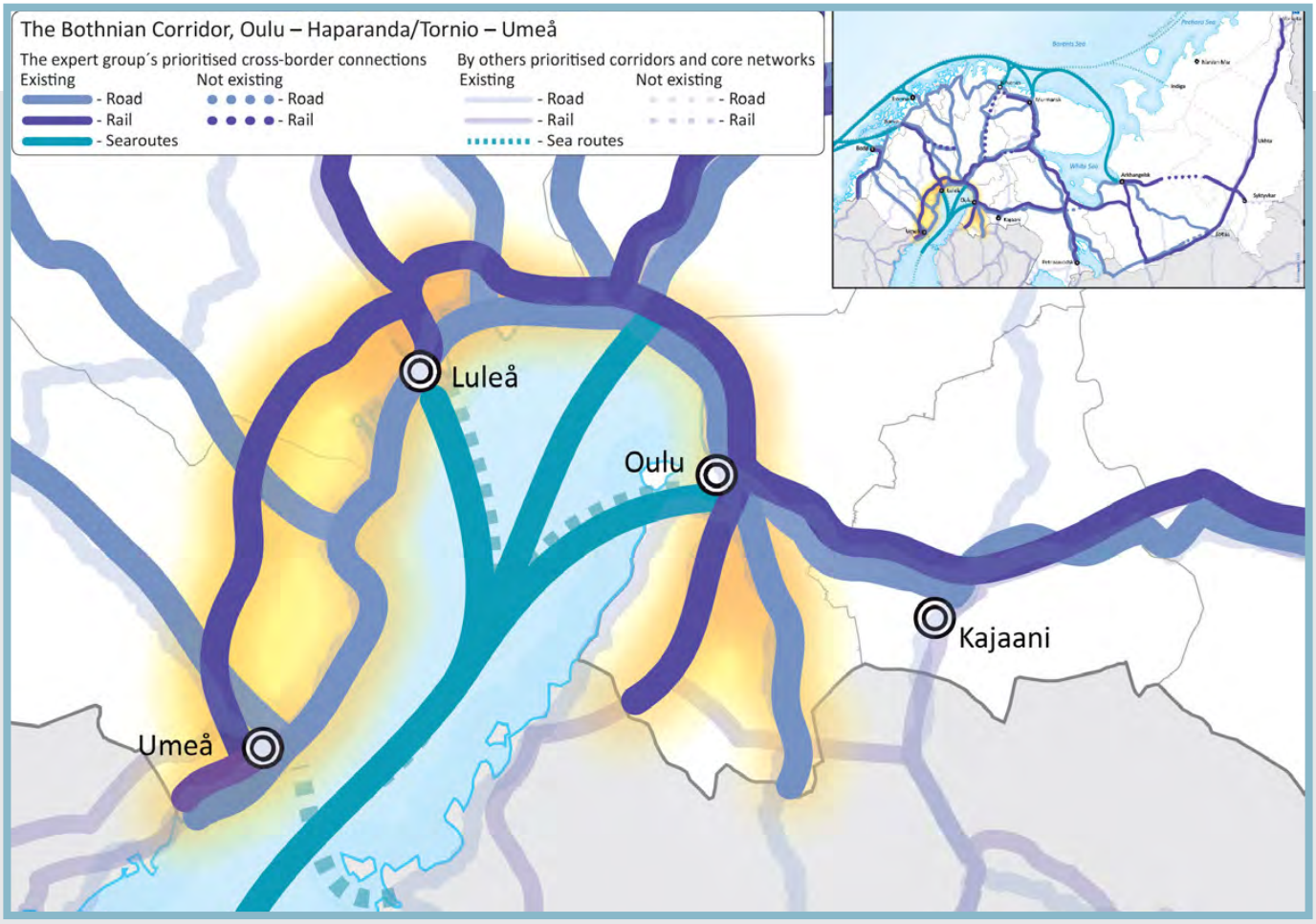


Figure 17: The Bothnian Corridor

Average number of vehicles per day where traffic is at its peak :

Umeå	8 200	Haparanda	5 700
Skellefteå	5 300	Tornio	11 000
Piteå	8 900	Kemi	12 500
Luleå	9 400	Oulu	47 500
Kalix	5 100		

Railway

Length

Sweden

Main line through upper Norrland 626 km (Bräcke-Umeå-Boden)
Bothnia line 185 km (Nyland-Umeå)
Haparanda line 161 km (Boden-Haparanda)

Finland

The total length of the Bothnian Corridor primary rail network in Finland is 812 km. About 40% of this distance is in the Barents region

Average number of passenger trains per day:

Sweden

Umeå – Vännäs:	32
Vännäs – Boden:	12
Boden – Haparanda:	0

Finland

Kemi-Oulu:	14

Average number of cargo trains per day:

Sweden

Umeå – Vännäs:	24
Vännäs – Boden:	32
Boden – Haparanda	4

Finland

Tornio – Kemi:	4
Kemi – Oulu:	6
Oulu – south:	14

Maximum permitted axle load:
Sweden: 25 tonnes Finland: 22.5 tonnes

Gauge: Sweden: 1 435 mm Finland: 1 524 mm

Maximum speed: Sweden: 250 km/h Finland: 140 km/h[29]

Signalling system: Sweden: ATC/ERTMS[30]/EBICAB 900 Finland: ATP-VR/RHK

Electrified/Not electrified:
Sweden: electrified
Finland: electrified except for Kemi-Tornio/Haparanda

Single or double track:
Sweden: Single track Finland: Single track

Ports

See Chapter 5.5.

Airports

Number of passengers per year:

Umeå	846 000
Skellefteå	225 000
Luleå	979 000
Kemi	97 000
Oulu	701 000

29 Maximum speed on most of the Bothnian Corridor is 140 km/h, 120 km on the short non-electrified section Kemi-Tornio/Haparanda

30 Automatic Train Control/European Rail Traffic Management System

General information

Number of inhabitants in cities along the corridor:

Umeå	117 000	Haparanda	10 000
Skellefteå	72 000	Tornio	22 000
Piteå	41 000	Kemi	23 000
Luleå	75 000	Oulu	131 000
Kalix	17 000		

5.1.1 GENERAL DESCRIPTION

The Bothnian Corridor encompasses road and rail from Helsinki to Stockholm. In this document only the part of the corridor that is within the Barents Region is described.

The Bothnian Corridor is a strategically important link within the transnational transport system of goods in northern Europe and proposed to be included in the TEN-T core network for both rail and road. It stretches out on both the Swedish and the Finnish side of the Gulf of Bothnia. It connects east-westbound and north-southbound transnational links in Sweden, Finland, Norway and Russia.

The corridor is the artery connecting the north of Sweden with the rest of the country and the continent. Northern Sweden supplies much of Europe and even the world with raw materials and a large part of this goes through the Bothnian Corridor. The corridor also encompasses 85% of the population of Norrbotten and Västerbotten, or about 300 000 people, which means that the route is vital for regional and national passengers. In Northern Finland the population is not as concentrated in the Bothnian Corridor as in Sweden, but major industrial centres are located on the coast of the corridor. Also in Finland the corridor is the main link between Northern Finland and the rest of the country. The road is very important for transports between Northern Finland and the main ports in the south.

The corridor is the functional connection and serves an important function:

- For commuting, healthcare-related travel and education-related travel
- For business travel (in particular the airports).
- For recreational travel and the tourism industry.
- For regional freight and long-distance freight traffic to/from Norrbotten/Västerbotten counties.
- For transit traffic to/from Norway, Finland, Eastern Europe and the rest of the Barents Region.

The Bothnian Corridor is already of great importance for transnational goods flows within the EU and to/from the EU. As European integration continues to expand, the importance of the corridor will increase further. It is important for the economy and growth of the Barents Region and it connects its main industrial areas, main cities and hubs.
The coastal region of the Gulf of Bothnia is very industrialized, both on the Swedish and Finnish side. There are large stainless steel factories, large forest industry mills, paper mills, steel mills and other important industries.

5.1.2 INFRASTRUCTURE AND STANDARD

Road

The E4 is Sweden's most important road, connecting the whole country from north to south. It follows the coastline from Stockholm through the main cities up to Haparanda, a distance of 1 020 km. The road has the same designation as it continues across the border to Finland, then as the E8 between Tornio and Kemi and finally as the E75 from Kemi via Oulu to Helsinki.

Since the E4 is of both national and international importance it has quite a high standard. In Sweden, most of it has been upgraded to at least 13 metres with a central barrier for higher traffic safety and accessibility, but there are still some parts, especially in the north, that are only 9 metres wide. In Finland most of the road is 10 metres wide, while so far only one section has been upgraded with a central barrier. 70 km of the northern part of the E75 road is four-lane motorway between Tornio and Kemi and in Oulu.

Rail
The entire Bothnian Corridor primary railway network is not electrified, since there are some shorter parts missing. It has an automatic train protection system – ATC or better. In Sweden both the Bothnia line and Haparanda line have ERTMS[31] installed. The maximum permitted axle load is 25 tonnes in Sweden and 22.5 tonnes in Finland.

The average speed limit is low and the railway network is steep in some parts, which together cause problems for freight transport operations.

In Sweden the railway from Härnösand up to Umeå is of good standard, thanks to the new Bothnian link. North of Umeå the main line through Northern Norrland has a lower standard and capacity, so there is a need for measures. The Haparanda line between Boden and Haparanda/Tornio was opened for traffic in early 2013.

In Finland the Seinäjoki–Oulu rail section has several line sections over ten kilometres without crossing sections, but this 335-kilometre rail section still has about 100 level crossings which are mostly equipped with safety equipment. The northernmost Oulu–Tornio rail section has about 70 crossing sections, most of which do not have safety equipment.

In Finland the railway standard is not adequate on the first 20 km from the border with Sweden. The railway is not electrified between Haparanda/Tornio and Kemi. In Haparanda/Tornio the facilities to handle the rail gauge difference are inadequate. The Haparada rail gauge changer is no longer functional.

Most European countries use a standard gauge of 1 435 mm, whereas in Finland the gauge is 1 524 mm. Therefore trains cannot cross the border in Haparanda/Tornio without a change of wheel sets or lifting cargo from one wagon to another. The Russian rail gauge is 1 520 mm, which makes it possible to use the same wagons on Finnish and Russian railways.

From Kemi to Oulu the railway has a single track. More than 300 km of the rail to the south of Oulu has been under reconstruction for many years and the work will continue for several years. Some 100 km of the reconstructed railway will be double-track.

The building of a new railway track from Umeå to Luleå, the North Bothnia line, has been considered. If such an investment is made in the future the rail capacity challenges in this part of the Bothnian Corridor will be solved.

5.1.3 TRAFFIC

Road
The traffic volumes throughout the corridor fluctuate. Road traffic volumes varied between 3 500–7 500 vehicles from Haparanda to Umeå, with the exception of the road section Luleå–Piteå, which had 9 000 vehicles. The share of heavy traffic was about 15–20% of the total traffic volume from Haparanda to Stockholm.

In Northern Finland the highest traffic volumes in the road network are on the E75 in Oulu where annual daily traffic volumes were almost 50 000 vehicles in 2011. Between Kemi and Oulu, the traffic volumes are generally from 6 000 to 11 000 vehicles per day, about 1 000 of them being heavy vehicles.

Rail
The number of freight traffic operations exceeds the number of passenger traffic operations in the northern part of the Bothnian Corridor. The Bothnian Corridor primary rail network mostly consists of single-track rail sections with the exception of a few double-track rail sections. The Bothnian rail corridor

31 European Rail Traffic Management System is a standardized system for signalling, control and train protection to enhance cross-border border interoperativity.

constitutes the primary freight corridor in Sweden and is especially important for Swedish primary industry, such as the steel, forest and paper industry.

Freight transport volumes reached about 5 million tonnes according to the most recent commodity flow survey. A significant share of the freight volumes is transported through the corridor from the northern part of Sweden to the ports on the west coast and in the south, from where transport volumes continue to other parts of Europe. Transports of steel are especially significant between Luleå and Borlänge. The main line through Northern Norrland is today the most congested single-track line in Sweden.

The highest freight traffic volumes in the Bothnian Corridor primary rail network in Finland are in the northern part of the Ostrobothnian rail line. In 2010, the Kokkola–Ylivieska rail section had the highest freight traffic volume with 6.6 million tonnes, while freight traffic volumes of 4.4-5.5million tonnes could be found on the Ylivieska–Oulu rail section. The significant freight traffic volumes on these rail sections are primarily the result of heavy transit traffic from Russia to the Port of Kokkola.

In the remaining northern part of the Bothnian Corridor primary rail network, freight traffic volumes of 3.2-3.8 million tonnes and 2.4-2.9 million tonnes were in the northern part of the main line and southern part of the Ostrobothnian line, respectively. Freight traffic volumes on the rail sections north of Oulu were about 1.6 million tonnes in 2010.

5.1.4 KEY CHALLENGES

Road

- Increase accessibility (speed) and traffic safety.
- Improve the horizontal and the vertical curves in some places.
- Reach the environmental quality standards in Umeå and Skellefteå.

Rail

- There is a serious lack of track capacity, carrying capacity and limited speed standard along the railway systems in the corridor. In Sweden especially between Umeå and Boden.
- Find an effective solution for the different gauges between Sweden (1 435 mm) and Finland (1 524 mm).
- Electrify the railway section between Tornio/Haparanda and Kemi.

5.1.5 PLANNED DEVELOPMENT

Road

- Bypass in Umeå E4/E12, 2015.
- 2+1 road with central barrier on some sections of E4 between Umeå and Haparanda.
- Reconstruction of crossings on E4.
- Improve the capacity of the E75 in Oulu by upgrading the road to six-lane motorway.
- 2+1 road with central barriers on several sections of E75 between Kemi and Oulu.

Rail

- Measures to improve the capacity Umeå – Boden
- Upgrading of stations in Sweden
- The improvement works on the 300 km long railway between Seinäjoki and Oulu will be completed by 2017.

5.1.6 FUTURE POTENTIAL

The corridor is important today and its importance will grow in the future due to the expansion of the industries in the northern areas of the Barents Region. The forecast in Sweden and Finland shows a significant growth in the northern areas due to the industrial expansion.

5.2 **CORRIDOR:** LULEÅ – NARVIK

Consists of:

Road

E10

Rail

The Iron Ore line and the Ofoten line

Brief facts:

Road

Length: 520 km
Width: 6-13 m (Sweden)
Width: 6-8.5 m (Norway)
Speed limit: 50-100 km/h
- In Sweden: 90/100 km/h
- In Norway: 60/70/80 km/h
Number of vehicles crossing the border per day at Riksgränsen/Björnfjell: 850
Average number of vehicles per day where traffic is at its peak: 4 000 (Kiruna) and 3 600 (Rombakken)

Railway

Length: 473 km
Average number of passenger trains per day: 7 (4-10)

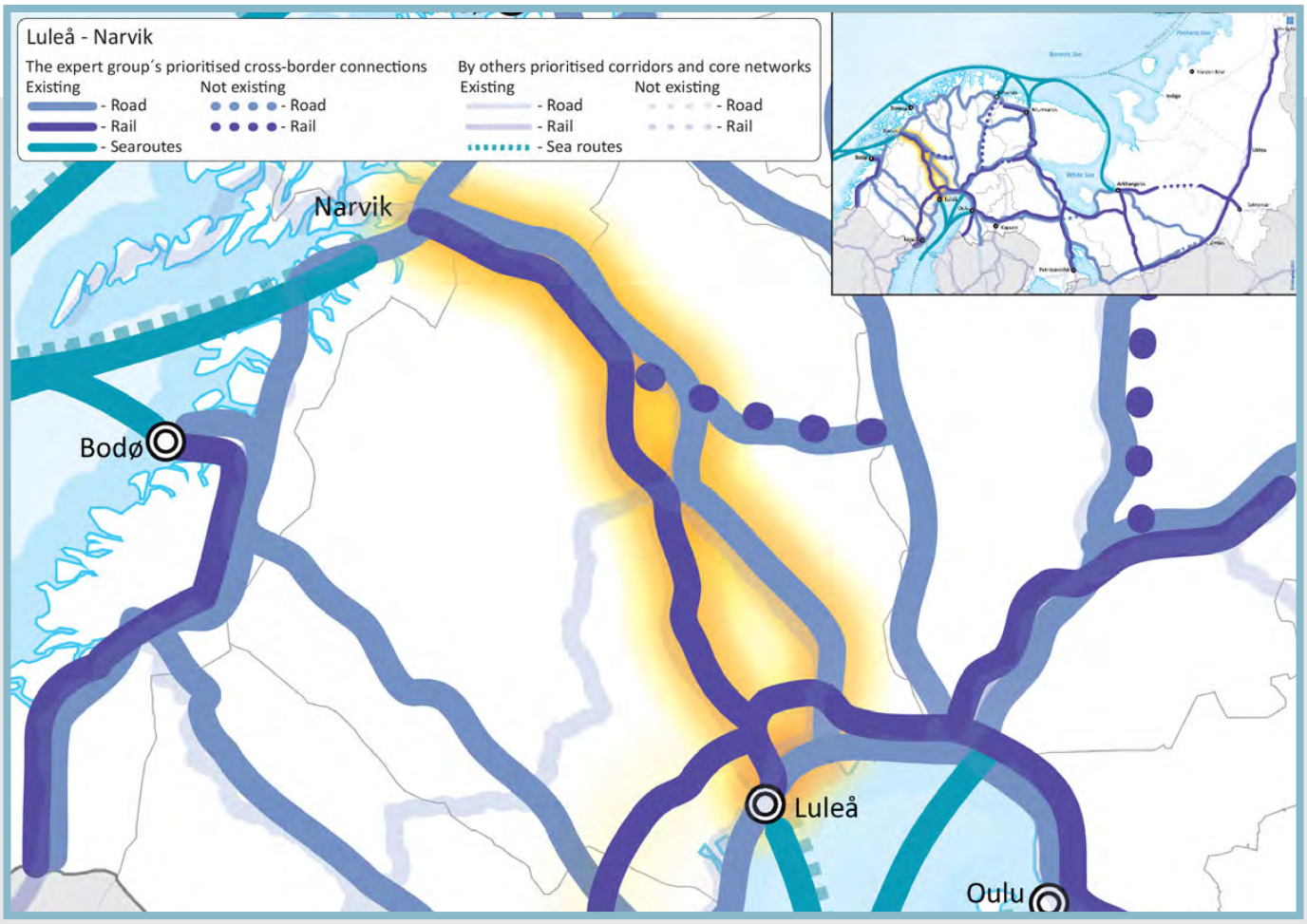


Figure 18: Luleå – Narvik

Average number of cargo trains per day: 19-50 depending on which part
Maximum permitted axle load: 30 tonnes
Gauge: 1 435 mm
Maximum speed: 135 km/h
Signalling system: ATC/FATC[32]
Electrified/Not electrified: Electrified
Single or double track: Single track
TEUs at Narvik rail terminal: 55 000[33]

Ports

See Chapters 5.4 and 5.5

General information

Number of inhabitants in cities along the corridor:

Luleå	75 000
Boden:	19 000
Överkalix	4 000
Gällivare	18 000
Kiruna	23 000
Narvik	19 000

Airports

Number of passengers per year:

Luleå	979 000
Gällivare	34 000
Kiruna	200 000
Harstad/Narvik	552 000

5.2.1 GENERAL DESCRIPTION

The corridor consists of both road and rail. It stretches from Luleå to Narvik, a distance of 520 km by road. The corridor consists of varying landscapes and climates. The corridor stretches from coast to coast and passes through sparsely populated forest and mountain areas.

The corridor is important for the economy and growth of the Barents Region and connects industrial areas, cities and hubs. The corridor serves and connects mining fields and industries in the area between the coast and ports of Luleå and Narvik. The corridor has large freight volumes, since 90% of Swedish iron ore production is located in in this part of Northern Sweden. It is also important for the local communities due to the border trade and businesses.

The corridor serves an important function:

- For regional freight and specifically ore traffic from the mining areas to ports.
- For transit traffic:
    - o transport of consumer goods (rail), general cargo (rail) and fish (rail and road) between Southern and Northern Norway via Sweden.
    - o rail/sea between the Barents Region and the European continent and between Asia and America on rail and sea.
- For recreational and tourism industry.
- For local and regional commuting, healthcare-related travel (Gällivare and Luleå hospitals) and education-related travel.
- For business travel.

Important hubs/nodes: Luleå (port), Boden, Gällivare, Kiruna, Narvik (port, rail freight terminal)

Both road and rail lacks alternative routes for freight traffic in the corridor if infrastructure breakdowns or vehicle accidents occur. The railway is especially sensitive to disturbances north of Gällivare since there are no re-routing options for trains. South of Gällivare the inland railway can be used, but with lower loads and only with diesel locomotives.

Heavy road traffic is more sensitive to disruption since it can only choose alternative routes that have an adequate load-bearing capacity. For example, a blockage between Gällivare and Svappavaara results in a route extension of 70 km. A blockage between Kiruna and Svappavaara results in a route extension of 700 km.

32 Full Automatic Train Control
33 Statistics for the year 2012

5.2.2 INFRASTRUCTURE AND STANDARD

Road
The E10 is one of Sweden's, Northern Norway's and the Barents Region's main cross-border routes for long-distance passenger and freight transport. The road is included in both the national road networks and the TEN-T. The E10 also acts as an important artery for passengers and freight to industries, workplaces, municipal and regional centres.

The road follows the route Luleå-Töre-Överkalix-Gällivare-Kiruna-Riksgränsen-Narvik. The length is altogether 520 km.

Steep sections on the E10 in combination with a narrow road make it difficult for heavy vehicles to pass and ascend the hills.

The custom office is only open in daytime.

The road is temporarly closed several times per year due to winter storms. In high-risk periods the road is closed for safety reasons at night. In the winter time the traffic quite frequently has to be accompanied by a snow-clearing vehicle.

Rail
The Iron Ore line/The Ofoten line is an electrified, single-track line divided into three sections due to the iron ore transports: the northern circuit, southern circuit and middle section. The gauge is 1 435 mm and it has an ATC/FATC signalling system.

There are 47 crossing sections in Sweden and five in Norway. Nearly half of these are too short and need to be rebuilt, especially due to the 750 metre long iron ore trains.

The Ofoten line is Norway's northernmost railway. The Ofoten line has no other connection to the Norwegian rail network, it only connects to the Iron Ore line. The Ofoten line is 42 km long, and the track is steep and curvy. The height difference between Narvik and Riksgränsen is 521 m over a stretch of 42 km, giving an average gradient of 12.3%.

The Iron Ore line extends between Boden and Riksgränsen, where the Ofoten line begins. The Iron Ore line is known as Sweden's most beautiful railway and is a major transit route to mountain facilities for those arriving by night train south. It is the only railway in Sweden that allows 30-tonne axle load and trains with a weight of 8 600 tonnes.

In the ports of Luleå and Narvik there is a need for infrastructure investments on land in order to be able to Increase the freight volumes. Luleå also requires major investments within the fairway in order for larger vessels to operate.

5.2.3 TRAFFIC

Road:
The average number of vehicles per day varies between 850 and 4 000, heavy traffic between 160 and 500 vehicles/day. The highest values are between Kiruna and Svappavaara. The average number of vehicles per day varies between 850 vehicles at the border and 3 600 vehicles close to Narvik.

Rail
The Iron Ore line/The Ofoten line is Sweden's most heavily trafficked railway due to iron ore trains. Northern Circuit (Kiruna-Narvik) has 4-6 passenger trains per day depending on season and it carries approximately 19 million metric tonnes of ore per year. Southern Circuit (Luleå-Boden-Gällivare-Kiruna) has 10 passenger trains per day and it carries around 7 million metric tonnes of ore per year. Between Kiruna and Narvik there are 22 ore trains per day in both directions and between Malmberget and Luleå 10 ore trains per day in both directions.

The other freight transport by rail is largely related to the container services “Arctic Railway Express” and “North Rail Express” between Narvik via Sweden to Oslo. The volumes for non-ore commodities are not large, at least compared to the ore volumes, but they serve as an important supply line for consumer goods, fish exports and other manufactured goods for different economic activities throughout Northern Norway north of Narvik.

The traffic requirements along the 473 km long track have increased since both longer and heavier trains will operate on the track. Since the Iron Ore line is single-track, crossing sections have a key role for efficiency and capacity.

The forecasts show a huge increase in cargo flows, especially from the mining and seafood industries. The highest increase will take place on the northern circuit between Kiruna and Narvik, since most mining companies, both existing and upcoming, are planning for shipments from Narvik. There are also plans for increased regional passenger traffic and increased investments in tourism.

All these plans will result in significantly more trains on the line and a high capacity utilization, and difficulties in operating and maintaining the line.

5.2.4 KEY CHALLENGES

Road

The overall challenges for the E10 are:

- Increase the width of the road in some sections to 8 metres
- Improve the horizontal and vertical curves in some places
- Lower the gradient in some places with steep hills
- Traffic safety, especially for inhabitants where the road passes through villages
- Drifting snow in the winter season
- Winter maintenance

Rail

- Improve robustness and reliability to an acceptable standard.
- Improve punctuality to an acceptable standard
- Increase capacity. In order to meet expected growth of the already established mining companies and to be able to service additional mining companies, investment in double tracks is necessary. Expected demand from the mining fields in Northern Sweden is 31 train pairs in 2020, an increase of 50%.
- Increase capacity of the power supply infrastructure
- Ensure increased maintenance without affecting traffic
- Prepare for 750 metre long trains including extending crossing sections to 1 000 metres.
- Develop the passenger traffic on one of Europe’s most beautiful railways in combination with serving important bulk and container flows
- The development of the railway is closely interlinked with that of the port of Narvik and Luleå and planning needs to be coordinated. Port capacity in Narvik is very limited after a new mining company in 2013 started using the port as its export gateway With continued mining in the Kaunisvaara mines, and/or with additional mininig companies wanting to use Narvik, a new port section needs to be developed.

5.2.5 PLANNED DEVELOPMENT

Road: E10

In the Swedish Transport Administration’s current long-term plan for existing infrastructure investments 2010-2021, the following is planned for the E10:

- New bypass in Kiruna, due to mining expansion and movement of the city
- E10 – Improvement of the roads plan, profile and width between Gällivare and Kiruna

- E10 – Road widening and load-bearing capacity measures Svappavaara-Kiruna (Mertainen) In Norway the construction work for a new bridge over the Rombaksfjord has started (the Hålogaland bridge) The total cost for this project will be about EUR 400 million. The distance from the border to the port will be reduced by 7 km.

Rail

Sweden
In 2013 a study of choice of measures has been initiated.
Planned investments:
Riksgränsen – Kiruna – Gällivare – Boden – Luleå
Crossing sections:

- Kiruna freight yard - 2013
- Four new crossing sections

Proposal for futher investments in Sweden[34] :
Riksgränsen – Kiruna – Gällivare – Boden - Luleå

- Double-track study Kiruna – Riksgränsen (Northern Circuit)
- ERTMS [35] system – 2018/2019
- Third track in Kiruna 2015
- Kiruna travel centre – 2017
- Gällivare freight yard – 2013
- Two new crossing sections

Norway
Planned investments:

- Double-track assessment will be complete in 2013.
- Work on Narvik terminal – Fagernes will be complete in 2013.
- Increase the axle load on the line between Narvik station and Narvik terminal (2.5 kilometres) to handle heavier trains from Northland Resources
- Narvik station will be extended to 750m in 2017
- New signal/safety system at Narvik station
- The crossing sections at Bjørnfjell and Rombak will be extended to 750m in 2015
- Measures to increase the power supply for the Ofoten line
- 2 new crossing sections – Søsterbekk and Djupvik

5.2.6 FUTURE POTENTIAL

This is an important corridor today and its importance will grow in the future due to the expansion of the industries in the northern areas of Barents. The forecast in Sweden and Norway indicates a significant growth in the northern areas due to the industrial expansion. It might also be an important corridor for Finnish mining in the future, since they will have access to the ice-free port in Narvik, via the corridor.

In addition to the important roleof the railway for bulk transports for the mining industry, the railway is important for transport of containers. There is a potential for transport of larger volumes of seafood on the railway in future years.

34 Proposed in new national infrastructure plan 2014-2025

35 The European Rail Traffic Management System will be the new standard for the European railway system. A common standard is necessary to ensure interoperabililty and the system comprises all aspects of management, safety and communication. ERTMS will first be implemented on all high speed lines, transit corridors and eventually on all European railways.

5.3 **CORRIDOR:** VORKUTA – SYKTYVKAR – KOTLAS – ARKHANGELSK - VARTIUS – OULU

Consists of:

Road

National Road R-21 “Kola”, National Road M-10 ”Russia”, National Road M-8, National Road 89 and National Road 22, E8

Rail

In Finland from Vartius – Oulu, and in Russia from Arkhangelsk to Finland via Kotshkoma and Kostomuksha.[36] There is a railway to the south-west from Vorkuta, but it is not directly connected to Arkhangelsk.

Brief facts:

Road

Total length:
Length in Russia 1479 km, 250 km in Finland (Vartius–Oulu)
Width: 12.5 m - 7 m
Speed limits: 120-80 km/h, 50-60 km/h in urban areas
Average number of vehicles per day at the border: 700 (Russia – Finland)
Average number of vehicles per day when traffic is at its peak: 10 000 in Oulu

36 As for now, there is no railway from Arkhangelsk to Syktyvkar. The Belkomur project deals with this missing link.

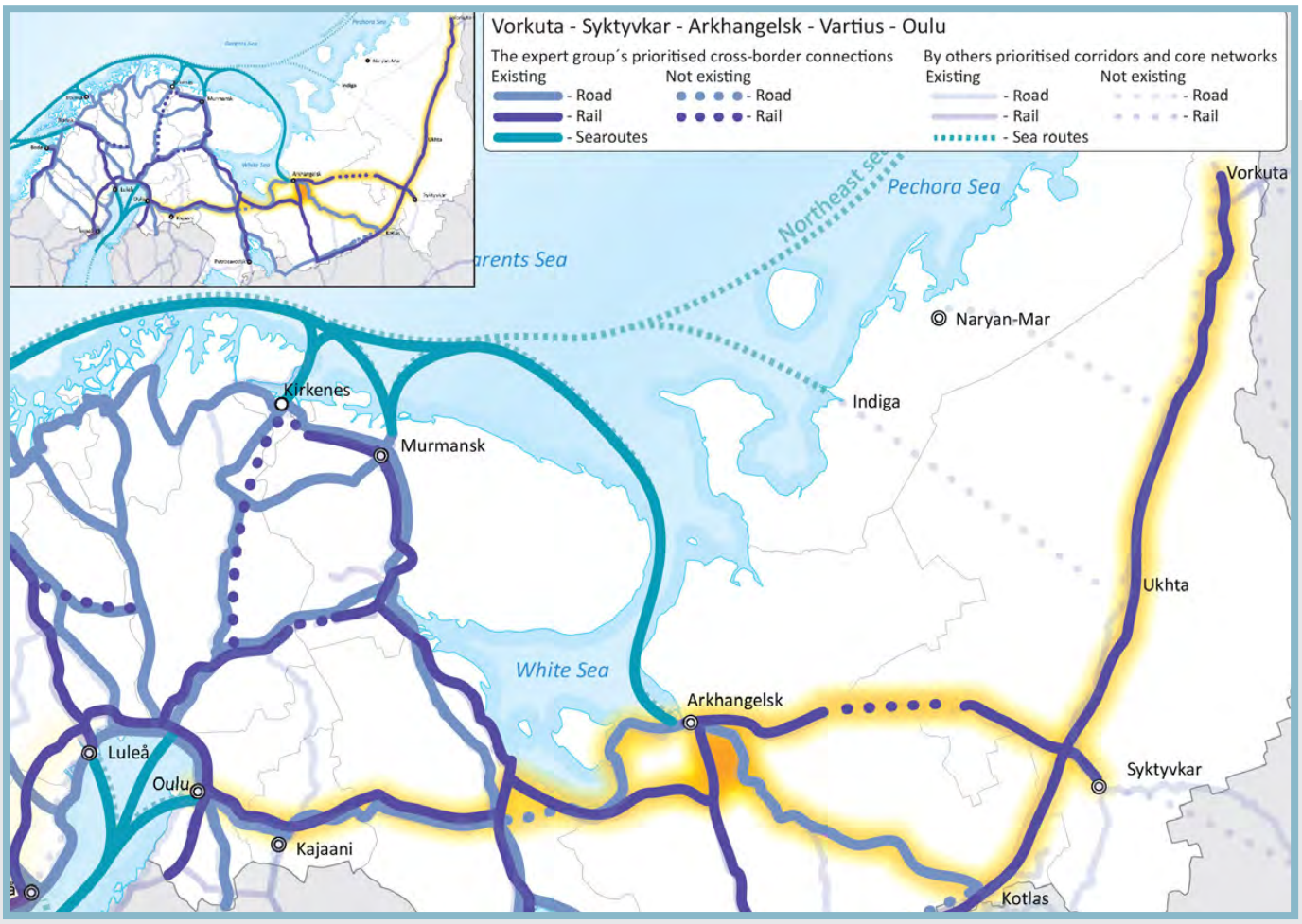


Figure 19: Vorkuta - Syktyvkar - Kotlas - Arkhangelsk - Oulu

Rail

Total length:
Length in Russia 1256 km, 261 km in Finland
Number of average passenger trains per day: 12 between Kontiomäki and Oulu, none to Russia
Average number of cargo trains per day:
Oulu-Kontiomäki: Five pairs of cargo trains per day (8.8 million tonnes/year)
Kontiomäki-Vartius: Three pairs of cargo trains per day (5.5 milion tonnes/year)
Electrified/Not electrified: Electrified in Finland
Single or double-track: Single-track
ATC[37] in Finland

Ports

See Chapter 5.5

Airports

Number of passengers per year at main airports:
- Oulu 1.1 million
- Kajaani 80 000

General information

Number of inhabitants (municipalities):

- Oulu	131 000
- Arkhangelsk	349 000
- Vorkuta	75 000

5.3.1 GENERAL DESCRIPTION

Russia–Vartius–Oulu consists of railway and road. Both the road and the railway are included in the proposed TEN-T comprehensive networks.

The mining town of Kostamuksha lies 30 km from the border. The mining company produces iron pellets. The pellets are transported by train, the majority of them to Russian destinations. Several million tonnes of pellets are, however, transported annually by train to the Finnish port of Kokkola, almost 400 km to the west.

5.3.2 INFRASTRUCTURE AND STANDARD

Road
The road corridor starts from the Bothnian Corridor in Oulu as road 22 to Kajaani. The paved area of the road is at least 8 metres wide. About 150 km from Oulu the corridor continues for another 100 km as road 89 to the Russian border in Vartius Lytta. Road 89 has a paved width of 6.3 metres for about 20 km, while for the remainder the paved area is 7.5 to 8 metres wide.

On the Russian side the corridor continues for about 240 km via Kostamuksha, Ledmozero and Tiksha to Kotskoma. The road is paved to a width of 7-12 m.

Rail
The 166 km long railway line between Oulu and Kontimäki is quite old, and still has wooden sleepers. The 95 km long railway line between Kontiomäki and Kostamuksha was completed in 1976. The railway is an electrified single-track railway. The railway has an automatic train control system, but the technology is over 20 years old.

The railway section between Ledmozero and the Murmansk railway has restrictions with regard to international transports. The corridor is therefore not currently used for international traffic destined for or originating from further east in Russia than Kostomuksha.

37 Automatic Train Control

5.3.3 TRAFFIC

Road
Average number of vehicles per day is almost 10 000 in Oulu, between 3 000 and 1 300 on national road 22 and between 300 and 700 on national road 89. The average daily number of border-crossing vehicles in 2012 was 662 cars and 55 lorries or buses. The number of border crossings has remained stable for the last few years.

On the Russian side average number of vehicles per day is 1 200 on the road section Kostamuksha – Lytta, and 400-600 on the road section from Kostamuksha, Ledmozero and Tiksha to Kotskoma.

Rail
The Oulu-Kontiomäki railway serves both cargo and passenger transports. There are five pairs of cargo trains per day transporting a total of 8.8 million tonnes of cargo per year. Kontiomäki-Vartius serves only cargo transports, with three pairs of cargo trains per day transporting 5.5 million tonnes per year. The transports on the Kontiomäki-Vartius railway section mainly consist of iron pellets from Kostomuksha to the Finnish port of Kokkola on the Gulf of Bothnia.

5.3.4 KEY CHALLENGES

Road

In Finland:
- Congestion problems on national road 22 in the urban Oulu region
- Poor road safety close to Oulu
- Need for improvements to the municipal centres the road passes through
- Need for improvement in the conditions for cyclists
- Restrictions for international transports near Kostomuksha in Russia

Rail
In Finland:
- Modernization is needed
- Outdated safety equipment, wooden sleepers on the western section

5.3.5 PLANNED DEVELOPMENT

Road
- National road 22 between Kajaani and Oulu will be upgraded with additional lanes and improved intersections in Oulu
- Some bypass lanes with central barrier in the rural area close to Oulu
- Improved safety in municipal centres
- Improved safety for cyclists

5.3.6 FUTURE POTENTIAL

This is an important east-west corridor with a potential for growth in transport to and from Russia, as well as providing a railway connection as far as Central Asia. When the missing railway connection between Arkhangelsk and Komi is in place, this corridor will be the fastest means of transport between Asia and the Barents Region for large volumes of cargo.

5.4 **CORRIDOR:** "THE NORTHERN MARITIME CORRIDOR": ARKHANGELSK – MURMANSK – THE EUROPEAN CONTINENT

Brief facts:

Country	Port	Cargo (1000 tons)	TEUs	Passengers except cruise	Cruise passengers	Depth	Population
Russia	Murmansk	23 600	50 483	0	3500	12.5	307 000
Russia	Arkhangelsk	5 150	22 000	0	1600	9.2	349 000
Russia	Kandalaksha	720	0	0	1000	10	36 000
Russia	Vitino	3 700	0	0	0	10	700
Russia	Varandey	3 100	0	0	0	17	50
Russia	Naryan-Mar	118	0	0	0	17	19 000
Norway	Kirkenes	2 417	0	167 454	0	13,8	10 000
Norway	Honningsvåg	77	0	14 241	139 000	5/15	3 000
Norway	Hammerfest	4 818	547	57 127	22 000	2/15	10 000
Norway	Alta	666	1 190	37 901	11 591	10.3/12.5	20 000
Norway	Tromsø	968	3 467	303 002	105 490	5,9/15	71 000
Norway	Narvik	19 416	126	0	7 537	13,5/26	14 000
Norway	Bodø	1 146	17 872	345 315	7 363	3.4/7.6	50 000
Norway	Mo i Rana	4 151	0	0	0	12	26 000
Norway	Mosjøen	1 545	23 154	21 526	0	8	13 000
Norway	Sandnessjøen	909	6 657	11 344	0	8/20	6 000

Table 6: Freight and passenger turnover in key ports [38][39]

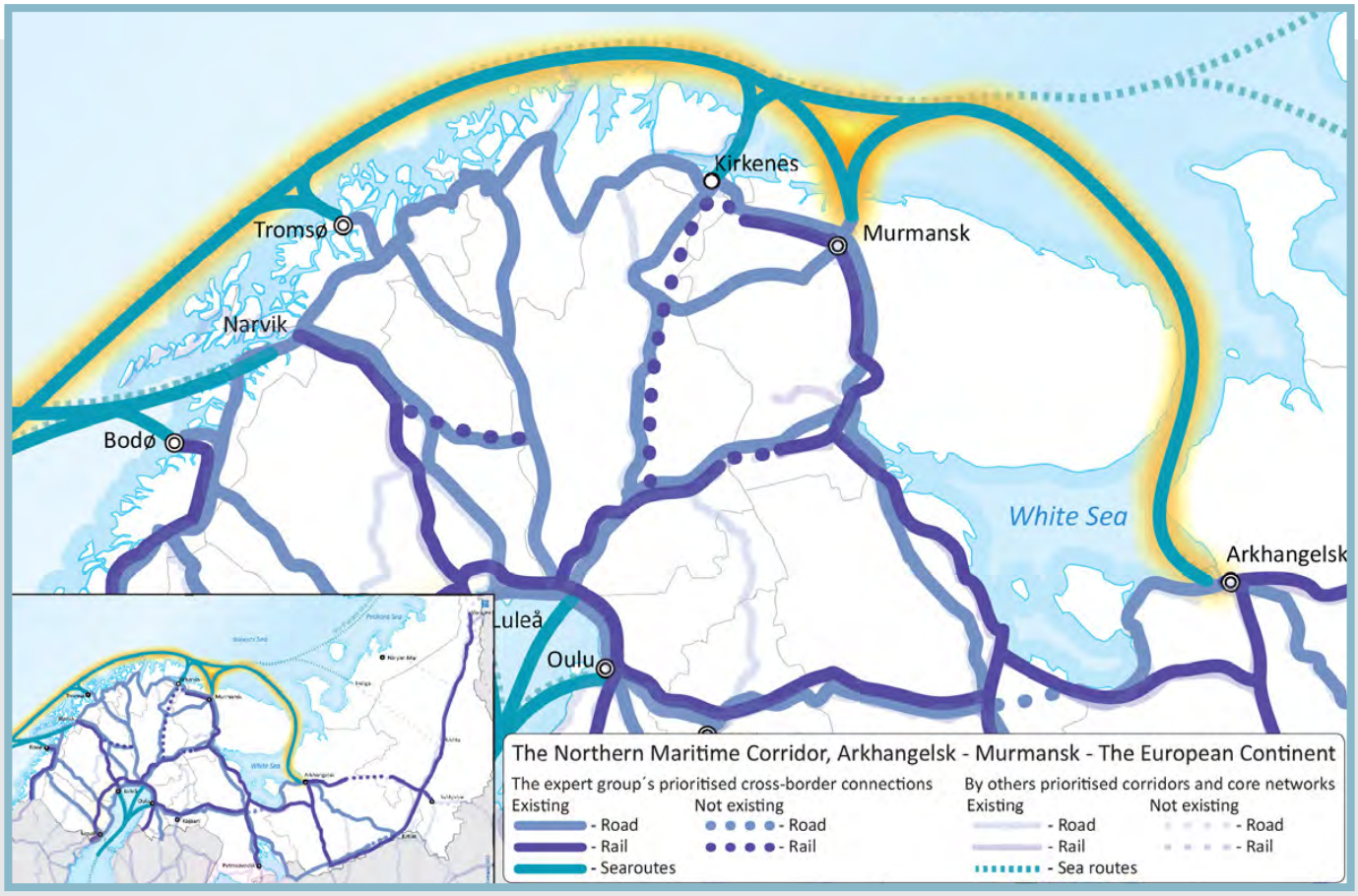


Figure 20: "The Northern Maritime Corridor": Arkhangelsk – Murmansk – The European Continent

38 Statistics on Russian ports provided by the Transport Ministry of the Russian Federation for the year 2012. Statistics on Norwegian ports provided by Statistics Norway (cargo) for the year 2012 and by Norwegian Coastal Administration (passengers) for the year 2012

39 The TEUs for ports in Norway is estimated based on an national average weight of a TEU. Exeption is made for the port of Mosjøen where the actual number of TEUs is used

Traffic density in the corridor[40]:

5.4.1 TRAFFIC AND INFRASTRUCTURE

Maritime transport is involved in a major proportion of international trade.

The deep-water ports of the Northern Maritime Corridor (primarily Murmansk and Narvik) have significant potential for growth and for shipment of cargo by sea from the Barents region throughout the world. The ports of the Northern Maritime Corridor are used to export products from the metal, mining, petroleum and forest industries to the markets of Europe, America and Southeast Asia.

There is a significant market for container shipping from the countries of Southeast Asia to the European market, and the ports of the Northern Maritime Corridor could support imports of goods to both the Barents region and other European countries.

Another factor that favours the development of the ports located in this corridor is the abundance of seafood in the Barents region, given the expected growth in worldwide demand for seafood.

The Northeast Passage and the Northwest Passage

The Northern Maritime Corridor is connected to the Northeast Passage and Northwest Passage in the north.

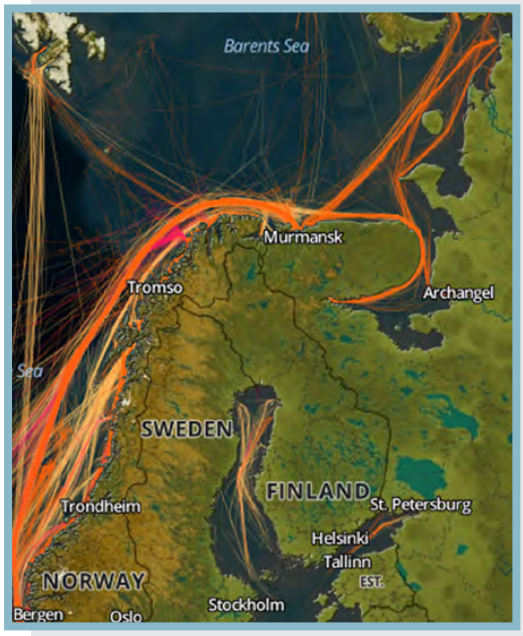
The Northeast Passage connects the Atlantic and the Pacific Oceans along the northern coast of Eurasia, from Murmansk to the Bering Strait. The Northeast Passage shortens the transport route between Asia and Europe by as much as 40% compared to the route via the Suez Canal.

The Northern Sea Route is a defined route within the Northeast Passage. The Northern Sea Route runs within Russia's exclusive economic zone from the Port of the Kara Sea by the island of Novaya Zemlya in the west to the Bering Strait in the east.

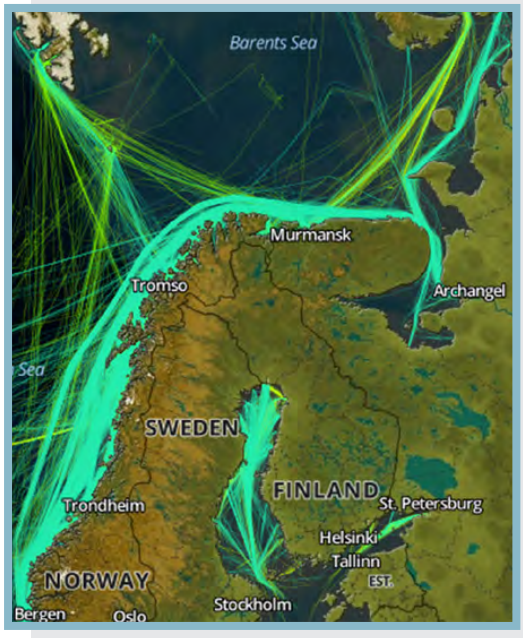
The Northern Maritime Corridor and the Northern Sea Route can be seen as two parts of one continuous northern sea corridor between Europe and Asia.

The Northwest Passage runs along the coast of Canada and is also an important sea corridor with potential for more traffic in the future.

Passenger ships



Tankers and bulkships



Ro-ro ships, containers, reefers and general cargo

Figure 21: Shipping traffic density

40 Source: www.arkgis.org

The faireway standard

No common faireway standard exists for the Russian and Norwegian part of the Northern Maritime Corridor, but there are no big challenges related to this since the standard in both countries are considered good. A common fairway standard maybe considered in the future. Capacity in the Northern Maritime Corridor is unlimited. For large ships and ships carrying hazardous cargo there is a defined faireway by the International Maritime Organization (IMO) from the border to Russia and south to the island of Røst in Lofoten.

5.4.2 SAFETY AT SEA

The expected increase of activity in Barents within the petroleum, metal and mineral industries, as well as increased transit transports, makes it important to ensure a sufficient level of safety and sustainability in the northern waters. In 2010 the number of shipments of petroleum products exported from the northern ports of Russia along the Norwegian coast to markets in Europe and America was 270[41] . Shipments of petroleum could multiply under favourable conditions.

Maritime activity covers a vast geographical area with harsh climatic conditions where low air and sea temperatures and extreme weather are combined with a lower quality of meteorological forecasts. Challenges such as icing, winter darkness, summer fog, remoteness, a limited access to infrastructure and communication require custom-designed solutions for maritime safety, emergency preparedness and search and rescue response for these waters.[42] [43] [44]

The Expert Group points in particular to the following:

- Finalization, adoption and implementation of the International Code of Safety for ships operating in polar waters (Polar Code), which would cover the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in polar waters
- The need for revision of the STCW convention (International Convention on Standard of Training, Certification and Watch keeping for seafarers) in relation to polar waters
- The need to develop a functioning system of communication (broadband satellite communications) in polar waters
- The need for more hydrographical surveys and development of complete charts, improvement of infrastructure for navigation and improved forecasts related to weather, waves and ice conditions
- The need for a joint traffic monitoring system The establishment of a joint Barents VTMIS (Vessel Traffic Monitoring and Information System), including seamless sharing of traffic data from AIS, Satellite AIS and other relevant sources
- Harmonization of national rules, regulations and procedures in the area, to achieve greater predictability and lessen the administrative burden on the mariner
- Extend the newly established Barents Ship Reporting System (Barents SRS) to cover the entire Barents Sea region
- The need for an improved system for search and rescue to ensure:
    - Early warning
    - Efficient detection equipment
    - Efficient mobilization and presence of rescue resources
    - Efficient coordination and execution of rescue operations
    - Efficient personal rescue equipment
    - Efficient use of non-governmental (non-SAR) ships to be in the area of any emergency situation

41 Statistics provided by the Norwegian Coastal Administration for the year 2010

42 Source: Report on opportunities and challenges in connection with increased sailings in the Polar Sea (“Økt skipsfart I Polhavet – muligheter og utfordringer for Norge”), Utenriksdepartementets faggruppe, April 2013

43 Source: Preliminary project report, Russian – Norwegian Barents Logistics and Transport, June 2013

44 Source: Project report SAR operations in the Norwegian part of the Barents Sea and Polar Sea, December 2012

5.4.3 DESCRIPTION AND POTENTIAL OF RUSSIAN PORTS IN THE NORTHERN BASIN

Russia pursues a policy to direct Russian cargoes through its own ports as far as available capacity allows. Russian cargo transported over ports in the northern basin consists of crude oil and oil products, coal, fertilizers, timber, ores and metals.

The North-western Federal District of Russia has a population of 14 million people. There are 15 ports; in the Barents region there are Murmansk, Arkhangelsk, Kandalaksha, Vitino, Varandey, Nayan-Mar, Onega and Mezen, in the Baltic basin are the Great Port of St Petersburg, Vyborg, Vysotsk, Kaliningrad, the passenger port of St Petersburg, Primorsk and Ust-Luga.

Port of Murmansk

The port of Murmansk is significant for the businesses of Northwest Russia. The main export cargoes at the port are bulk commodities (metals, coal, iron ore, chemicals and fertilisers), and imports of foodstuffs. The port provides transshipment of petroleum products and processes general and bulk cargo and fish products.

The port of Murmansk is the northernmost deep-water ice-free port in Russia, and it is the functional endpoint of the Northern Sea Route. The the Arctic icebreaker fleet has its base here.

The port of Murmansk is used as a transshipment terminal to consolidate shiploads for transportation of oil from the ports of Arkhangelsk, Vitino and Varandey (and in the future from offshore installations). Oil is delivered by ice-class shuttle tankers to the roadstead oil terminals at the port of Murmansk, where it is reloaded onto ocean tankers of up to 150 000 tonnes deadweight. In 2009 18 million tonnes were liquid cargo. The rapid growth in cargo turnover over prior years is due to increased use of the Roadstead Transshipment Complex RTC-3[45].

On the eastern shore, the adjacent industrial and urban areas limit the expansion of the existing port of Murmansk. The western shore is not limited by residential and commercial construction, so it could be the site of expanded transshipment operations for dust-producing and hazardous cargoes. The terrain in certain areas could accommodate large-capacity warehouse operations, which is very important for high volumes of bulk cargo.

For the above reasons, and to meet the needs of the coal industry at the port of Murmansk, the Federal Targeted Program[46] includes a plan to construct a coal terminal on the western shore of Kola Bay, at the mouth of the Lavna River, with a capacity of 15-20 million tonnes per year. The project is being implemented as a public-private partnership. The federal state-owned institution Rostransmodernizatsiya[47] is responsible for the design and construction of a railroad bridge to the western shore of Kola Bay and a railroad spur (approximately 30 km in length), along with infrastructure facilities at the sea port to ensure safe navigation. A private investor is responsible for the construction of a sea terminal for transshipment of coal (docks, warehouses, and cargo handling equipment).

In addition, the maritime transportation subprogram[48] includes the reconstruction of the docks and buildings of the port station on the eastern shore of Kola Bay.

The project to develop the Shtokman gas field includes plans to build a liquefied natural gas (LNG) terminal near the village of Teriberka (a remote terminal of the Murmansk sea port). The construction of the LNG terminal depends directly on the implementation of the primary project.

The further development of the Murmansk transportation hub will also require expansion of railroad capacity on both the Vologda – Volkhovstroy – Murmansk line and the line Vologda – Obozerskaya – Belomorsk – Murmansk line.

45 The transhipment complex is home of the Belokamenka floating storage tanker, with a capacity of 340 000 tonnes

46 Development of Russia's Transportation System (2010-2020)

47 Directorate of the Government Customer for Implementation of the Federal Targeted Program "Modernization of Russia's Transportation System", an organization within the Russian Ministry of Transportation

48 Subprogramme of the Federal Targeted Program "Development of Russia's Transportation System (2010-2020)

There is currently no dedicated container terminal, but attention to Murmansk as a future international container port should be noted. The round trip between Rotterdam and Murmansk is around 3 000 nautical miles. From the perspective of the broader Russian hinterland, Murmansk is clearly favoured as the main future container port in the High North, ahead of the other candidate ports (Kirkenes and Arkhangelsk).

Port of Arkhangelsk

The sea port of Arkhangelsk is located on the delta of the Severnaya Dvina River, which flows into the White Sea.

The port is a significant oil, coal and timber gateway. Other cargoes include metals, wood pulp, cardboard, heavy equipment, chemicals and containerized products.

In winter, access by sea is limited to ice-classed vessels, which are assisted by ice-breakers between November/December and April.

The port has three rail terminals linked directly to the Russian railway network, although the railway line is not of modern standard. The proposed building of a missing railway section between Arkhangelsk and Perm via Syktyvkar will increase the attractiveness of the port of Arkhangelsk for mining and metal manufatured products.

There are plans to create a new deep-water area of the Arkhangelsk port, but the economic feasibility of this project has not yet been demonstrated.

The cost of operation of the port of Arkhangelsk is high, due to the need for extensive dredging and icebreaker assistance, which in turn results in relatively high port fees compared to the port of Murmansk.

Port of Kandalaksha

The sea port of Kandalaksha is located in the northern part of Kandalaksha Bay in the White Sea.

The waters around the port are protected from winds on all sides by islands, the port is only open to Kandalaksha Bay to the southeast. The waters of the port freeze in early December and melt in early May. The port operates year-round.

The port can handle import-export and domestic bulk and general cargo. However, in recent years, the port has handled only coal.

The economic development strategy for Murmansk Region in the period until 2015 envisioned the use of the port of Kandalaksha for transshipment of up to 9 million tonnes of various cargo, but investors to implement these projects have not been found. This is partially explained by the more efficient logistics of sending these types of cargo through the ice-free, deep-water port of Murmansk.

Port of Vitino

The port of Vitino is a specialized port for transshipment of bulk petroleum cargo, including gas condensate, and is located in Kandalaksha Bay in the White Sea. Ships entering (or leaving) the port in the winter must be accompanied by ice-breakers.

In early 2011, Nord-Transit LLC drafted a declaration of intent to create a roadstead transshipment complex for tankers with a deadweight of up to 300 000 tonnes in the outer anchorage of the Vitino sea port. The concept is to use tankers with a deadweight of 250-300 000 tonnes and anchor them in the outer anchorage of the port and load them with smaller delivery tankers. The proposed cargo turnover of the roadstead moorings is up to 3 million tonnes per year.

Other Russian ports

Arkhangelsk county has about 3500 km of navigable rivers open for transports between May and October. The main rivers are Dvina (to Syktyvkar), Mezen (to Venddenga) and Onega (via Plesetsk).

The sea port of **Onega** handled 61 000 tonnes of timber cargo in 2012, and the port of **Mezen** handled 15 000 tonnes of coal and petroleum products in 2012.

The port of **Naryan-Mar** handled 118 000 tonnes of timber cargo, petroleum products, and individual containers in 2012. From the port of Naryan-Mar transports can continue inland along the Pechora river from May to October. The port handles timber, coal, mineral and construction cargoes and commodities, containers, general cargoes and oil products.

The new seaport of **Varandey** was built in 2000. The transshipment volume was 3.1 million tonnes in 2012 and 2.5 million tonnes in the first six months of 2013.

The port of **Belomorsk** is located in the Republic of Karelia, on Onega Bay in the White Sea, very close to the White Sea-Baltic Canal. From the port of Belomorsk it is possible to follow the river and lakes of Ladoga and Onega south to St Peterburg. There are a number of ports along this route, including Petrozavodsk, Medhezhyegorsk and Nadvoisty. In 2007, several private investors announced plans to develop the port of Belomorsk, including the construction of a coal terminal. However, these projects have not yet been implemented and probably will not go forward, because the needs of the coal industry will be met by expanding the coal transshipment capacity at the port of Murmansk and the ports of the Gulf of Finland (Ust-Luga and Vysotsk).

5.4.4 DESCRIPTION AND POTENTIAL OF NORTHERN NORWEGIAN PORTS

Because of long distances and a population that is sparsely distributed over the whole region, it has proven difficult to direct the cargo and passenger flows to a smaller number of hub ports in northern Norway. In the three northern Norwegian counties, there are 76 municipalities connected to the sea and most of them have their own port. The ports described below are therefore fairly numerous and small compared to the ports described in the neighbouring countries. However many of the smaller Norwegian ports play an mportant role in domestic, and to a certain extent also in international, logistics. The total freight turnover of the ports in Northern Norway is 43 million tonnes (Nordland county 33 million tonnes, Troms county 2 million tonnes and Finnmark county 8 million tonnes).

There is a regular passenger service calling at 25 ports in northern Norway twice a day, operated by the shipping company Hurtigruten (the Norwegian Coastal Express).

From the Norwegian island of Spitsbergen substantial volumes of coal from both Norwegian and Russian mining companies are exported (Norwegian volumes in latest years between 1-3 million tonnes).The island of Spitsbergen is strategic located in connection to search and rescue in the Barents Sea.

Port of Mo i Rana
The port of Mo i Rana handles general cargo and containerized export products from the local iron ore and metal industry. A volume of 3,3 million tonnes of iron ore is annually transported by rail on the Nordland line from Krutfjell to the port of Mo i Rana for further transport to the processing sites.

Port of Mosjøen
Volumes though Mosjøen are mainly metal exports. Mosjøen is the largest port for containerized industrial cargo in Northern Norway.

Port of Bodø
Bodø is important mainly with respect to domestic container traffic of consumer goods.The national railway through Norway ends in Bodø and rail cargo from Oslo is reloaded here to ships for further connections north to Tromsø and Alta.The port of Bodø has daily ro-pax connections to the Lofoten islands which are considered the second most important tourist destination in northern Norway. Bodø is an attractive cruise port along with several ports in northern Norway. Bodø is a prioritized port by Norwegian authorities. Development of the port is directed towards improving both passenger and freight capacity and service.

Port of Narvik
The port of Narvik is a strategically important node in the EU TEN-T[49].

Narvik is a bulk port and is the main embarkation and disembarkation port for the mining company LKAB, mainly for iron ore pellets and filler material for pellet production in Kiruna.

With an annual turnover of 19 million tonnes of cargo Narvik is by far the largest port in northern Norway. The port has expanded enormously in recent years, and this is expected to continue. Studies are ongoing in the port of Narvik to increase the ports capacity.

Port of Tromsø
Tromsø is both the largest cruise port in northern Norway and one of Norway's largest fishing ports. Tromsø is an important port in northern Norway for containerized consumer goods.

Tromsø is a prioritized port by Norwegian authorities and its expansion and development is ongoing. This comprises both a new port section to serve the petroleum industry, increased cargo capacity and improved facilities for cruise liners starting and finishing their cruises in Tromsø.

Port of Alta
The port of Alta is mainly important as a container port for domestic cargo.

Port of Hammerfest
Apart from the export volumes of liquified natural gas from the Melkøya gas plant (4.5 million tonnes), Hammerfest is a small port. In addition to LNG, Hammerfest handles supplies to the petroleum industry and serves the fishing fleet and cruise liners.

Port of Honningsvåg
As the nearest port to northern Norway's largest tourist attraction, the North Cape cliff, Honningsvåg is an important cruise port. It also serves the fishing fleet, and a new port section is planned to receive oil from the oil fields north of Finnmark. The port has future development potential with respect to petroleum logistics.

Port of Kirkenes
Cargo volumes through the port of Kirkenes are primarily iron ore for export to the EU. Fishery-related activities however represent the port's main source of income today.

Despite its location in the far north, Kirkenes is ice-free throughout the year thanks to the Gulf Stream. Kirkenes is in international comparison a small port, but its strategic location gives it substantial growth potential.

Several private Norwegian initiatives exist to develop the port and industrial areas in Kirkenes (KILA/ Tømmerneset/Pulkneset). The rational for these initiatives is an expected rise in traffic of petroleum, ores, minerals and containers through the Northern Sea Route (if prices, safety and quality is right), an expected increase in Norwegian and Russian petroleum activity in the Barents Sea, and an expected increase in shipping of ore and industrial products from the region. Investments from 2014 to 2020 are stipulated to 0.7-1.4 billion EUR.

Although Kirkenes is a small port compared to Murmansk, it is still a possible future transhipment port for international cargo originating in or destined for Northwest Russia or between Asia and continental Europe. Between Yokohama and Rotterdam about 3 million containers are transported per year[50] and some of these volumes may be transported via the Barents region in the future. There is currently no dedicated container terminal in Kirkenes. A future international container terminal would require large investments, but water depth is in Kirkenes is highly competitive for container handling and a possible connection to the Russian railway system through extension of the railway from Nikel to Kirkenes[51] makes this a scenario worth investigating further.

49 Trans-European Network - Transport
50 Source: Ocean Shipping Consultants
51 See chapter 5.6 on the possibilities of a new railway link Nikel - Kirkenes

5.4.5 CURRENT CONNECTIONS BETWEEN PORTS IN NORTHERN NORWAY AND RUSSIAN PORTS IN THE NORTHERN BASIN

The number of sailings between the port of Murmansk and ports in northern Norway is currently about 120 each way per annum according to AIS[52] statistics. Some of these sailings call at several ports in northern Norway.

Kirkenes is the last port of call in Norway in most of the cases. Only one regular container feeder service (weekly service) between Murmansk and northern Norway was reported in 2012.

There is a potential to develop maritime relations between Russia and Norway both in respect to cargo and passengers. There is currently no passenger traffic between the neighbouring countries.

52 Automatic Identification System

5.5 **CORRIDOR**: "THE MOTORWAY OF THE BALTIC SEA": LULEÅ/KEMI/OULU – THE EUROPEAN CONTINENT

Brief facts:

Country	Port	Cargo (1000 tons)	TEUs	Passengers	Depth	Population
Finland	Raahe	5 526	4 500	0	10	23 000
Finland	Oulu	2 825	35 000	0	12.2	131 000
Finland	Kemi	1 816	12 000	1 700	10	23 000
Finland	Tornio	1 959	21 000	0	9,1	22 000
Sweden	Umeå	2 300	19 000	100 000	13	117 000
Sweden	Skellefteå	1 800	0	0	8.5/13	72 000
Sweden	Piteå	1 600	200	0	11.5	41 000
Sweden	Luleå	9 000	0	1 500	11.9	75 000
Sweden	Kalix	269	0	0	5,6/6,6	17 000

Table 7: Freight and passenger turnover in key ports

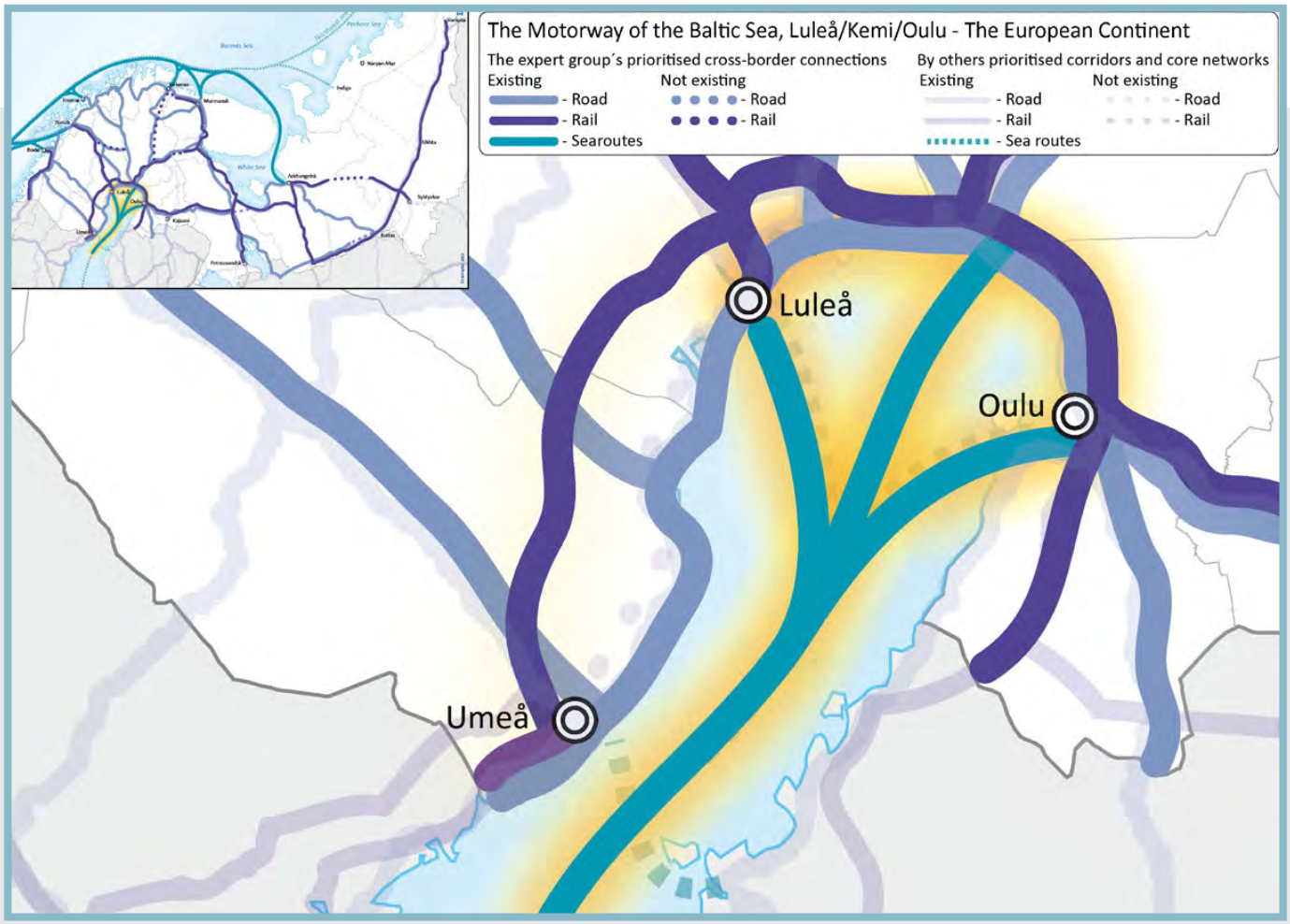


Figure 22: The Motorway of the Baltic Sea

Traffic density in the corridor[53]

5.5.1 CURRENT TRAFFIC AND INFRASTRUCTURE. FUTURE PLANS AND POTENTIAL

The sea route in the Gulf of Bothnia is essential for the transports of both raw materials and especially the products of the industries situated along the Bothnian Corridor. The Baltic Sea offers a direct connection southwards to the rest of Europe.

The traffic volumes in the Bothnian Corridor transport network in the short term (until the year 2020), include mining products, timber, chemicals and other commodities produced in the area. The main transport in the corridor is cargo, but Kemi, Luleå, Umeå also have passenger traffic.

The corridor is very important for the industries situated along the Bothnian Corridor. Most of the customers of these industries are located in Europe or on other continents, and are impossible to reach otherwise. It is not economically feasible to use long distance railway transports from the industries along the Bothnian Corridor to ice-free Atlantic ports. In spite of some challenges, the future potential of the corridor is good.

5.5.2 KEY CHALLENGES

Shallow waters

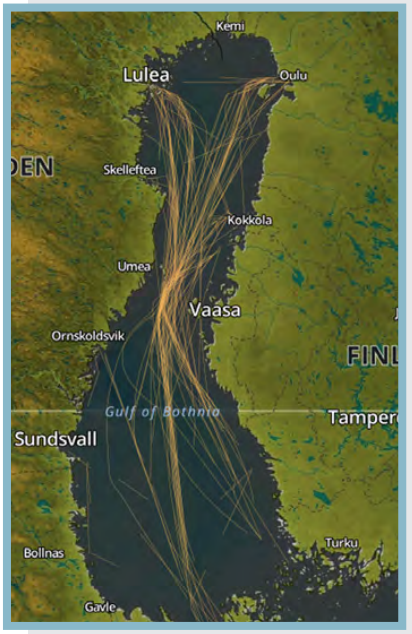
A general problem for navigation in the region is that the Gulf of Bothnia is very shallow. And as the land is rising at the rate of about 1 metre in 100 years, the fairways and ports must be dredged regularly to keep them navigable. There are plans to dredge the fairways to the port of Oulu and Kemi to 12 metres and in Luleå to 15 metres.

Icebreaking

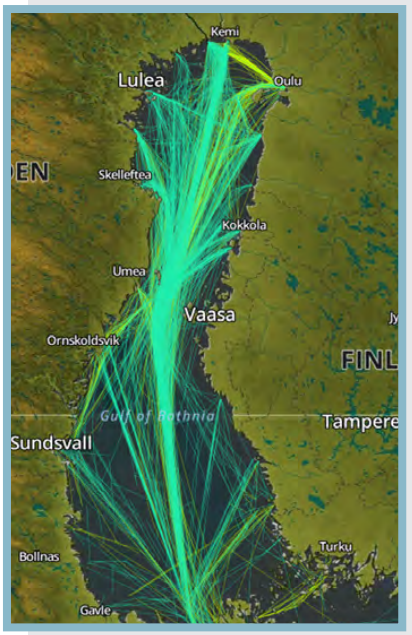
One of the key challenges for navigation, in addition to the shallow waters, is winter ice. The Baltic Sea, including the Gulf of Bothnia, is subject to icy conditions every winter. Therefore all ships calling at the ports need to be ice-classified during the stipulated conditions and/or time periods. Ice-breaking ships tend to be slower or less fuel-efficient than ordinary ships, which implies higher transport costs and therefore has a certain impact on trade and on the competitiveness of the industries in the region.

Icebreakers have to be used to keep the fairways open during the winter season. The ice-breaking service is delivered by Swedish and Finnish authorities as equal counterparts and under one command. The number of vessels not required to wait exceeded 90% in 2011. For the vessels that had to wait, the average waiting time was 3.16 hours.

Passenger ships



Bulkships



Ro-ro ships, containers, reefers and general cargo

Figure 23: Shipping traffic density

53 Source: www.arkgis.org

Sulphur Directive
The IMO Sulphur Directive, effective in the Baltic Sea from 2015, is expected to affect future transport costs. A study conducted by the Finnish Transport Administration reported an equivalent increase in costs for shipping of 25-40%.

An ongoing investigation by the Swedish transport authorities, however, suggests that LNG ships and establishing LNG terminals in ports could limit the reduction in traffic arising from the Sulphur Directive. One other result is the estimate that most ships will use desulphurized oil, it will be sufficient and that the fuel price will increase significantly. This may be partly be compensated by slower speeds, bigger ships, mixed loading etc.

5.5.3 DESCRIPTION AND POTENTIAL OF THE NORTHERN SWEDISH PORTS

A large proportion of Sweden's foreign trade goes via ship and the ports have an important share in this link. Sweden, with its long coastline, has a good potential to use maritime transport relatively close to the customer. The freight volumes handled by these ports vary significantly and some of the ports have specialized in handling only certain types of goods.

Port of Luleå
Luleå is the port in the Gulf of Bothnia with the strongest position in the TEN-T network. A large proportion of the cargo through Luleå consists of foreign volumes.

The port of Luleå handles large volumes of bulk cargo, mainly iron ore pellets from Malmberget and incoming coal. TEN-T funding has been granted for studies in Luleå to increase capacity.

Port of Skellefteå
The port of Skellefteå handles mainly bulk, forest products, smelting materials and finished products to and from the Rönnskär smelter, and slabs, scrap and lumber.

Port of Piteå
The port of Piteå handles mainly forest products, paper products such as kraftliner, and pulp.

Port of Umeå
The port of Umeå primarily handles forest products (half the volume) and general goods (about 25% of the volume). The RoPax connection over the Kvarken strait to Vaasa in Finland is important both for freight and passenger traffic.

5.5.4 DESCRIPTION AND POTENTIAL OF THE NORTHERN FINNISH PORTS

Maritime transport is important both for domestic transport, foreign trade and international passenger traffic. Both the long coastline and the scattered production/ settlement have contributed to the development of a large network of ports. The two ports of most importance are Kemi and Tornio. These two ports handle about 10% of Finnish exports. Paper, wood products and minerals constitute the main commodities through the Northern Finnish ports.

Port of Kemi
The port of Kemi serves mainly the forest industry, mines and chemical transports. It is currently planned that the port will also handle shipments for the initial phases of mining operations in Kolari and perhaps also in the long term shipments for other mines.

Port of Tornio
The port of Tornio mainly handles steel products and supplies for the steel industry. Tornio mainly serves the Outokumpu stainless steel mill.

Port of Oulu
The port of Oulu has moderate cargo volumes and handles oil and bulk, paper, pulp and cement.

Port of Kokkola
About half of the cargo handled in the port of Kokkola consists of transit traffic from Russia.

Port of Raahe
The port of Raahe handles large volumes of bulk cargo, including steel from the Ruukki steel mill and iron ore from Gällivare going out via the port of Luleå, and other minerals, steel products and sawn wood products.

5.6 **CORRIDOR:** PETROZAVODSK – MURMANSK – KIRKENES

Consists of:

Road

E105 (R-21 “Kola”, M-10 ”Russia”)

Rail

The October railway (Murmansk – St. Petersburg and Murmansk – Nikel)

Brief facts:

Road

Total length: 1199 km
Length: Petrozavodsk to Murmansk – 969 km
Length: Murmansk to Kirkenes - 230 km (10 km in Norway).
Width: 8.5 m (Norway) and 11–12 m (Russia)
Speed limit: 60–80 km/h (Norway) and 60–110 km/h (Russia)
Number of vehicles crossing the border per day: 257
Average number of vehicles per day where traffic is at its peak
Kirkenes: 7 100
Murmansk: 6 100

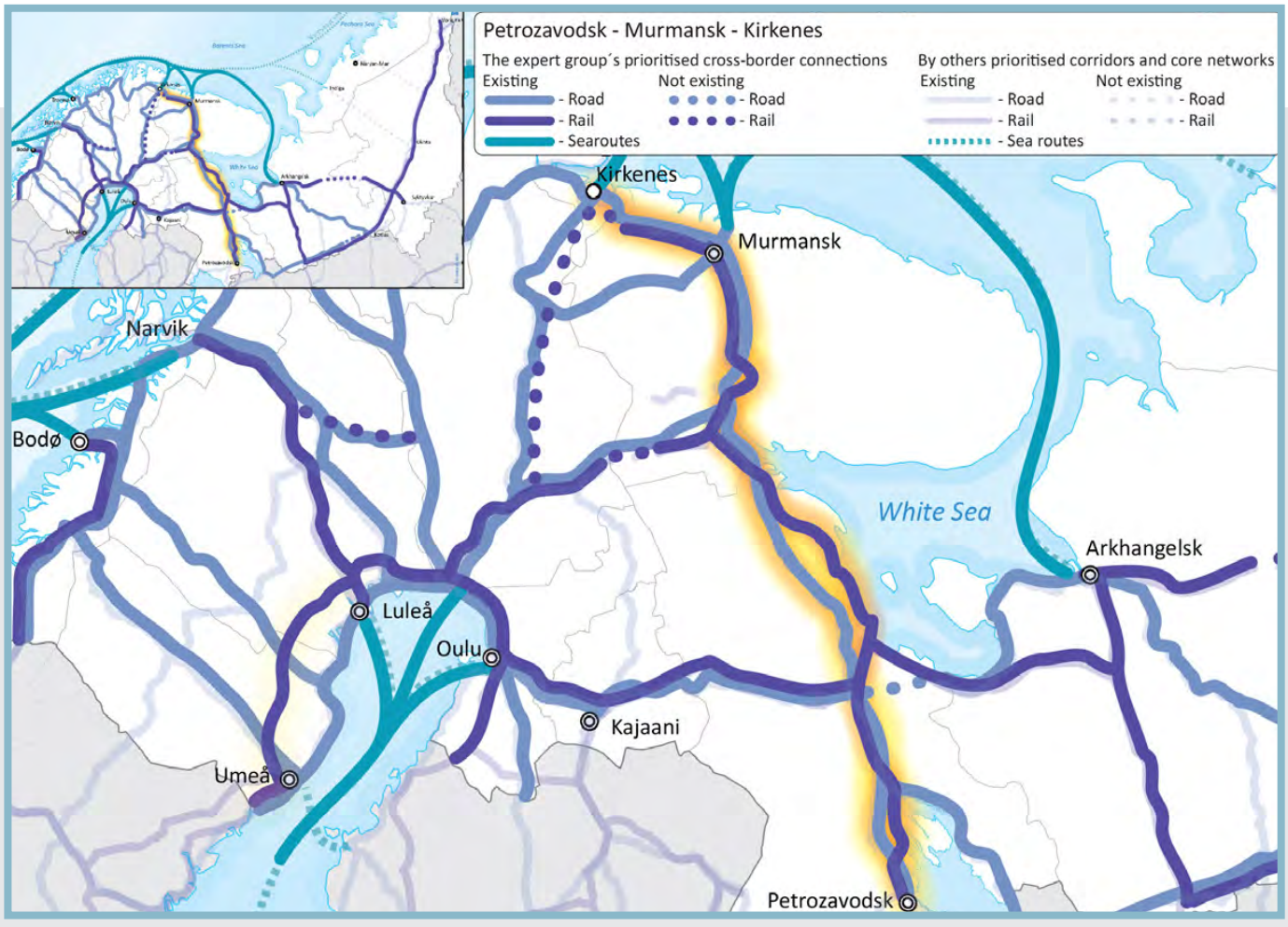


Figure 24: Petrozavodsk - Murmansk – Kirkenes

Railway

Murmansk – Nikel line:
Length: 206 km
Average number of passenger trains per day: 1
Average amount of cargo per year: 5 million tonnes
Not electrified
Single track

Murmansk – St. Petersburg line:
Length: 1440 km
Average number of passenger trains per day: 4
Average volume of cargo per year: 27.2 million tonnes
Electrified
Single track

Kirkenes – Bjørnevatn line[54]
Single track
Length: 8,5 km

Ports

See Chapter 5.4

Airports

Kirkenes	300 000 passengers/year (2011)
Murmansk	280 000 passengers/year (2006)

General information

Population of main cities:

Petrozavodsk	262 000	Zapolyarny	16 000
Kandalaksha	36 000	Nikel	13 000
Murmansk	307 000	Kirkenes	10 000

5.6.1 GENERAL DESCRIPTION

The corridor is the only border crossing between Russia and Norway and is very important for the regional "people to people" cooperation in this part of the Barents Region. The corridor therefore plays an important role in the northern political cooperation and in the growth of business and industry in the border area and in Northern Norway in general. The corridor encompasses the E105 Kirkenes – Murmansk road route of 230 km, as well as the industrial rail link between Nikel and Murmansk, and the further connection southwards to Petrozavodsk.

There are civil airports in Petrozavodsk, Murmansk and Kirkenes.

5.6.2 TRANSPORT IN THE CORRIDOR

Road Transport

Murmansk – Kirkenes
The export of goods from Norway to Russia via Storskog has varied from year to year, but in the past three years it has been between 6 000 and 7 000 tonnes per annum. Import of goods from Russia to Norway via Storskog reached 6 600 tonnes in 2007. In recent years this has decreased to only 1 800 tonnes. The main types of goods transported by vehicle over the border are fish, timber products, products for the mining industry and maritime equipment. Russian road transport in the corridor is primarily general cargo, food products and passenger transport between the cities in the region. There are several Russian bus companies offering transport between Murmansk and Kirkenes.

54 Owned by a private mining company, Sydvaranger Gruve AS produced 1.98 million tonnes of iron ore concentrate in 2012, the ore is shipped from Bjørnevatn to Kirkenes by rail

The corridor is very important for passenger transport between Kirkenes, Murmansk and the other towns just over the border on the Russian side. Border crossings via Storskog/Borisoglebsk have increased markedly in recent years. Last year's increases may primarily be attributed to the introduction of proofs of lawful residency in the border area for the inhabitants of both countries within a radius of 30 km of the border. An increase in the number of border crossings up to 400 000 is estimated in 2015. The total number of vehicles crossing the border at Storskog increased from 33 170 in 2009 to 93 977 in 2012.

Rail transport

This section of the October Railway runs from St. Petersburg in the south via Petrozavodsk and Kandalaksha to Murmansk city and the coast of Murmansk in the north. The total distance between St. Petersburg and Murmansk is 1 448 km, and the section between Petrozavodsk and Kola has a length of 1 054 km. It has 52 stations. The railway was electrified in 2005.

The rail link between Nikel and Murmansk is primarily used for freight from the nickel mine at Nikel. A passenger train runs daily between Nikel and Murmansk. The railway needs upgrading.

Traffic volumes on the western shore of the Kola Bay are estimated at 16.5 million tonnes by 2015 and 31 million tonnes by 2020. Development of the Murmansk Railway Node will generate freight flows up to 36 million tonnes by 2015 and up to 52 million tonnes by 2020. Locally produced goods are primarily exported to Norway, Sweden, the Netherlands, Finland and Switzerland. The majority of imports come from Norway, Finland, Great Britain, Germany, Sweden and the Netherlands.

Air transport

Petrozavodsk airport is a regional airport with services to St Petersburg and Moscow. Murmansk Airport is an international airport which is operated by several airlines and has, besides domestic flight connections to major cities in Russia, connections to Finland (Helsinki, Rovaniemi) and Norway (Tromsø). Murmansk Airport has one runway with a length of 8 202 ft.

5.6.3 KEY CHALLENGES

The introduction of the scheme for proof of lawful residency in the border area has simplified border crossings for the local population. Customs and visa procedures and rules must, however, still be viewed as a main challenge for transport in the corridor. Additional factors are limited capacity and long waiting times at the Storskog/Borisglebsk border-crossing post. There are plans to extend and streamline the border stations on both Norwegian and Russian sides to cope with future growth.

The E105 between Murmansk and Kirkenes is undergoing improvement and will be completed during 2015. The road on the Norwegian side will then have good-standard status and be open to modular vehicle combinations (25.25 m / 60 t) from the border down to Kirkenes and to the border of Finland (Neiden). On the Russian side the permitted total weight for heavy goods vehicles[55] is 40 tonnes (38 t) and permitted length is 18 m. Differences in vehicle regulations for heavy goods vehicles between the two countries might hamper the development of international cargo transport over the border.

A need to extend the runway at Kirkenes Airport to 2 200 m has been identified in order to accommodate larger aircrafts.

5.6.4 PLANNED DEVELOPMENT

In total EUR 46 million will be invested on the 10 km stretch of the E105 from Hesseng to Storskog/Borisglebsk in Norway. On the Russian side the improvement works have been in progress since 2008 and have encompassed the entire 230 km stretch between the border and Murmansk at a cost of EUR 60-55 million. Reconstruction of other parts of the E105 in Russia is also planned. E105 on Russian side will have motorway sections with a total length of 1580.2 km when the reconstruction is done.

55 Heavy Goods Vehicle

The Russian Federal Program[56] includes several investment projects in the region. It is planned to build additional second tracks and 327 km of public rail track Murmansk – Petrozavodsk.

There are plans to extend the runway at Kirkenes Høybuktmoen airport in the period 2018-23. This is in light of expectations of a significant increase in Norwegian petroleum activity in the southeastern Barents Sea. There are also plans to reconstruct Murmansk airport.

5.6.5 FUTURE POTENTIAL

Potential in relation to existing infrastructure
To some extent, any future development of the corridor close to the border will depend on the content and progress of the cooperation between Norway and Russia on business policy in the border regions.

Tourism already plays a significant role in the economy of the Barents Region and it is a sector with great potential for further growth. Cooperation across borders is, however, a prerequisite for such growth. Developing cross-border infrastructure and reducing bureaucratic barriers along the national border in the region will facilitate practical cooperation with regard to tourism.

In the near future the potential lies primarily in an increase in private road traffic. Proof of lawful residency in the border area, visa-free border crossing and development of a possible common residence and labour market may give rise to greater transport needs in the region.

Potential in relation to new infrastructure- the possible extension of the Russian railway to Kirkenes
Russia has a comprehensive rail network, and today there is a railway as far as Murmansk and onward to the town of Nikel which is close to the Norwegian border. The distance between Nikel and Kirkenes is approximately 40 km.

The basis of freight for a new rail link could be ore and minerals, forest products, fertilizer, petroleum, seafood and containers. The link could be of great significance for industrial development in both Russia and Norway and would stimulate business relations over the border. Infrastructure development in the Murmansk-Kirkenes axis has been on the agenda for many years. A couple of studies have been done on the possibility of a new railway, but they are outdated and not thorough enough when it comes to market analysis and cost of construction. More detailed studies that have some relevance have been conducted for the construction of a new port close to Kirkenes on Russian territory.

Such studies have suggested cargo turnover of 65 million tonnes a year for a new port only kilometres away from the port of Kirkenes. It is known that the cargo volumes out of the town of Nikel alone amount to 3 million tonnes a year.

With the more open border and the good relations between Russia and Norway in recent years, now is probably a good time to make a joint study on a possible new railway link Nikel – Kirkenes. A joint feasibility study conducted in partnership by Russia and Norway can investigate the cargo basis, the industrial significance and the costs of a rail link between Nikel and Kirkenes and will provide a good basis for considering this possibility further.

56 "Development of transport infrastructure 2010–2015"

5.7 **CORRIDOR:** KEMI – SALLA – KANDALAKSHA

Consists of:

Road

E105, E75 and National Road 82

Rail

Kandalaksha – Alakurtti (branch of the October railway) and Kemi – Rovaniemi – Kemijärvi line

Brief facts:

Road

Distance Kemi-Kandalaksha: 446 km
Width: 10 m. 6.5 m, 7 m in Russia
Percentage of the road with a width of 8 m or more is 58% on the Finnish side
Speed limit 100 or 80 km/h, 50 to 60 in urban areas and 90-30 on the Russian side
Number of vehicles crossing the border per day: 300
Average number of vehicles per day when traffic is at its peak: 20 000 in Rovaniemi, 2 000 in Alakurtti

Ports

See Chapters 5.4 and 5.5.

Airports

Kemi-Tornio	66 000 passengers/year
Rovaniemi	400 000 passengers/year

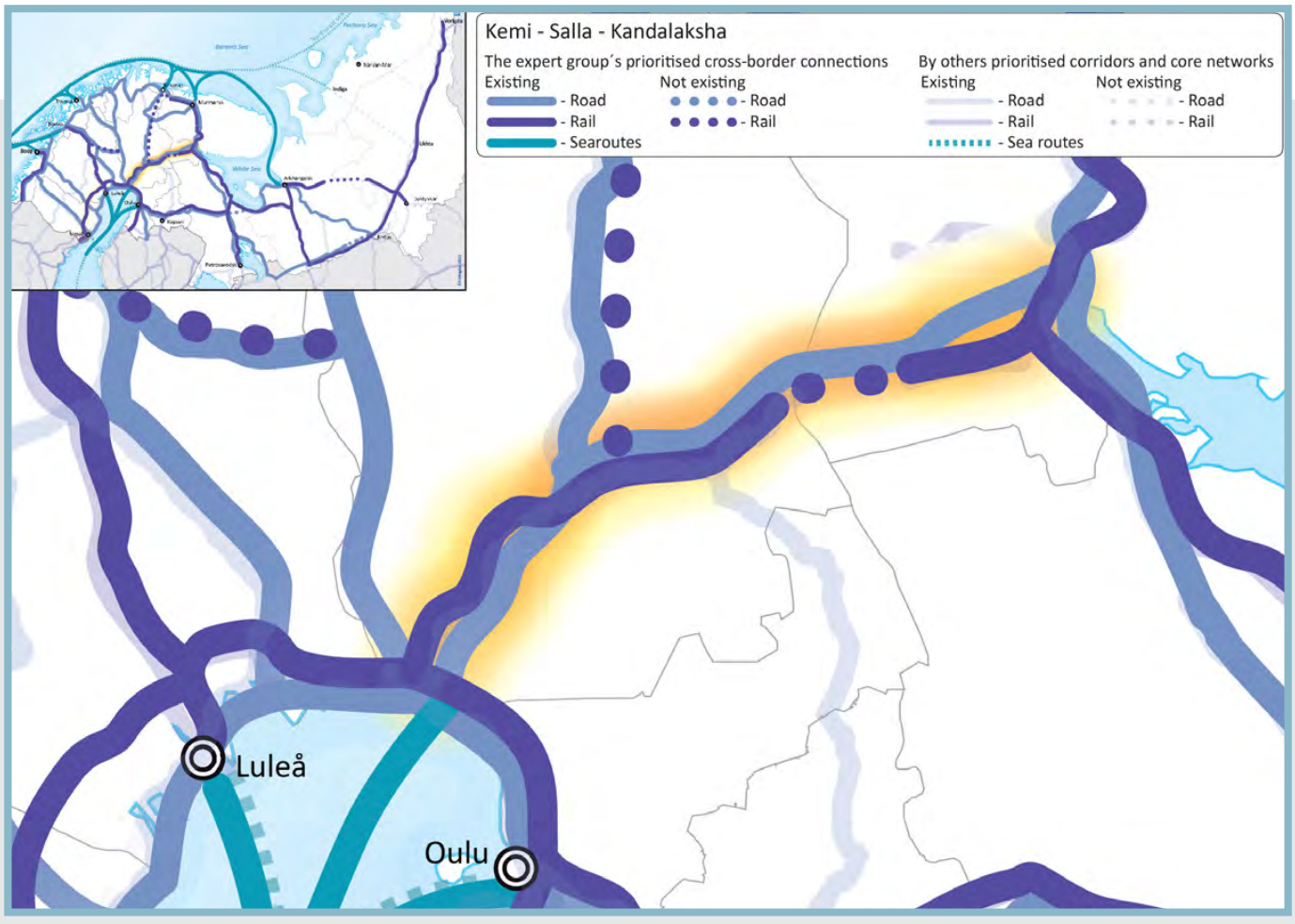


Figure 25: Kemi – Kandalaksha

Railway

Length Kemi (Laurila junction to be exact) to Kelloselkä on the Russian border 270 km
Average number of passenger trains per day: 14 trains, 400 000 passengers/year between Kemi and Rovaniemi, 2 trains between Rovaniemi and Kemijärvi
Average number of cargo trains per day:
6 trains Kemi–Rovaniemi
3 trains Rovaniemi–Kemijärvi
No regular trains beyond Kemijärvi
Electrified from Kemi to Rovaniemi, electrification as far as Kemijärvi expected to be in use by 2014
Single track
Automatic train control

General information

Number of inhabitants in cities:

Kemi	22 000
Rovaniemi	61 000
Kemijärvi	8 000
Salla	4 000
Alakurtti	3 000
Kandalaksha	36 000
Murmansk	307 000

5.7.1 GENERAL DESCRIPTION

The corridor starts from the Bothnian Corridor in Kemi and runs via the towns of Rovaniemi and Kemijärvi to the municipal centre of Salla and to the Russian border-crossing point at Salla. From there the corridor continues via Alakurtti to Kandalaksha.

The Finnish part of the road is included in the proposed TEN-T comprehensive road network. This road is part of the road connection between Bodø and Murmansk, which has often been called the Barents Road.

There are railways on both sides close to the border, but these are not connected. The lack of a railway link at Salla (60 km) is the important aspect of this corridor.

5.7.2 INFRASTRUCTURE AND STANDARD

Road
The road from Kemi to the Russian border is 280 km long and the road on the Russian side from the Finnish border to Kandalaksha is 166 km long. The paved road width varies between 6.5 and 10 m on the Finnish side, the widest section being between Kemi and Rovaniemi. Some sections of the road on the Russian side are still unpaved.

Rail
There is at present a 279 km long railway connection from the Bothnian Corridor to Kelloselkä, near the Russian border at Salla. Regular rail transports end at Kemijärvi. There have been projects aiming to connect the Finnish rail network and the Russian rail network which extends as far as Alakurtti.

There is currently a missing connection of 60 km along this section. In addition the railways need improving for another 200 km on both sides of the border. There have been many studies showing that connecting the Russian and the Finnish rail networks in Salla by building the missing 60 km of rail and making the necessary improvements on the existing rail network could be economically feasible. These plans have not yet been realized and no decision to build the possible new rail has been made.

The railway is electrified from Kemi to Rovaniemi and electrification to Kemijärvi is under construction.

The October railway has four crossings to southern Finland (Buslovskaya Svetogorsk, Wartsila, Kivijarvi), but only the Vartius crossing in the Barents Region.

5.7.3 TRAFFIC

Road
Average number of vehicles per day is from 3 000 to 6 000 between Kemi and Rovaniemi, up to 20 000 in Rovaniemi and about 1 000 on the Finnish side close to the border. The average daily number of border-crossing vehicles in 2012 was 290 cars and five trucks or buses. The number of border crossings has been growing over the last few years. average number of vehicles per day on the Russian side is 440, 30% of which are heavy vehicles.

Rail
There are six daily trains transporting mainly round timber from the terminal in Kemijärvi to the paper mills in Kemi and Oulu. Another six cargo trains transport round timber from the Rovaniemi timber terminal to the same mills.

One night train serves passengers to and from Kemijärvi. There are 14 trains transporting passengers between Rovaniemi and Kemi, where the corridor connects to the Bothnian Corridor railway. The annual number of passengers from and to Rovaniemi has been around 400 000 and to Kemijärvi around 30 000.

5.7.4 KEY CHALLENGES

Road

- Rovaniemi – Kemijärvi is too narrow for the volume of traffic.
- Need to improve the vertical curvature in some sections of the E75 south of Rovaniemi.
- Accessibility and road safety on the E75 south of Rovaniemi are inadequate.
- The road standard is poor in some sections between the Finnish border and Alakurtti.

Rail

There is a 60 km long missing link between the railways in Salla and Alakurtti. Also the railway between Kemijärvi and the Finnish Russian border in Salla should be reconstructed if the missing link is to be built.

5.7.5 PLANNED DEVELOPMENT

Road

- New bypass lane sections with central barriers will be planned on the E75 south of Rovaniemi in the future.

Rail

The electrification between Rovaniemi and Kemijärvi will be finalized by 2014.

The October Railway will develop its infrastructure, and in particular, it is planned to build a second railway track in Karelia in order to improve access to the port of Murmansk. With a second railway track trains can go in both directions without any delays. To increase the transit cargo flow to Scandinavian countries, the international railroad border check-points will be reconstructed.

5.7.6 FUTURE POTENTIAL

Today the use of the corridor is limited mainly to tourism and business travel between Russia and Finland. Cargo transport is very limited. The mining industry has shown some interest in this corridor, in case the railway connection is realized. An updated feasibility study is planned.

The development of this corridor will open new opportunities for “people-to-people” contact between Northern Finland and the Murmansk region. The construction of the missing 60 km of rail between Salla and Alakurtti will give the mining industry of Northern Finland important access to the port of Murmansk.

5.8 **CORRIDOR:** KEMI – ROVANIEMI – KIRKENES

Consists of:

Road

E75 National Road 971, National Road 893 and E6

Rail

No railway exists today, but is an option in the future

Brief facts:

Road

Length: 702
Width: 10 m–5.5 m
Speed limit: 100 or 80 km/h, 50 km/h in some urban areas
Number of vehicles crossing the border per day: 500
Average number of vehicles per day when traffic is at its peak: 20 000 in Rovaniemi

Ports

See Chapter 5.4 and 5.5

Airports

Rovaniemi	400 000 passengers/year
Ivalo	150 000 passengers/year
Kirkenes	301 000 passengers/year

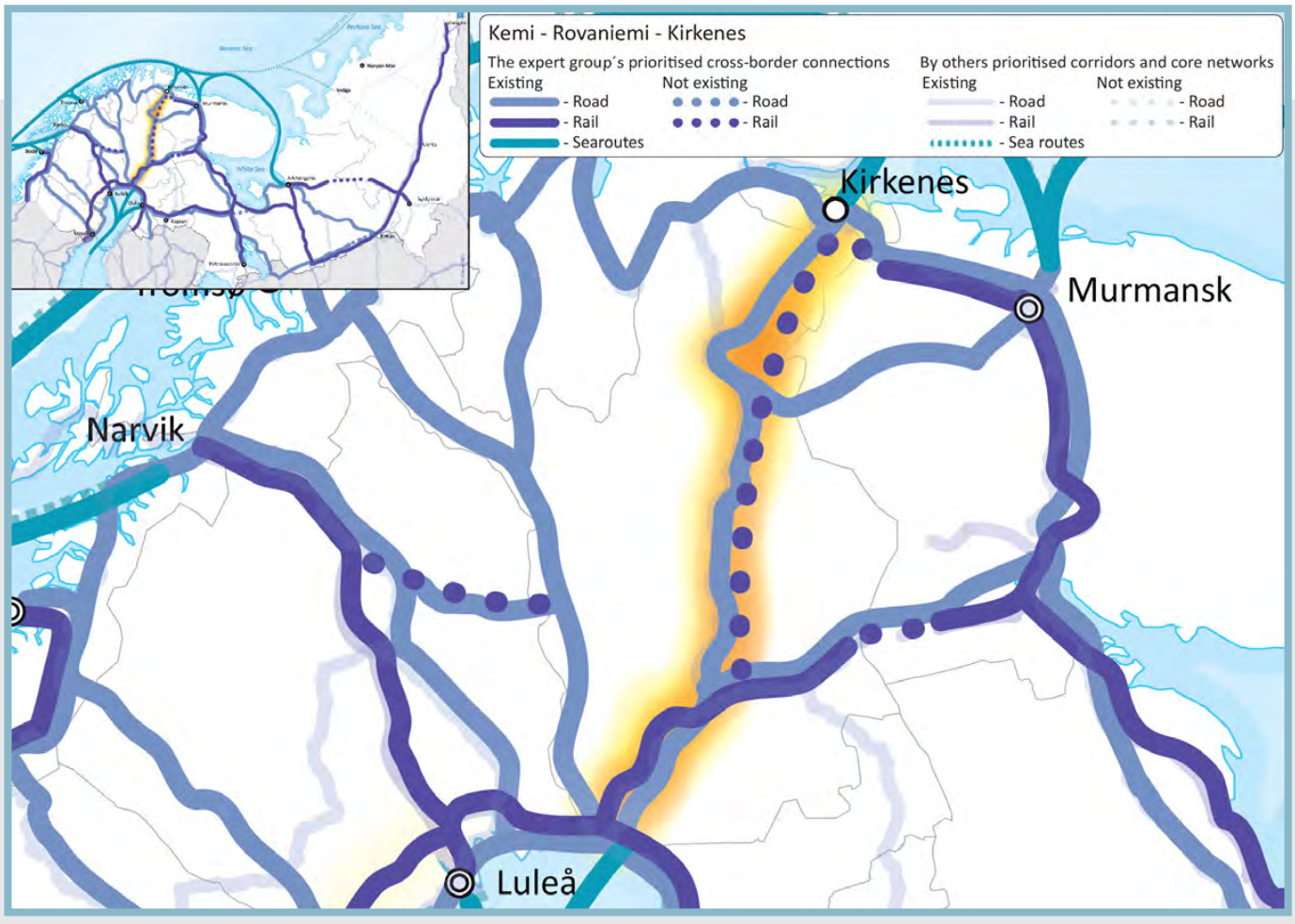


Figure 26: Kemi – Rovaniemi – Kirkenes[57]

57 There are several possible routes for a new railway. Passing Lake Inari on the south side is the shortest and cheapest. A new railway could start at Kemijärvi instead of Rovaniemi.

General information

Number of inhabitants in cities:	
Rovaniemi	61 000
Sodankylä	9 000
Ivalo (municipality of Inari)	7 000
Kirkenes	10 000

5.8.1 GENERAL DESCRIPTION

For information on rail see Chapter 5.8.6.

The road corridor starts from the Bothnian Corridor in Kemi and runs parallel to the Barents Road to Rovaniemi. From Rovaniemi it runs north as the E75, passes by Rovaniemi airport and runs through mostly forest-covered countryside to Sodankylä and further to Ivalo and Inari. Those three towns are the only municipal centres and the road runs through all of them. Before Ivalo there is the Saariselkä holiday resort, which during high season has more inhabitants than Ivalo. Between Saariselkä and Ivalo, close to the road is Ivalo airport, which serves Saariselkä holiday resort and the rest of Northern Lapland. There is also some tourist traffic destined for Finnmark including the main tourist attraction in Northern Norway, the North Cape Cliff.

There are two operating mines and several advanced mining projects in Central Lapland north of Sodankylä along the E75. The transports to and from the mines are operated by lorry and are directed mainly to the port of Kemi . A significant amount of timber is transported on the E75 to Rovaniemi, where it is loaded onto trains and transported to paper plants in Kemi and Oulu.

20 km north of Inari the road corridor leaves the E75 and becomes National Road 971 to the border-crossing in Neiden and from there to the E6 via the town of Kirkenes. The corridor is part of the proposed TEN-T comprehensive road network as far north as National Road 971, which is not included in TEN-T. The road corridor is a lifeline for the northernmost parts of Finland. It is the only road suitable for heavy transports between the municipalities of Utsjoki and Inari and the rest of the country. The lack of railway increases the importance of the road corridor for all transports between Northern and Central Lapland and the southern parts of Finland.

5.8.2 INFRASTRUCTURE AND STANDARD

The distance from Kemi to the Norwegian border in Neiden is 590 km. The E75 road has an 8 m wide pavement almost all the way from Rovaniemi to Ivalo, but it needs some widening in places. The most urgent need for widening is close to Rovaniemi because of the relatively large number of cars on the road. Between Ivalo and Inari the E75 is only 7 m wide, and there is a need for widening.

National Road 971 from E75 to Neiden has only a 5.5 to 6 m wide pavement and therefore must be widened before any significant amount of international transport can use it.

5.8.3 TRAFFIC

The highest average number of vehicles per day is near Rovaniemi, with almost 20 000, and the lowest is on National Road 971, with only 250. The average daily number of border-crossing vehicles in Neiden in 2012 was 492 cars and 22 trucks or buses. The number of border crossings has been growing over the last few years. The traffic in Kirkenes is described in Chapter 5.6.

5.8.4 KEY CHALLENGES

The standard of National Road 971 from the E75 to Neiden is not adequate for cargo transports. The horizontal curvature is particularly poor in many places. The road is also too narrow.

5.8.5 PLANNED DEVELOPMENT

There is an ongoing study which aims to determine the measures needed to prevent the E75 from deteriorating under heavy loads coming from the mines in Sodankylä.

So far, no plans have been made to improve the standard of National Road 971.

In the medium long term, a new railway may be built from Rovaniemi or Kemijärvi up to Sodankylä to serve the new mines in Central Lapland. Both the forest industry and the mines would benefit from the possibility to use train transport in the future. The future railway corridor from the present railway to the mining area at Sodankylä will be determined in the regional land use plan within the next three years.

5.8.6 FUTURE POTENTIAL

This corridor is very important for the transport of timber to the forest industry, and for the mines to import the raw materials they need and to export their products. The E75 is of crucial importance to these industries. To keep the transport costs low, the total weight of the cargo must be maximized. There are initiatives for testing 100 tonnes or more on public roads in this corridor.

Some investigations have been made into building a new railway connecting Kirkenes to the Finnish railway system and thus making Kirkenes an important hub for Finnish exports. However, studies have failed to indicate a positive cost-benefit ratio for such a venture and such a project is therefore not included in Finnish transport plans.

In its 2012/13 study "Traffic requirements for the mining industry" Finland has evaluated the construction of a new rail link between Rovaniemi – Sodankylä – Kirkenes for the shipment of ore and minerals from the Pajala/Kolari – Sodankylä – Savukoski belt via the port of Kirkenes.

A link of this type will entail construction of approximately 460 – 470 km of new railway.

Much of the freight that will be carried on this railway will be the same ore and minerals that are discussed in Chapter 5.15 Corridor: Svappavarra – Pajala – Kolari.

From a Barents point of view, a railway line from Finland to Kirkenes will provide a more complete railway network in the Barents Region, in particular if a connection from Kirkenes to the Russian railway network is constructed.

5.9 **CORRIDOR:** NATIONAL CORRIDORS THROUGH NORTHERN NORWAY, KIRKENES – MOSJØEN

Consists of:

Road

E6

Rail

The Ofoten line, the Nordland line and the Meråker line

Brief facts:

Road

Length:	1 684 km (Nordland, Troms and Finnmark)
Width:	5.6 – 8.5 metres
Speed limits:	vary between 50 – 90 km/hour
Amount of traffic:	300 – 13 000 vehicles/day

Rail

The Nordland line:	
Length:	727 km (Trondheim – Bodø)
Propulsion:	Diesel
Number of tracks:	Single track, no CTC, few crossing sections

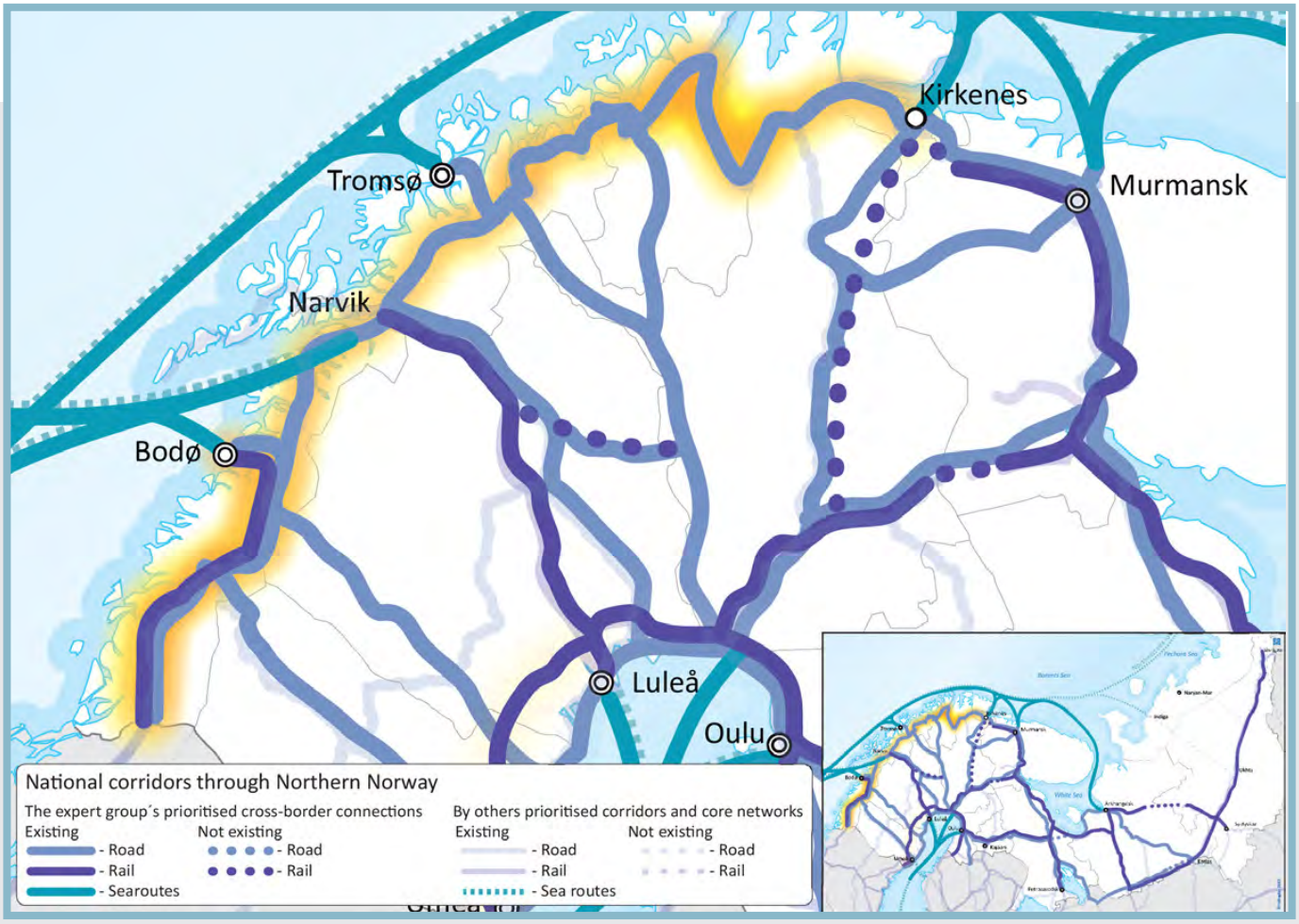


Figure 27: National corridors (rail and road) through Northern Norway, Kirkenes - Mosjøen

The Meråker line:

Length:	74 km (Hell – Storlien/Riksgrense)
Propulsion:	Diesel
Number of tracks:	Single track

Ports:

See Chapter 5.4.

Airports:

Annual passenger numbers for the largest airports in the corridor:

• Tromsø	1.8 mill.
• Bodø	1.6 mill.
• Evenes	600 000
• Alta	350 000
• Kirkenes	300 000
• Bardufoss	200 000

General information:

Number of inhabitants in cities:

5.9.1 GENERAL DESCRIPTION

The corridor is characterised by long distances and low population density. It is the only national freight haulage corridor between Northern and Southern Norway and it is very important for regional and local traffic in this part of the country.

There is a railway in the southern section of the corridor – the Nordland line that runs between Trondheim and Bodø.

The Meråker line connects to the Nordland line in an east-west direction. It is about 74 kilometres long and is not electrified. On the Swedish side it connects to Mittbanan which is electrified.

The road connections from neighbouring countries connect to this national road corridor, which thus has a distribution effect. Hauliers from the foreign corridors mostly include the E6 in their route to their final destination.

5.9.2 TRAFFIC

The E6 corridor has low traffic volumes with the exception of traffic through cities and towns. Long stretches of the corridor have an average number of vehicles per day of below 1,500 vehicles. Traffic increases towards the cities Mosjøen, Mo i Rana, Narvik and Alta where traffic volume rises to over 8 000 vehicles. The proportion of heavy vehicles varies, and is highest in the low traffic sections of the E6 where it is up to 25%.

The railway that runs to Bodø transports both freight and passengers. Total rail freight to and from Bodø amounts to about 350 000 tonnes annually.

5.9.3 KEY CHALLENGES

Road standard

Road width is of great importance for the accessibility of industrial haulage vehicles. Sections where the asphalted surface extends less than 6 metres across are prioritized for improvement. The same applies to bottlenecks. Several tunnels and bridges are of such poor quality that they will have to be improved within a few years. Road strengthening and surface renewal works will be carried out. The high level of

industrial freight imposes rigorous requirements on the road with respect to its traffic regularity. To achieve this, sections that are exposed to avalanches must be secured, and problematic mountain passes must be improved.

Railway standard
The Nordland line is currently serviced by three pairs of trains daily, each approx. 425 metres long. Freight trains provide the design criteria for the development of the railway. It is an objective to double the quantity of goods carried by rail by 2020 and to triple this by 2040. The railway will be further developed to allow for goods trains of up to 600 metres. New, longer crossing sections will be built. Completion of remote control of the railway will make the train service more efficient and reduce vulnerability to knock-on delays on long sections. Assessing electrification from an overall national and environmental perspective will be an important task.

The Nordland line connects to the railway network of Sweden via the Meråker line. The Meråker line is just south of the Barents region, but is included in this corridor description because of its potential importance for the export of seafood from Nordland. It is believed that the Meraaker line in combination with the Nordland line could constitute an important corridor to the markets in Central and Southern Sweden and further south to Western Europe.

The Meråker line has some major shortcomings today, but is now prioritized for upgrading by the Norwegian government. The Meråker line lacks electrification, has low axle load, no automatic train control, too few crossing sections, a single steep slope which necessitates the use of two locomotives, and it lacks a triangle track for efficent connection for cargo from Northern Norway. All these factors makes it an unprofitable option for cargo owners. Currently 2-3 trains normally run in each direction. Planning for electrification is in progress.

The Meråker line is interesting from a wider Barents point of view. The Ofoten line connection to Sweden will be utilized almost 100% from now onwards. The Nordland line/the Meråker line combination may therefore be a better routing for seafood in the future.

5.9.4 PLANNED DEVELOPMENT

Upgrading is planned for several sections of the E6. The largest ongoing and future projects are:

- Development/rebuilding of the E6 in the area of Helgeland (southern part of the corridor)
- Development of the stretches north and south of Kråkmo mountain
- Development of the road through the small town of Ballangen
- Shortening of the road/ construction of a new bridge close to Narvik, “the Hålogaland bridge”
- Avalanche protection in Nordnes - Skardalen
- Building of new tunnel through Sørkjosfjellet mountain
- Construction/upgrading west of Alta
- Construction of a new bridge in the village of Tana

Renewal measures for roads, bridges and tunnels are also planned on a number of other sections of the E6.

Completion of remote control on the Nordland line will make the train service more efficient, increase capacity and reduce vulnerability to knock-on delays on long sections.

5.9.5 FUTURE POTENTIAL

The corridor is of great importance for transport between Northern and Southern Norway, and an efficient national corridor will be a key factor for connecting Northern Norway to national and international markets.

5.10 **CORRIDOR:** "THE NORTHERN LIGHTS ROUTE": HAPARANDA/TORNIO – TROMSØ

Consists of:

Road

E8, National Road 93 and National road 99

Rail

The Tornio – Kolari line

Brief facts:

Road

Length: 620 km between Tornio and Tromsø (470 km in Finland and 150 km in Norway)
National Road 99 in Sweden between Haparanda and Karesuando: 364 km
Width: varies between 6.5 – 8.5 m on the E8 and 6 – 10 m on National Road 99.
Speed limit: mostly 80 – 90 km/h but down to 60 km/h over shorter distances (in Norway), mostly 100 km/h in Finland (80 km/h in winter), in Sweden 80-100 km/h.
Number of vehicles crossing the border per day: on the E8 about 500 vehicles of which 20% are heavy. Border-crossing Sweden/Finland National Road 99 in Karesuano: 560
Average number of vehicles per day where traffic is at its peak: 10 000 vehicles close to Tromsø.

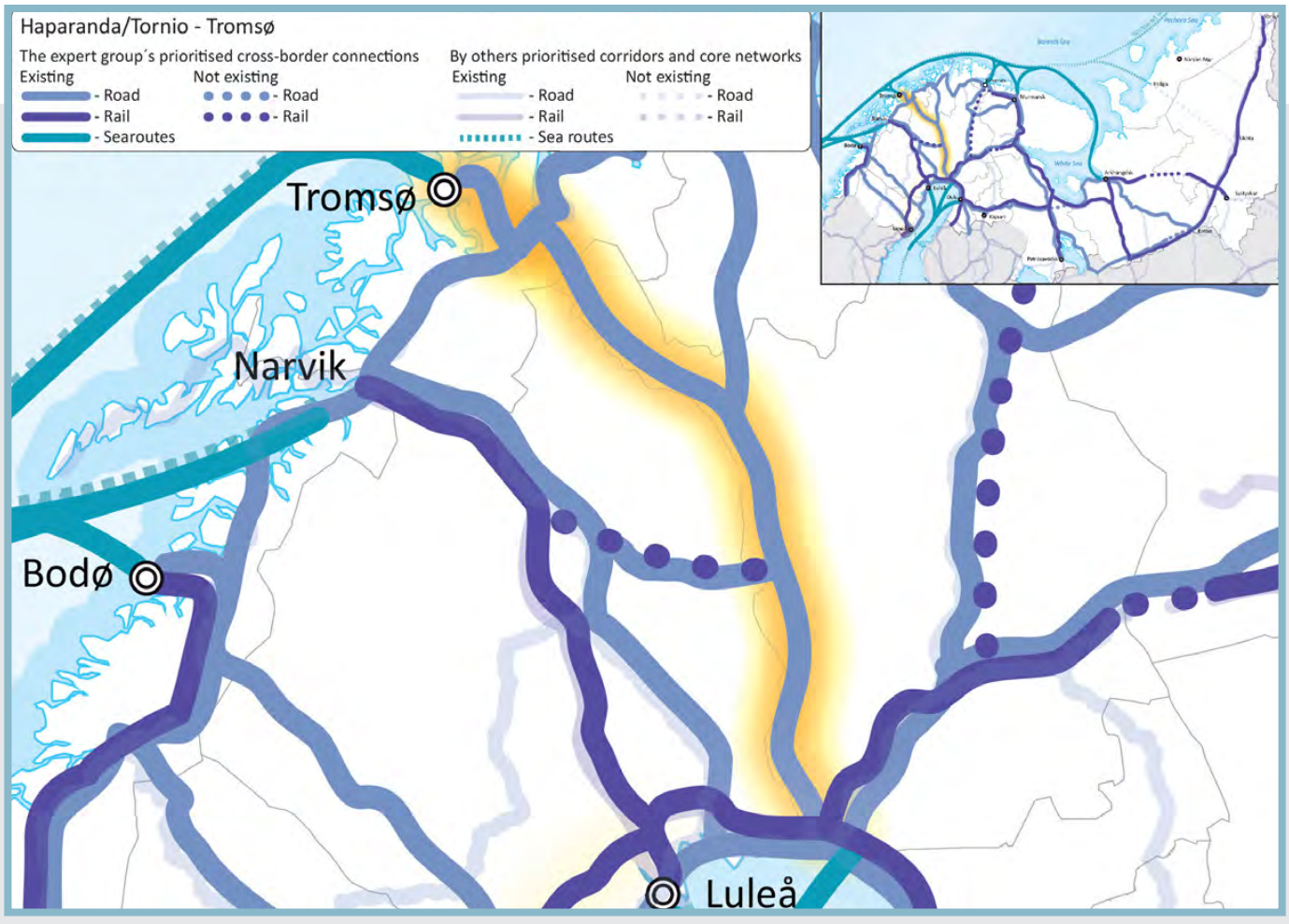


Figure 28: "The Northern Lights Route": Haparanda/Tornio – Tromsø

Railway

Length Tornio – Kolari: 183 km
Average number of passenger trains per day: three in the tourist season.
Average number of cargo trains per day: two
Non-electrified
Single track
Automatic train control

Ports

See Chapters 5.4 and 5.5

Airports

Tromsø	1.8 million passengers/year
Kittilä	260 000 passengers/year

General information

Number of inhabitants in cities:

Tromsø	71 000
Tornio	22 000

5.10.1 GENERAL DESCRIPTION

The corridor connects to the Bothnian Corridor at the Gulf of Bothnia on the border between Sweden and Finland. From here, the corridor goes north to the Norwegian Sea and the coast of Troms and western Finnmark in Norway.

Furthest to the south, the corridor consists of parallel roads on both sides of the river Torne which forms the border. On the Finnish side this is the E8, while on the Swedish side it is National Road 99. The fact that this corridor has six (6) border crossings between Sweden and Finland makes it unique. National Road 99 in Sweden and the E8 in Finland must be viewed as one road which functions as an interconnected unit. There is extensive cooperation between transport authorities on border crossings. Also the local cooperation on a community level between the countries is strong and affects the movements and transports across the border.

The E8 runs northwards through Tornedalen on the Finnish side to Kilpisjärvi. Immediately after Kilpisjärvi the E8 crosses the border with Norway, and the road runs down to Skibotndalen until it meets the E6 and continues further along the coast to Tromsø.

The roads in the corridor generally are insufficiently wide. Many stretches need improvements in road alignment. This applies especially to sections of the E8 in Skibotndalen that are defined as bottlenecks due to difficult gradients, where heavy goods vehicles can become stuck when driving in winter conditions. On the Norwegian side the E8 is open for modular vehicle combinations up to 25.25 metres in length and a total weight of up to 60 tonnes, while National Road 93 is open for heavy goods vehicles up to 19.5 metres in length and a total weight of up to 50 tonnes.

On the Finnish side the northern parts of the corridor are difficult for heavy transports because of insufficient width and poor horizontal and vertical curvature. The road is prone to accidents especially in winter.

There is also a railway in the corridor from Tornio on the Finnish side of the Swedish border up to Kolari. The railway was originally built to meet the needs of mining transport, but currently it is used for the transport of timber and for tourism.

There is an advanced iron-ore mining project in Kolari and this railway will probably be used by the mine when it opens. The mines usually require transports of large and heavy particles. An optimal route for these is difficult to find because of weak bridges and some bottlenecks in the road network.

There are reasonably large airports at both ends of the corridor in Kemi, Tornio and Tromsø. Just outside the corridor there are airports both in Kittilä on the Finnish side and Pajala on the Swedish side. The towns of Tornio/Haparanda and Tromsø lie at the end of the corridor. Apart from these there are no towns in the corridor, but there are several hubs such as Ylitornio, Pello, Pajala, Kolari, Muonio, Kaaresuvanto and Skibotn.

Kolari serves as an important regional transport hub.

5.10.2 TRAFFIC

The E8/National Road 99 is important for both cargo and private transport. The lack of a rail service in the corridor gives the roads an added importance, both for long-distance transport between several countries and for regional and local transport within the individual countries.

Since there are six border crossings between Sweden and Finland connecting the local communities, there is a lot of local traffic over the border river.

From the Norwegian side, seafood products are transported through the corridor. These are products destined for the Swedish and Finnish markets, but increasingly also products destined for Russia and southern European countries.

From the Finnish side, a certain amount of timber and other construction materials are transported to Norway.

The corridor is important for travellers to and from several main tourist resorts that lie close to the corridor on the Finnish side (Levi and Ylläs). The corridor is important for travellers visiting Norwegian tourist attractions such as the North Cape cliff. The port of Tromsø is a turnaround port for cruise ships.

Petroleum industrial activity in the northern regions is resulting in transport of materials both by road and sea.

The corridor also has a function as a transit corridor for transports between the counties of Troms and Finnmark and the southern part of Norway. Travel is via Finland and Sweden since roads are of better quality and the speed limits are higher than on the domestic north-south corridor in Norway.

5.10.3 KEY CHALLENGES

The challenges of the corridor are not a lack of capacity. The main challenges for transport of people and goods are an unacceptable road standard. The deficiencies in road standard are generally narrow roads, poor horizontal and vertical curvature on certain stretches, difficult gradients on some sections and poor load-bearing capacity on certain stretches.

There are also challenges on a local level in terms of facilitating the movement of local inhabitants over the six border bridges and the need to make the border crossings more attractive for both the local community and tourists.

The mountain crossings between east and west can be subject to adverse weather conditions for periods during the winter, which again can create problems of accessibility and regularity. There are few possible alternative roads and significantly longer driving distances will be required.

The airport in Tromsø requires expansion of the terminal to be able to facilitate an increase in air travellers.

5.10.4 PLANNED DEVELOPMENT

The E8 has a high priority from the Norwegian side. Spending of approximately EUR 53 million is planned over the next four years and a significant increase is expected up to 2023:

- Close to Tromsø on the E8, construction of about 10 km of new road in Ramfjorden is planned. A new access road will be built to the port terminal in Breivika/Tromsø.
- Work on modification/improvement of the most difficult gradients in Skibotndalen in Norway has already begun in 2013, thereby removing one of the worst bottlenecks.
- Improvement works are planned on some stretches between Skibotn and the national border with Finland through to 2023. As part of this work, the second bottleneck in Skibotndalen will be removed.
- Significant modification/improvement of the E6/E8 at the southernmost part of the stretch between Skibotn – Nordkjosbotn is expected during the same period. This will provide considerable improvement in accessibility and reduced travel time.

Planned Finnish measures are mainly focused on the northernmost section between Palojoensuu and Kilpisjärvi. The road should be widened and both vertical and horizontal curvature improved. In many places the load-bearing capacity should also be improved. The costs are estimated to be EUR 50 million, but no decision has been made with regard to financing.

National Road 99 is being reconstructed from 2013-2015 between Kaunisvaara and Autio due to the mining expansion in the area.

There are plans to expand the airport terminal in Tromsø, but it appears that this will not happen for six years.

5.10.5 FUTURE POTENTIAL

During the past five years there has been an increase of approximately 19% in the number of heavy goods vehicles crossing the borders. There is nothing to indicate that this growth will diminish in future years. On the contrary, it is expected that transport for the seafood industry will increase significantly in the next 30 years and increased activity in the petroleum industry in the Barents Sea can be expected to increase the volume of goods transported in the corridor. Tourism is an important industry both in Northern Finland and Northern Norway. Preparations are being made for greater collaboration between the actors in all three countries and and thereby a growth of traffic in the corridor.

Strategic discussions between the road authorities in Sweden and Finland about the role of National Road 99 and the E8 must take place, since there are two parallel roads in the southern part of the corridor with six border bridges.

There is one major mine in the corridor in Kaunisvaara, Sweden and an advanced mining project in Kolari, Finland. One other mine close to the corridor is in Kittilä, Finland. Several other mining projects are expected to start during the next decade. The mining industry will create additional transports to the corridor, both on the railway and on the roads.

In the long term, a new railway along this corridor may also be put on the agenda, but currently there is no rationale for a railway. However, mineral reserves in the north-western parts of Lapland may cause this to change this in the future.

5.11 **CORRIDOR:** KARESUANDO – ALTA

Consists of:

Road

E8 and National Road 93

Brief facts:

Road

Length: 272 km (100 km in Finland and 172 km in Norway)
Width: varies between 6.5 – 8.5 m on the E8 and on National Road 93 it reduces to 5.5 m
Speed limit: mostly 80 – 90 km/h but down to 60 km/h over shorter distances (in Norway), mostly 100 km/h in Finland (80 km/h in winter).
Number of vehicles crossing the border per day: about 400 vehicles of which 20% are heavy vehicles.
Average number of vehicles per day where traffic is at its peak: 3 500

Ports

See Chapter 5.4.

Airports

Alta	350 000 passengers/year
Kittilä	260 000 passengers/year

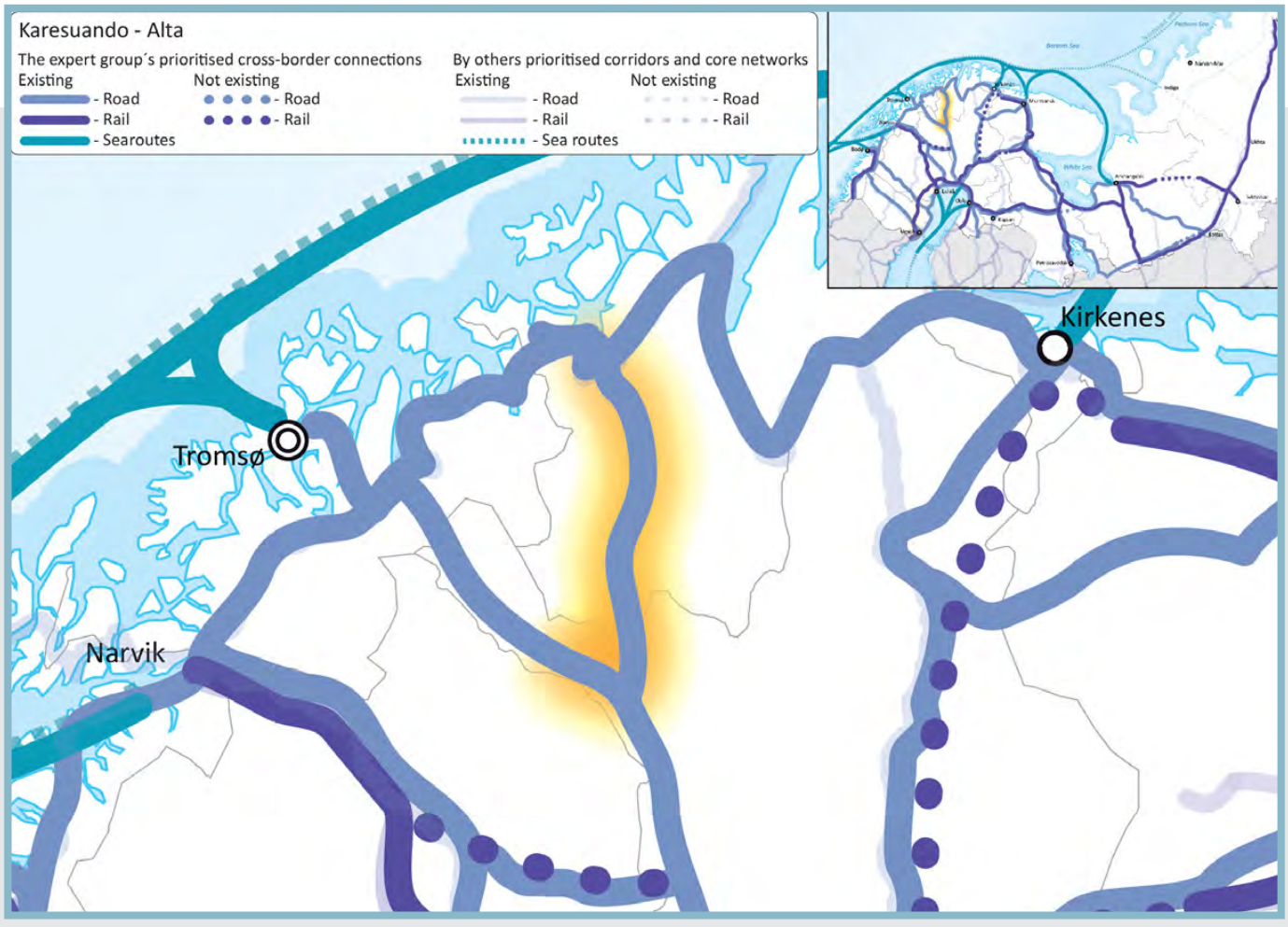


Figure 29: Karesuando - Alta

General information

Number of inhabitants in cities:

Alta	20 000

5.11.1 GENERAL DESCRIPTION

The corridor connects to "The Northern Lights Route" (corridor 5.10) in Karesuando and goes north to Alta where it connects to the E6. The corridor consists of National Road 93 in Finland and Norway. The road is open to vehicles up to 19.5 meteres in length and total weight up to 50 tonnes.

The corridor is important for both cargo and private transport. The lack of a rail service in the corridor gives the road an added importance. The road is important both for long-distance transport between several countries and for regional and local transport within the individual countries.

5.11.2 TRAFFIC

Average daily traffic in the corridor is less than 500 vehicles with the exception of the section close to the city of Alta where traffic increases.

5.11.3 KEY CHALLENGES

The main challenge of the corridor is not a lack of capacity, but an unacceptable road standard. The deficiencies in road standard are road width, poor horizontal and vertical curvature on certain sections, difficult gradients on some sections and poor load-bearing capacity on some sections. National Road 93 has an approximately 5 km section near the village of Kløfta which is classified as a bottleneck due to road width combined with poor vertical and horizontal curvature and risk of landslides. In certain periods during winter, mountain crossing is challenging, but the road is rarely closed due to poor weather conditions. There are few possible detours if the roads are to be closed due to weather conditions, accidents or vehicle breakdowns, especially in the northern part of the corridor. On the Finnish side there is one bridge on National Road 93 that represents a bottleneck for the use of 76 tonne trucks. Finnish National Road 93 is not wide enough to accept an increase in transports.

5.11.4 PLANNED DEVELOPMENT

In the next ten year period it is planned to remove the bottleneck close to Kløfta. The bottleneck bridge on the Finnish side will be replaced by a new bridge. Other measures to improve the road standard must be planned simultaneously.

5.11.5 FUTURE POTENTIAL

During the past five years there has been an increase in the number of heavy goods vehicles crossing the border in this corridor. There is nothing to indicate that this growth will diminish in future years. On the contrary, it is expected that transport for the seafood industry will increase significantly in the next 30 years and increased activity in the petroleum industry in the Barents Sea can be expected to increase the volume of goods transported. Tourism is an important industry both in Northern Finland and Northern Norway.

Continuing the E45 numbering up to the E6 in Alta would be logical.

5.12 **CORRIDOR:** "THE BLUE ROAD": VASA – UMEÅ – MO I RANA

Consists of:

Road

E12

Rail

The Storuman – Hällnäs line

Brief facts:

Road

Total 492 km (Umeå – Mo i Rana)
Length
Sweden: National border–Umea (Holmsund) 452 km
Norway: (Mo i Rana – National border) 40 km
Width: 6–14 metres (Sweden), 7.5 – 8.5 m (Norway)
Percentages of the road with a width of 8 m or more:
Speed limits: 90-100 km/h (Sweden), 50 – 80 km/h (Norway)
Number of vehicles crossing the border per day: 620 Sweden/Norway, Sweden/Finland: Ferry
Average number of vehicles per day where traffic is at its peak: 10 000 Umeå, 7 500 Mo i Rana

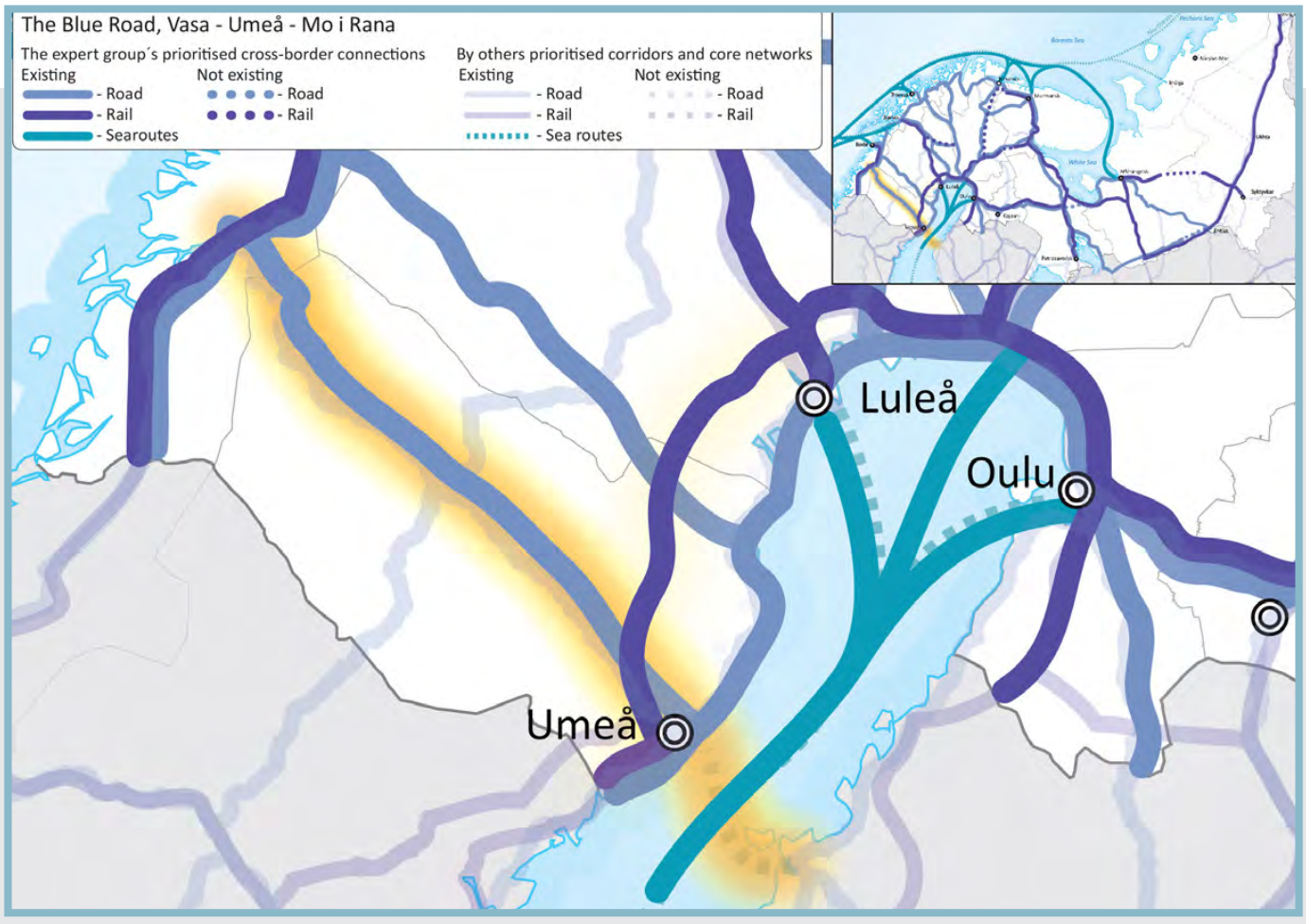


Figure 30: The Blue Road»: Vasa – Umeå – Mo i Rana

Railway

Sweden (Storuman-Hällnäs)

Length

Sweden: 167 km Storuman-Hällnäs, 47 km Vännäs-Holmsund
Average number of passenger trains per day: 8
Average number of cargo trains per day: 6
Maximum permitted axle load: 22.5 tonnes
Gauge: Sweden 1 435 mm

Maximum speed: 90 km/h
Signalling system: System M, ATC
Electrified/Not electrified:
Not electrified
Single or double track: Single track

Ports

See Chapters 5.4 and 5.5.

Airports

Mo i Rana	103 000 passengers/year
Umeå	846 000 passengers/year

General information

Number of inhabitants (municipalities)

Mo i Rana	26 000
Umeå	117 000

5.12.1 GENERAL DESCRIPTION

This corridor consists of both road and railway (sections). It begins in Mo i Rana, Norway, traverses Sweden via Umeå and ends in Vasa, Finland, with a ferry link between Sweden and Finland. "The Blue Road" is sometimes described as going through Finland and all the way to Karelia. The eastern part is, however, mainly a tourist route and its importance is considered too minor to include it in this description.

The E12 road is included in proposed TEN-T comprehensive networks and is about 910 km in length. The section within Finland is Finnish National Road 3. The road follows this route: Mo i Rana – Storuman, Sweden – Lycksele, Sweden – Umeå, Sweden – Holmsund, Sweden – (ferry) – Vaasa, Finland – Tampere, Finland – Hämeenlinna, Finland – Helsinki.

On a local and regional level, the E12 acts as an artery for passenger/freight transport to larger industries, workplaces, and municipal and regional centres.

The ferry line has one departure per day. It risks being withdrawn because a commercial company operates it, and it is unprofitable due to low passenger figures. There is no government support, since this is only available for domestic connections. It is a principle, especially in Sweden, that international travel should not be supported by taxpayers. However, the city of Vaasa supports the ferry route.
There is a 260 km railway line between Storuman and Hällnäs, where it connects to the main railway through Northern Sweden and continues to the port of Umeå. The missing rail link between Storuman and Helgeland (Norway) is approx. 280 km.

5.12.2 INFRASTRUCTURE AND STANDARD

Road: E12

On the E12 there are some sections with steep slopes, which combined with the narrowness of the road makes it difficult for heavy vehicles to pass and to get up the hills. This becomes a bottleneck also for other traffic.

Rail

The line between Storuman and Hällnäs is of a low standard, but it is proposed to upgrade it in the years to come in the proposal for a new national transport plan 2014-2025. One section, Lycksele-Hällnäs, has recently been upgraded to 90 km/h.

5.12.3 TRANSPORT IN THE CORRIDOR

The main volume of transport in the corridor consists of goods from Norway to Sweden and Europe. The freight consists largely of fish and steel reinforcement bars. There is a small proportion of industrial items from Sweden to Norway.

The road has a traffic volume of approximately 620 vehicles per day of which 10% are heavy vehicles at the border between Norway and Sweden. Modular vehicle combinations of up to 25.25m and a total weight of up to 60 tonnes are permitted.

The route is very important for the tourist industry.

There are no scheduled flights between the towns along this route.

5.12.4 KEY CHALLENGES

The traffic volumes vary considerably between different sections of the road. The traffic is heaviest towards the towns of Mo i Rana, Umeå, Vasa and Helsinki. The lightest traffic is at the border crossing between Norway and Sweden.

The capacity of the road is generally sufficient, but the geometrical standard varies considerably. On the Norwegian section of the road the aim is to obtain a width of 8.5 m. Currently just 17% of the road complies with this objective.

The current traffic safety situation is acceptable.

- Nickel Mountain AB aims to establish a mine in Rönnbäcken. The investment cost will be SEK 11 billion. This will create 750 new jobs

The project will have the following effects/consequences:

- 1 600 000 tonnes of magnetite iron ore will be transported to Mo i Rana (166 km.) This means 260-280 heavy vehicles each day.
- In addition 100 000 tonnes of nickel will be transported. This means 16 heavy vehicles each day.
- The transport of iron ore may start in 2018
- Duration of the project is 20 years

This activity will mean that load-bearing capacity must be increased both on the Norwegian and Swedish side. The road from the border to Mo i Rana must be built with a width of 8.5 m.

The estimated cost in Norway will be EUR 48 million. The cost in Sweden has not yet been calculated.

5.12.5 PLANNED DEVELOPMENT

The upgrading of the Umskard tunnel will be completed in 2014.

No comprehensive measures have been proposed until 2017. But other necessary measures – such as increasing load-bearing capacity and widening – will be carried out in the period 2018 – 2023.

Investment in a new airport at Mo i Rana has also been proposed, which can handle larger aircraft, e.g. Boeing 737s.

5.12.6 FUTURE POTENTIAL

As mentioned above, the corridor has great importance for the mining industry. As a result of the Sulphur Directive which will come into force for the ships in the Baltic Sea, this will probably create traffic along the E12 from Sweden to Mo i Rana. Aquaculture will increase in volume and create more traffic. The tourist industry will also expand.

5.13 **CORRIDOR:** "THE SILVER ROAD": SKELLEFTEÅ – BODØ

Consists of:

Road

National Road 95, National Road 77, E6 and National Road 80

Rail

The Bastuträsk – Skellefteham line, The Jörn – Arvidsjaur line, and
The Nordland line Saltdal - Fauske – Bodø

Brief facts:

Road

Total length: 379 km
Sweden: Skellefteå (E4) – Swedish/Norwegian border – National Road 95
Sweden: 355 km
Width 6-9 metres, narrowest section near the border
Speed limits 90–100 km/h
Number of vehicles crossing the border per day: 220, 40 heavy
Average number of vehicles per day where traffic is at its peak:

Skellefteå	6 700
Arvidsjaur	6 400
Arjeplog	3 500

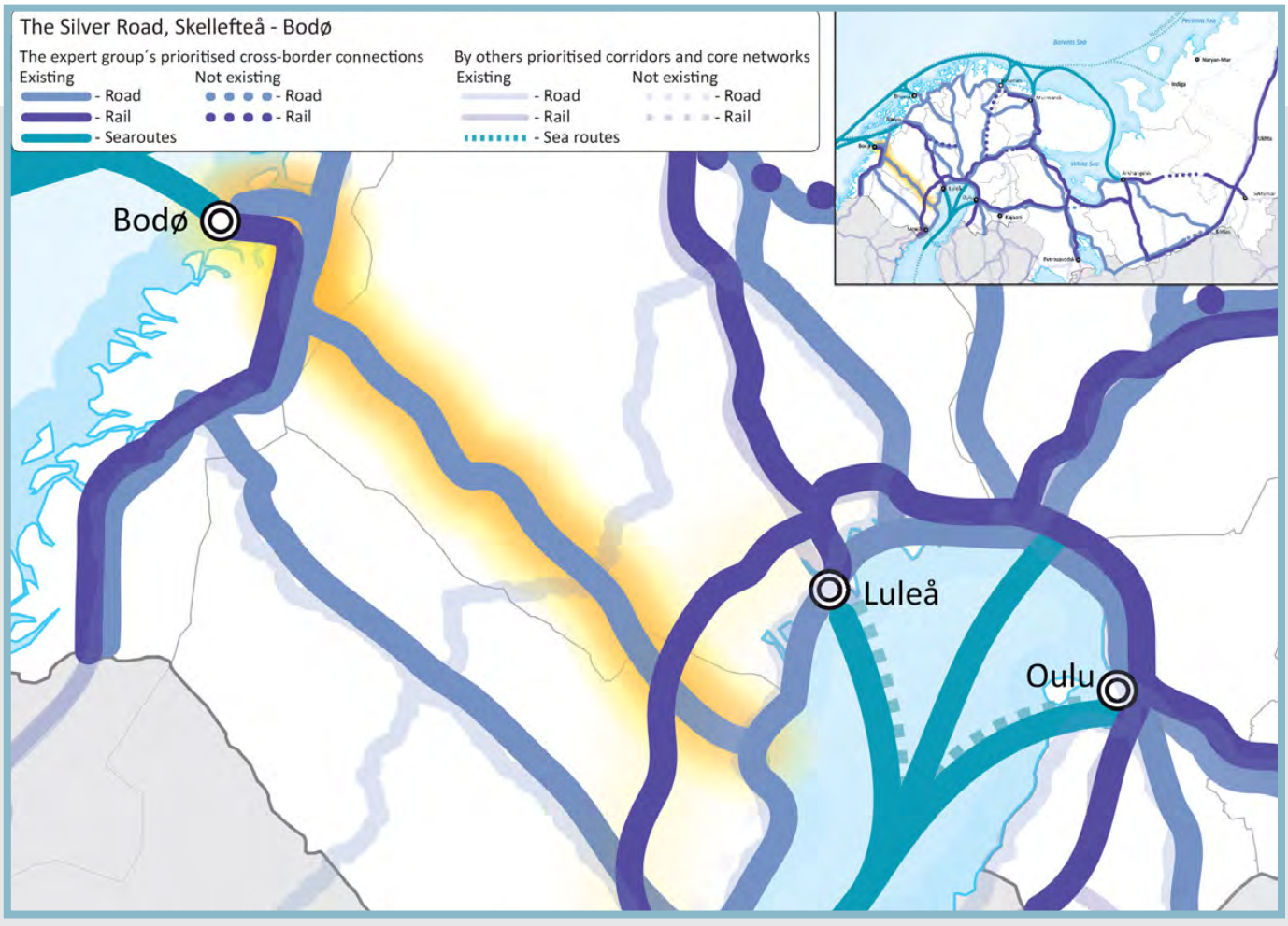


Figure 31: Skellefteå – Bodø

Swedish-Norwegian border – E6, National Road 77
National Road 77: 24 km (140 km Swedish/Norwegian border – Bodö)
Width: 6.5 – 7.5 m
Speed limit: 80 - 90 km/h
Number of vehicles crossing the border per day: 390, 26% heavy.
Average number of vehicles per day where traffic is at its peak:
Bodø: 31 000
Fauske: 10 000

Railway

Length:

Bastuträsk-Skelleftehamn	66 km	electrified
Jörn – Arvidsjaur	75 km	not electrified, no maintenance or traffic today

Average number of passenger trains per day: 0
Average number of cargo trains per day: 0
Partly electrified
Single track

Ports

See Chapters 5.4 and 5.5.

Airports

Skellefteå	225 000 passengers/year
Bodø	1.6 million passengers/year

General information

Number of inhabitants (municipalities)

Skellefteå	72 000
Arvidsjaur	5 000
Arjeplog	3 000
Rognan	3 000
Fauske	10 000
Bodø	50 000

5.13.1 GENERAL DESCRIPTION

This corridor consists of both road and railway (short sections in the Swedish costal area). It starts in Bodø and ends in Skellefteå. On the way it passes Arjeplog and Arvidsjaur municipalities.

It is an important east/west link between the Atlantic coast and the Bay of Bothnia, and also has an important role for the communities along the road. There is little cross-border traffic today, but there is a substantial potential for increase in export/import if a tunnel through the Tjernfjellet mountain is built. The current standard is quite uniform except for this 3 km long stretch of extremely poor standard. This bottleneck makes certain transports impossible and makes heavier transports in general choose other and longer routes. Removal of the bottleneck is now high on the national agenda in Norway and agreements are that planning should start within the next four years. Some minor funds have already been made available for building the tunnel, but more funds are needed in future budgets.

There are two short railway stretches on the Swedish side. They are of minor importance and will not be described further in this document.

On the Norwegian side the Nordland line runs next to the E6. The Nordland line is the Norwegian national railway north – south. Cargo for export on the Nordland line crosses the border in Southern Norway. In the future there is also a potential for a border crossing in Central Norway if the railway here (the Meraaker line) is upgraded. Such an upgrading is planned and is described separatedly. See chapter 5.9 for more information on the Nordland line and the Meraaker line.

5.13.2 INFRASTRUCTURE AND STANDARD

Road: National Road 95
The road has a low geometrical standard and is narrow in some sections.

Road: National Road 77
The alignment of the road is very poor, especially the section (Tjernfjellet) close to the E6. The gradient is very steep and is combined with sharp horizontal and vertical curves. In the winter heavy vehicles face severe problems. In bad weather drifting snow may be a problem.

5.13.3 TRAFFIC

The traffic volumes between different sections of the road vary considerably. The traffic volume is highest towards the towns of Bodø, Skellefteå and Arvidsjaur. The lowest traffic volume is at the border crossing between Norway and Sweden.

It is important for commuting between Arvidsjaur and Arjeplog and between Boliden and Skellefteå. There is an international bus service between Bodø and Skellefteå that operates every day of the week. The capacity of the road is generally sufficient, but the geometrical standard varies considerably.

5.13.4 KEY CHALLENGES

- To obtain a satisfactory geometrical standard
- Measures to reduce the effect of drifting snow in bad winter weather conditions

5.13.5 PLANNED DEVELOPMENT

There are plans to develop the road between Skellefteå and Skelleftehamn on National Road 95.

National Road 77:
In the Norwegian Transport Plan investment is proposed for a tunnel through Tjernfjellet in the period 2018 -2023. The total cost is estimated at EUR 60 million. This will greatly improve the geometrical standard. The length of the road will be reduced by 0.8 km.

E6:
The Norwegian transport plan investment is estimated at EUR 50 million for the improvement of the E6 down the northern slope of Saltfjellet between Sørelva and Borkamo in the period 2018-23.

National Road 80:
In the Norwegian Transport Plan[58] the investment for National Road 80 in the period 2014-17 is estimated at EUR 250 million. Mainly this is linked to restructuring the road into Bodø, to four lanes and a double tunnel. There are also many other smaller infrastructure projects around Bodø planned for forthcoming years.

58 Including the "Bypakke Bodø" which is a joint financing project for the city - combining different sources of financing.

5.13.6 FUTURE POTENTIAL

There is little cross-border traffic today, but there is a potential for an increase, especially for freight services, if a tunnel through Tjernfjellet is built. This applies especially for transport of fish from Norway to Sweden and Europe.

It should be mentioned that the road has an important role as a supplementary connection between Southern and Northern Norway. There is a risk of emergency closures of the E6 between Fauske and Narvikfor several reasons. The biggest risks are considered to be rock falls, avalanches or breakdown of bridges/tunnels. When such emergencies occur, the Silver Roadacts as the link between Southern and Northern Norway. It is a long, but still the best diversion north-south in Norway if the E6 closes in this region.

5.14 **CORRIDOR:** MURMANSK – RAJA-JOOSEPPI – IVALO

Consists of:

Road:

National Road R-10, A138 and National Road 91

Brief facts:

Road

Total length: 350 km (4h 45 min)
Length: 53 km in Finland and 247 km in Russia
Width: (max-min) 7 m in Finland, 11–12 m in Russia (total width not paved width)
Speed limit: (max-min) 100–50 km/h in urban area of Ivalo and 60–110 km/h (Russia)
Number of vehicles crossing the border per day: 160
Average number of vehicles per day where traffic is at its peak:
2 800 in Ivalo and 6 100 in Murmansk

Ports

See Chapter 5.4.

General information

Number of inhabitants in cities:

Ivalo	7 000
Murmansk	307 000

Airports

Number of passengers per year at main airport:

Ivalo	150 000
Murmansk	280 000

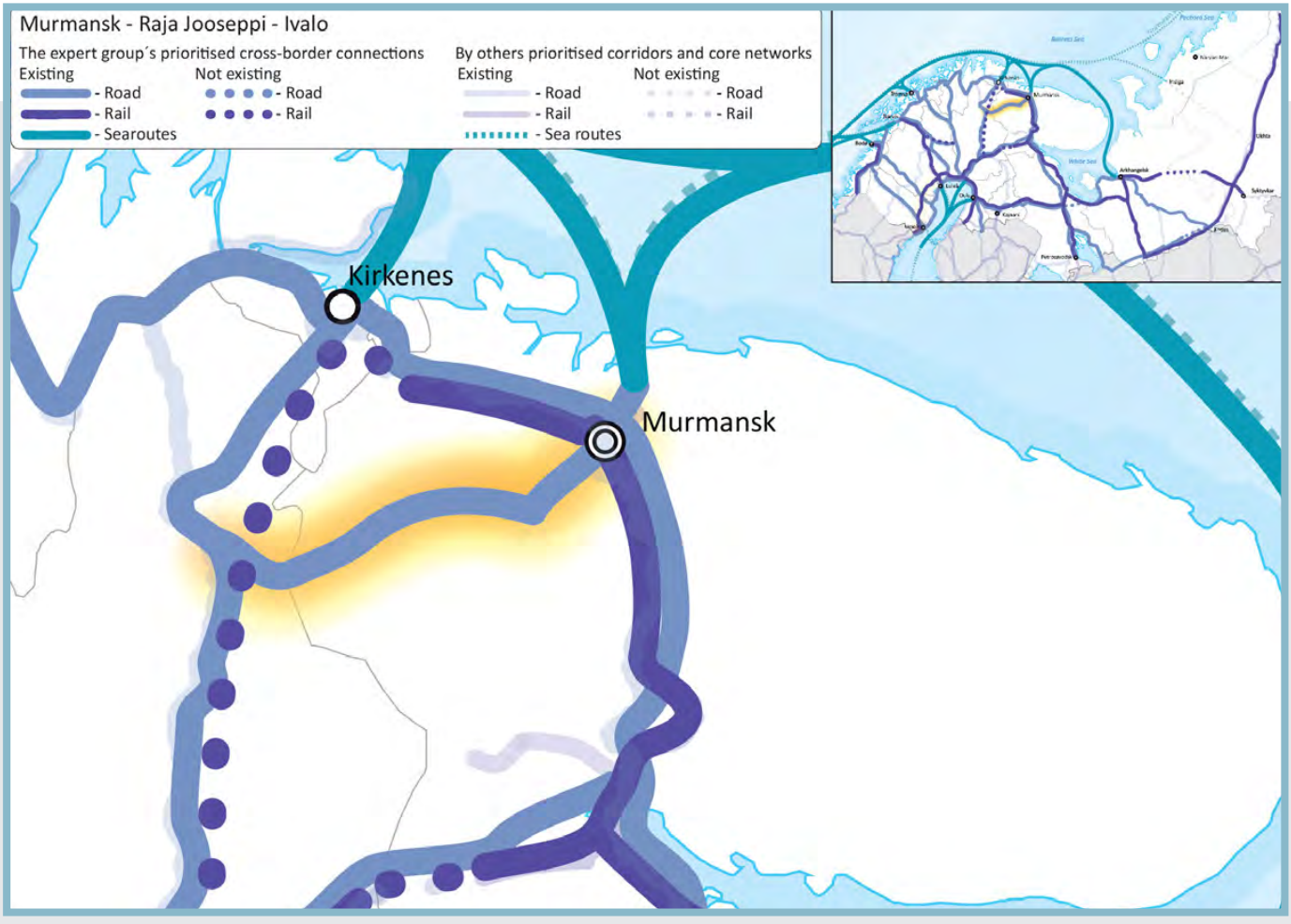


Figure 32: Murmansk – Raja Jooseppi – Ivalo

5.14.1 GENERAL DESCRIPTION

This road corridor consists of National Road 91 starting from the E75 in Ivalo and ending at the international border-crossing point of Raja-Jooseppi on the Russian border and then continuing to Murmansk. The corridor is not included in the proposed TEN-T comprehensive road network and cannot be considered an important Barents corridor before the standard is improved.

The region between Ivalo and Upper Tuloma, 50 km from Murmansk, is almost uninhabited and there are no services or other activities along the road.

The corridor is a supplement to the Salla corridor (Kemi – Kandalaksha). Which corridor is preferred depends on the road condition, which in turn varies throughout the year.

5.14.2 INFRASTRUCTURE AND STANDARD

The road on the Finnish side is 53 km long and on the Russian side 232 km long. The pavement is 7 m wide on the Finnish side and 11 m on the Russian side. On the Russian side there are some dangerous curves. The road on the Russian side has been under reconstruction for many years but there are still some unpaved sections and sections with pavement in poor condition.

5.14.3 TRAFFIC

The average daily number of border-crossing vehicles in 2012 was 153 cars and seven trucks or buses. The number of border-crossings has been growing over the last few years. On the Finnish side there is no other traffic than that going to the border. The average number of vehicles per day on the Russian side is 530, of which 25% are heavy vehicles.

5.14.4 KEY CHALLENGES

The road standard in the Russian part of the corridor, especially the surface of the pavement, is inadequate in many places.

5.14.5 PLANNED DEVELOPMENT

There are no plans for road investments in Finland. The border-crossing facilities at Raja-Jooseppi are planned to be upgraded within the next few years.

5.14.6 FUTURE POTENTIAL

Three other roads connecting the Murmansk region with the neighbouring countries - one from Norway (E105) and two to Finland through the checkpoints Salla and Lotta. The regional population seem to appreciate the advantage of having several border-crossing opportunities and find this connection important in the future.

5.15 **CORRIDOR:** SVAPPAVARRA – PAJALA – KOLARI

Consists of:

Road

E10, E45, 395, 99

Rail

No railway exists today, but is an option in the future

Brief facts:

Road

Total length:160 km

In 2014, approx. 5 million tonnes of iron ore products are planned to be transported from the mines in the Pajala area (Kaunisvaara) to Svappavaara to be reloaded onto trains for further transportation on the Iron Ore line/the ofoten line to Narvik. This approx. 160 km transport is carried by 90 tonne lorries on public roads.

Between 2012 and 2017 the road(s) between Kaunisvaara and Svappavaara will be reconstructed to meet the mining industry's demand for robust and reliable infrastructure.

Construction of a new railway would allow the ore products to transfer to rail and thereby open possibilities for increased mining in the region.

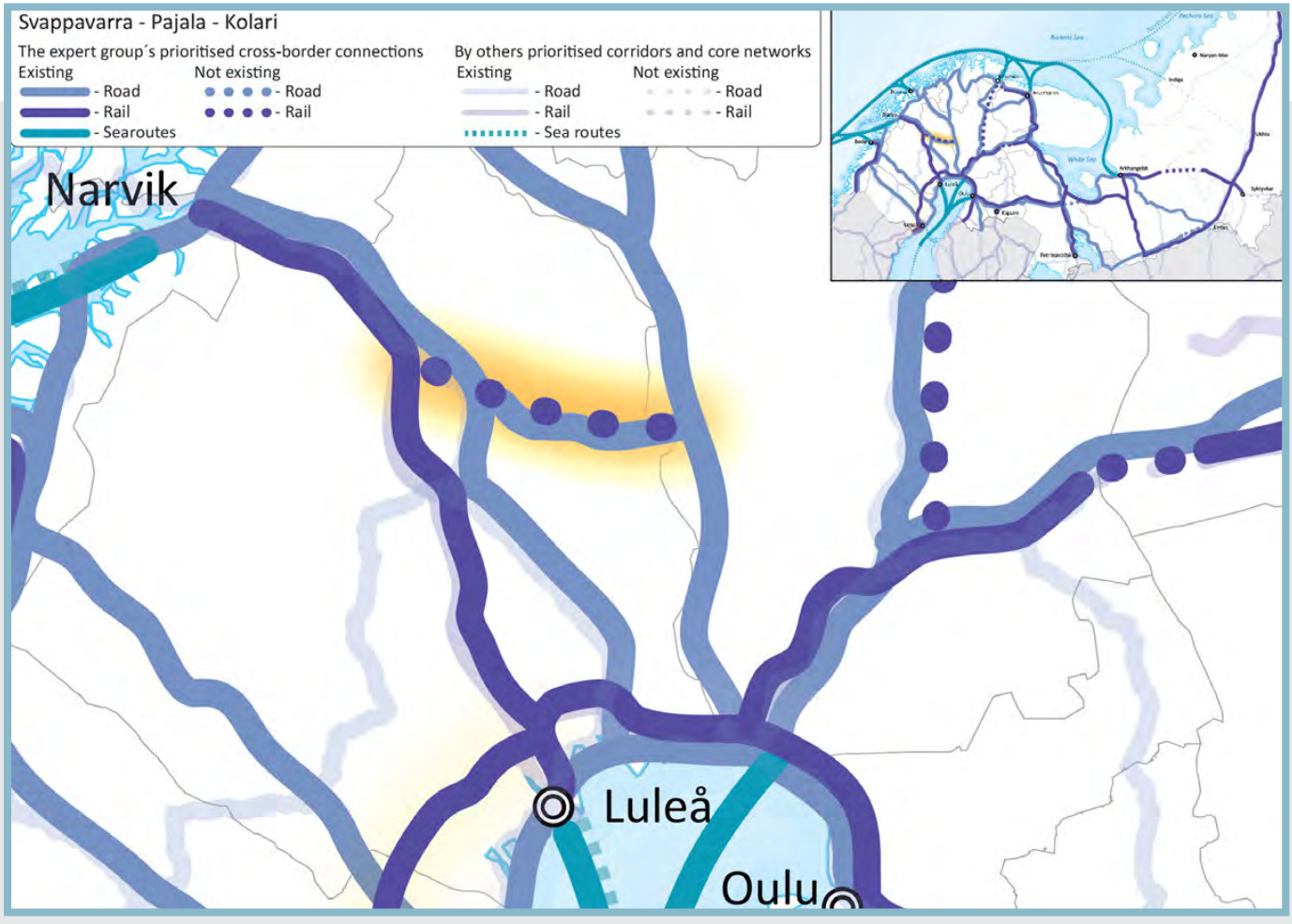


Figure 33: Svappavarra - Pajala - Kolari

As a future alternative, a possible new railway could stretch from Svappavaara – Pajala in Sweden and onward to Kolari in Finland and further into Northern Finland where several mines are located. It may also connect with the line between Tornio and Kolari. This first section will be around 110 km long on the Swedish side of the border. Svappavaara is the terminus for a branch line on the Iron Ore line in Sweden.

The need to construct a rail link of this type will depend on several issues, among themthe future expansion of the mining industry in the Pajala/Kolari – Sodankylä – Savukoski belt, and on the choice of location for shipment of ore and minerals from this region. In a recent study[59] Finland has undertaken an assessment without providing any clear recommendation.

In another study[60], Sweden has evaluated the need for infrastructure on the Swedish side, in the Pajala region. Sweden is committed to transport of ore by lorry as far as the railway at Svappavaara, and by rail from there to Narvik. In connection with work on its international transport plan for 2014 – 2025 in the spring of 2013, Sweden produced a report on the preconditions for a railway between Svappavaara and Kaunisvaara (the Swedish/Finnish border point). This report indicates that investment in rail is profitable, with great benefit to industry and society. The calculations are very uncertain. Sweden will continue with a study to determine the geographic location of a railway and an evaluation of costs and financing options. The current study also indicates that there is substantial potential for minerals in the area between Svappavaara and Kaunisvaara and onward into Northern Finland.

The Iron Ore line/the Ofoten line have problems of capacity. Short and long-term development plans are being worked on for these railways (see Chapter 5.2). It will, if relevant, be natural to assess the consequences of a possible new east-west link as discussed above as part of the long-term development plan.

The need for greater capacity, and thereby the need for expansion of the ports which will experience greater activity as a result of the new rail link, must form part of the project.

Another important issue that must be addressed with regard to a new link is the choice of track gauge for the various line sections, and where a transshipment hub should be located.

59 Source: “Traffic requirements for the mining industry” (2012/2013)
60 Source: “Raw materials and communications in the Barents Region” (2012)

5.16 **CORRIDORS IN THE AIR:** EAST-WEST FLIGHT SERVICES IN BARENTS

5.16.1 INTRODUCTION

There are long distances between the cities in the Barents Region. Therefore air transport has an important role to play in passenger transport within the region. However, due to economic viability the air traffic system has a strong north-south structure in all countries. As the map below shows, air passengers between the northern parts of Norway, Sweden, Finland and Russia normally have to take a route through two capitals in the south to reach their destinations in the north. This means two-stop connection flights and long travel times.

Better east-west flight connections in the Barents Region could substantially improve the communications for passengers between the main agglomerations in the region. This could contribute to a positive development for trade and industry, and support tourism and cultural exchange in the whole region. There have been attempts to improve the east-west flight connections, but these attempts and previous studies[61] on air transport in the Barents Region have shown that there are a number of challenges connected with air transport in the Barents Region. Low population density and low demand for cross-border flights have resulted in low air-traffic flows. This has caused both financial and operational challenges for the airline companies which have been forced to reduce their air services. A lack of choice of air services has a negative influence on the number of passengers,thus creating a negative spiral.

61 Source: STBR (Sustainable transport in the Barents Region) 2003-2007 aviation project, Inregia AB and WSP Civils (Sweden), TØI (Norway), LT Consultants (Finland), and RDIRDT (Russia)

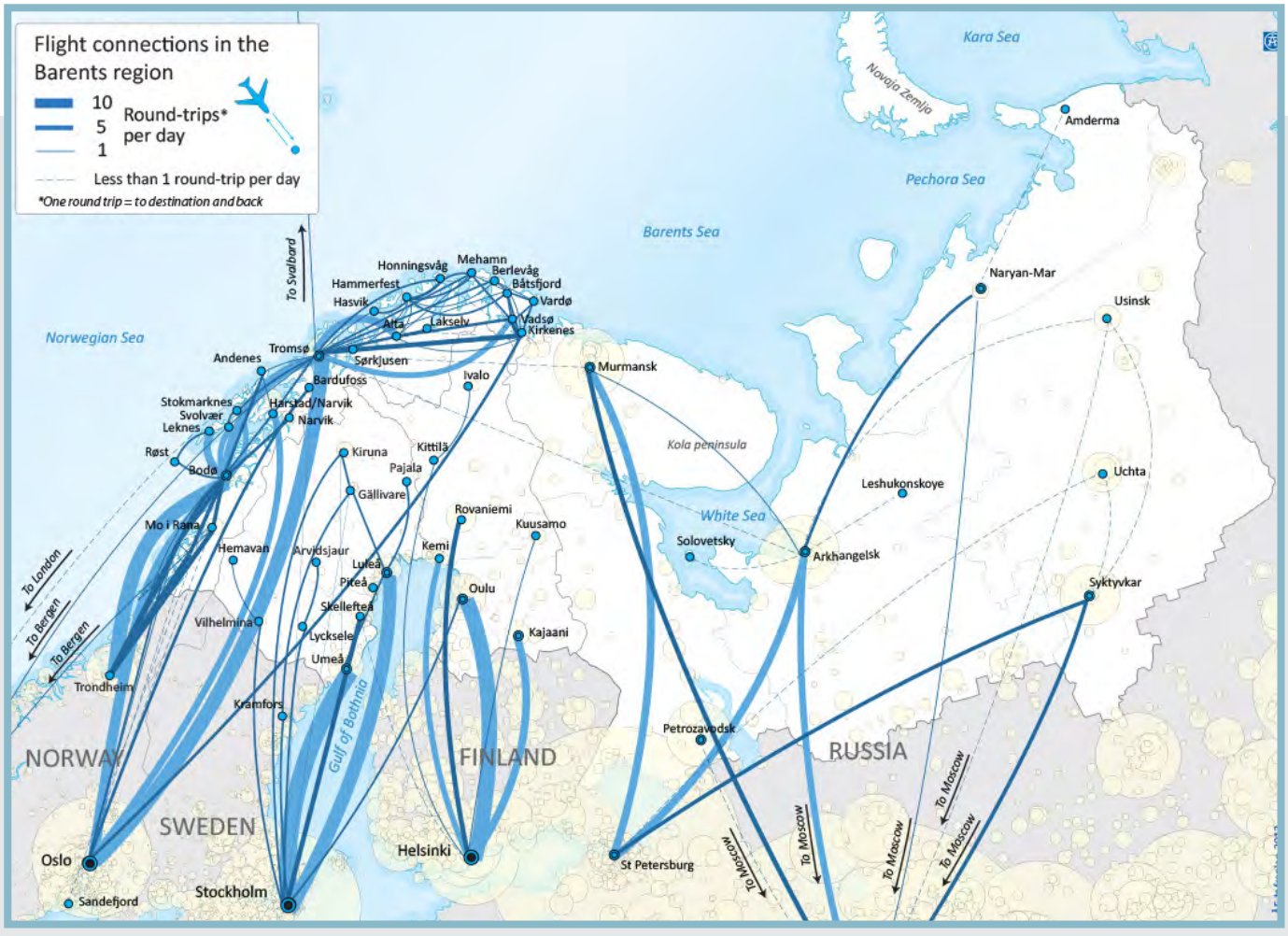


Figure 34: Air transport network

There are other barriers hampering the development of Barents cross-border aviation.[62] A kind of Public Service Obligation (PSO) may be necessary to incentivize new flight services which are not initially profitable. EU-regulation 1008/2008[63] has regulations on PSOs and needs to be further analysed regarding possibilities for cross-border PSOs both to EU/EEA countries and to Russia.

Russia and the Nordic countries do not always have the same approach to international technical standards for safety, security, environmental performance etc. An example of this is the problem of de-icing procedures for the former Kirkenes – Murmansk route. Finally, international flights to and from Russia are regulated by bilateral agreements. If new agreements are needed, the negotiation could take time. However, the existing bilateral agreements from 1956 are currently under re-negotiation between Norway and Russia, and Sweden and Russia.

In 2013 Avinor AS, the Norwegian national airport company, initiated a re-evaluation of cross-border flights within the Barents Region[64] . The study shows that overall the socio-economic development in the Barents Region has been positive, but there are still large disparities between the Nordic countries and Russia, especially in terms of disposable income. The positive socio-economic development indicates that there can be an increased demand for cross-border flights. Interviews with major players in the region may shed more light on potential demand and factors influencing the demand. On a general basis the most important factors determining demand for air transport are ticket price, frequency of departures, total travel time and connections to/from the airport.

Based on previous studies and on recent developments, the consultant study has focused on both cross-border air routes between the Nordic countries and Russia, and routes to connect the Atlantic Coast with the Northern Gulf of Bothnia.

5.16.2 AIR SERVICES CONNECTING RUSSIA WITH THE NORDIC COUNTRIES

The following routes have been looked into:

- Arkhangelsk – Murmansk – Tromsø (Figure 35)
- Murmansk – Kirkenes
- Murmansk/Arkhangelsk – the Northern Gulf of Bothnia

Arkhangelsk – Murmansk – Tromsø

This is the only currently existing route, and it has operated since 1996. The previous frequency was three times a week, but since 2009 there have only been two flights a week. The reduction in frequency has reduced the load factor to slightly above 50%. The study concludes that frequency should be at least three times a week to improve performance of the route. Utilization of modern aircraft could further improve performance. Another conclusion is that connections between Murmansk/Arkhangelsk and the cities of Bodø, Alta, Harstad and Narvik via Tromsø can be improved through combinability of air fares between existing flights. The possibility for interline agreements and transfer fares depends on the policies of the airlines involved. If interline market demand from Bodø prooves sufficient a next step may be to consider a direct connection from Bodø.

Murmansk – Kirkenes

This route was operated by Widerøe for about a year in 2007/2008. Few passengers and problems with different EU and Russian standards for de-icing procedures forced Widerøe to close the service. The airline has stated that a possible restart of the route depends on the Shotkman project development which will increase the demand for full-fare tickets as the market today is mainly price-sensitive leisure passengers. Another factor is that the road connection has improved considerably since 2007, thus making road transport a more attractive choice. The driving distance is 230 kilometres. The Avinor study points to the possibility of making this route part of a routing continuing to the Northern Gulf of Bothnia.

62 Source: STBR publications 10/2005: Barents Regional Aviation

63 Source: Regulation (EC) No 1008/2008 of the European Parliament and of the Council

64 Source: Frank Neumann, Aviation Consultant, Re-evaluation of cross-border flights within the Barents-Euro-Arctic Transport Area, April 2013

Murmansk/Arkhangelsk – the Northern Gulf of Bothnia

The Luleå – Rovaniemi – Murmansk – Arkhangelsk route was operated by Nordavia between 1996 and 2005. The route closed due to low demand and financial losses. The Avinor study concludes that there should be a possibility for a flight service between the large agglomerations both in Murmansk/Arkhangelsk and Luleå/Oulu/Rovaniemi. Oulu is the biggest Nordic city in the Barents Region with almost 200 000 inhabitants. However, a multi-leg flight service including Luleå, Oulu and Rovaniemi is not viable operationally. Therefore the study analyses the possibility of using Kemi-Tornio airport as a geographical focal point for Luleå, Oulu and Rovaniemi. 500 000 people will reach Kemi airport within two hours. With such a solution the total travel time between Oulu and Murmansk will be 3 hours 45 minutes, compared with more than 11 hours today via Helsinki and Moscow or 10 hours by car. Between Luleå and Murmansk the total travel time will be 5 hours, compared with more than 17 hours today via Stockholm and Moscow or 10.5 hours by car.

Scenarios created in the Avinor study show that it is possible to operate Kemi – Murmansk without subsidies, but subsidies are probably necessary initially to incentivize a new flight service. Another interesting scenario is to extend this route to Kirkenes and operate it using an aircraft based in Kirkenes.

There are also some other obstacles to overcome before these solutions can be a reality. Kemi must be accepted in Luleå, Oulu and Rovaniemi as the airport for flights to Russia, and there must be an efficient and cheap surface transport to the airport. There is also a need for negotiation with Russia over traffic rights.

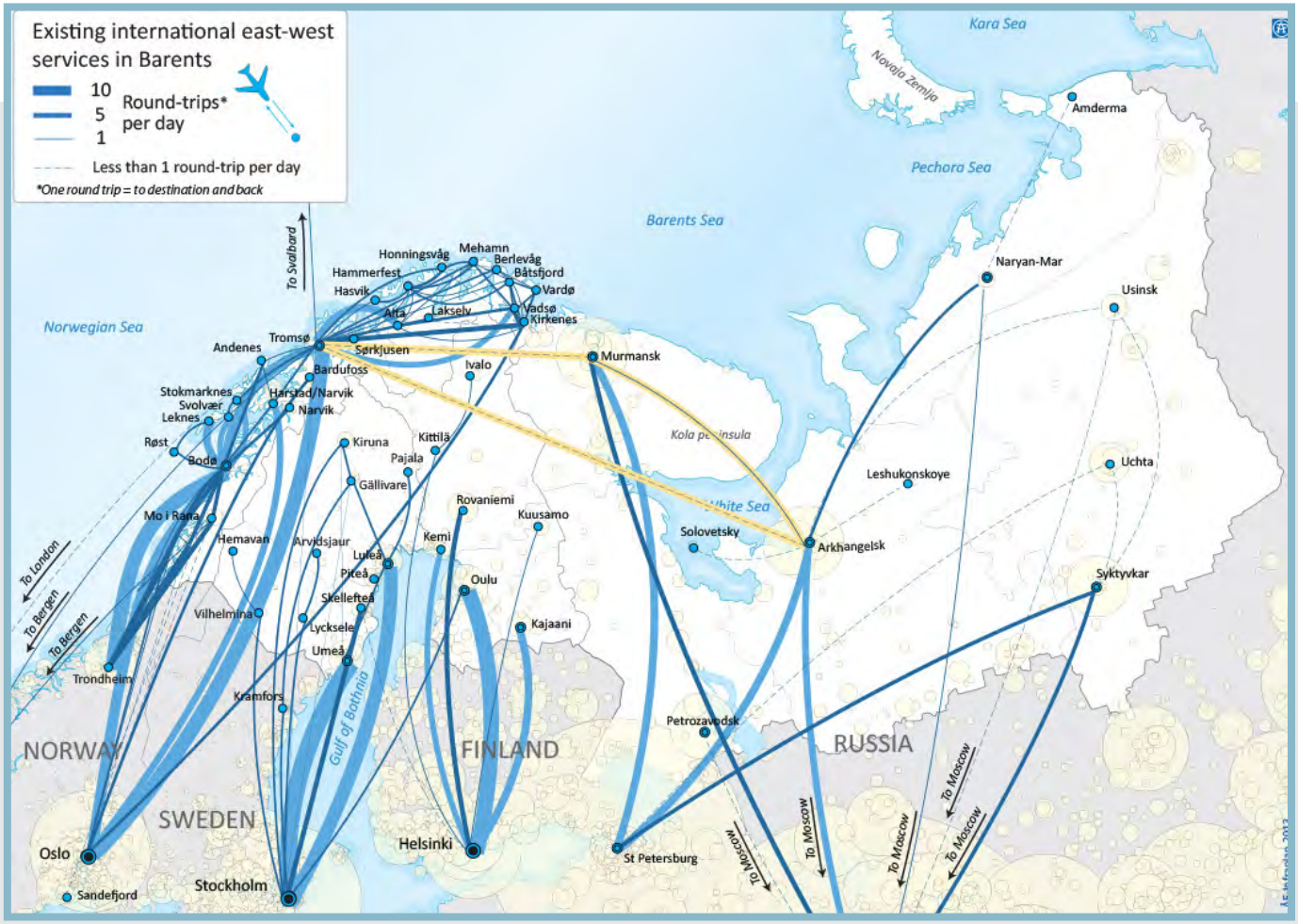


Figure 35: Existing international east-west services

5.16.3 AIR SERVICES CONNECTING THE ATLANTIC COAST WITH THE NORTHERN GULF OF BOTHNIA

There is currently no direct air service connecting the Norwegian Atlantic coast with the Swedish and Finish agglomerations of the Northern Gulf of Bothnia. The following routes are considered:

Tromsø – Kiruna – Luleå
This route was operated three times a week by Barents AirLink in 2004-2008 and received EU subsidies for about two years. Due to low demand the route never made a profit. The Avinor study concludes that it appears difficult to establish a profitable operation for this route.

Tromsø – Luleå – Oulu
The Avinor study concludes that it could be an option to operate this route with a larger capacity than was used between Tromsø and Luleå. More aggressive pricing could stimulate demand. A flight schedule providing connectivity and combinability in Tromsø to flights to Bodø, Harstad, Narvik and Alta could attract additional passengers. There could also be a connection in Luleå to existing flights to Kiruna and Gällivare.

Tromsø – Murmansk – Kemi
A flight between Murmansk and Kemi would offer a one-stop connection into the Northern Gulf of Bothnia region, but due to longer surface travel time from Kemi there would be almost no travel gain compared to a two-stop flight connection via Oslo and Stockholm. For this reason the study does not recommend this flight service.

Tromsø – Kemi
A flight between Tromsø and Kemi would offer a nonstop connection into the Northern Gulf of Bothnia region. Due to the longer surface travel time for passengers coming from Oulo, Rovaniemi or Luleå, the total travel time gain over a two-stop flight connection via Oslo and Stockholm would be less significant compared to the total gain on a potential Kemi – Murmansk route (approximately 3 hours' gain to Tromsø compared to minimum 7 hours' gain to Murmansk). For that reason the acceptance of Kemi as an origin and destination for this routing is expected to be lower and would require further evaluation.

5.16.4 RECOMMENDATIONS REGARDING EAST-WEST FLIGHT CONNECTIONS

The Expert Group makes the following conclusions and recommendations regarding flight connections in the Barents Region:

- Improved flight connections in the Barents Region could substantially improve the communications for passengers between the main agglomerations in the region. This could contribute to the positive development of trade and industry, and support tourism and cultural exchange in the whole region.

- The supply of air transport services is the responsibility of the market economy and the airline companies. However, public authorities can contribute to the establishing of air transport services:
    - Within the EU/EEA the market is free for carriers to establish new connections on economic grounds that they find feasible. International flights to and from Russia are regulated by bilateral agreements. If initiatives for new flight routes are dependent on new bilateral agreements, the national authorities should undertake the necessary negotiations.
    - Governmental subsidies may be necessary to incentivize new air connections at the outset. There are Community guidelines on financing of airports and start-up aid to airlines.[65] The European Commission has recently published a draft of new EU guidelines on state aid to airports and airlines. Therefore, there is a need to further

65 Application of Articles 92 and 93 of the EC Treaty and Article 61 of the EEA Agreement to State aids in the aviation sector OJ C 350, 10. 12. 1994, p. 5 and Community guidelines on financing of airports and start-up aid to airlines departing from regional airports.

analyse the possibilities of providing start-up aid and if that aid is not sufficient, the possibility of providing continual aid. Therefore further analyses of the possible public service obligations for international flights should be carried out.
    - The existing Tromsø – Murmansk – Arkhangelsk route has a potential for more frequent traffic, especially if the fare combinability can be improved to provide good connections with Bodø, Harstad/Narvik and Alta. Therefore relevant stakeholders should try to influence the airline companies concerned to change their policy and pave the way for fare combinability.
    - The Avinor study concludes that there are advantages in establishing Kemi as a joint airport for flight connections between Russia and Luleå, Oulu and Rovaniemi. Relevant Swedish and Finnish authorities and stakeholders should conduct further analyses in order to create a basis for an open discussion of possible solutions.

- It is essential that the relevant authorities in Norway, Sweden, Finland and Russia maintain a continuous dialogue with relevant airline companies about the development of flight connections in the Barents Region. New initiatives are not possible without close cooperation between national and local authorities and airline companies.

6 IDENTIFYING POSSIBLE MEASURES

This chapter presents possible measures discussed by the Expert Group, while the next chapter will present the actual proposals by the Expert Group.

6.1 MEASURES IN ACCORDANCE WITH MAIN OBJECTIVE

In Chapter 2 a joint strategic objective for the Joint Barents Transport Plan is formulated, based on the national objectives in each country:

Russia, Finland, Sweden and Norway have the ambition to develop an efficient transport system in the Barents Region with good internal connectivity between the Barents countries and with good external links to world markets. The transport system should facilitate Barents regional development and create new opportunities for important industries. The transport system should be developed in a manner that safeguards the environment and improves safety and accessibility for all.

This objective is to be achieved by different measures, and measures to this effect are analysed below according to the four-stage principle[66].

6.2 ANALYSING MEASURES IN ACCORDANCE WITH THE FOUR-STAGE PRINCIPLE

The Expert Group's mandate requires possible measures in the Barents region to be analysed in accordance with the four-stage principle. This principle is in use in Finland, Sweden and Norway and should be seen as a general approach to analyses of measures for the transport system. The principle has been in active use for 10-15 years and was initially mainly a tool to stimulate increased use of information technology in transport and to focus on the fact that infrastructure is occupying an increasing share of unspoiled nature. The principle has over time developed into a planning principle for general management of resources and reduction in the negative effects of the transport system.

The principle is designed to handle all modes of transport, but has so far primarily been used when dealing with deficiencies and problems within the road transport system. A basic premise is that measures that do not include the building of new infrastructure can be sufficient to handle present or future transport demands.

66 Step 1: Measures which affect the demand for transport and the choice of modes of transport
Step 2: Measures that give more efficient utilization of the existing transport network
Step 3: Improvement of infrastructure
Step 4: New investment and major rebuilding measures

The four steps involve analysis of measures in the following order[67]:

Step 1: Measures which affect the demand for transport and the choice of modes of transport

Covers planning, control, regulation and information that has a bearing on both the transport system and society at large, in order to reduce the demand for transport or transfer transport to less space-requiring, safer or more environmentally friendly means of conveyance.

Step 2: Measures that give more efficient utilization of the existing transport network

Covers measures related to planning, control, regulation and information directed towards the various components of the transport system, in order to use existing infrastructure more efficiently, more safely and in a more environmentally friendly way.

Step 3: Improvement of infrastructure

Covers improvement measures and rebuilding of existing segments, for example traffic safety measures or load-bearing capacity measures.

Step 4: New investment and major rebuilding measures

Covers rebuilding and new building measures, which often demand new land, for example new segments of road.

The four-stage principle means first considering whether one can fully or partly attain one or more of the objectives with the measures in step one. After that, measures in step two are considered, etc. When all the steps for relevant transport modes have been analysed, the measures are weighed up and prioritized with various timelines, taking into account cost-effectiveness and long-term sustainability.

Even if a measure is found which partly fulfils the objectives, there may be measures at a later stage that address all the issues or which are more cost-effective, and therefore are better overall. Due to budget restrictions and other priorities, they may still not be possible to implement in the short term. All steps should consequently be analysed if it is not obvious that the goals are attained in a cost-efficient manner that is sustainablein the long term. Measures in the various steps should not be seen as alternatives, but can complement one another. The result may therefore be a combination of measures from the different steps.

6.3 CONCEIVABLE MEASURES IN ACCORDANCE WITH THE FOUR-STAGE PRINCIPLE IN JBTP

The Expert Group has discussed the following examples of measures or categories of measures as a basis for their proposals presented in Chapter 7:

Step 1: measures which affect the demand for transport and the choice of modes of transport
Measures in this category are typically spatial planning measures, measures related to improving efficiency of logistical systems (for instance systems that improve cargo balance and the filling rate of cargo on trucks), measures to increase the intermodality of different transport modes, measures to reduce the need for travel (such as easy access to information technology for video meetings etc.), taxes (road taxes, port taxes). These examples of step 1 measures are primarily those which are possible to implement on a national level. No measures are identified in this category for the Barents Region by the Expert Group. (One might think that prioritizing development of sea and rail transport over development of road and air transport is a step 1 measure because this can effect the choice of measures. However, since such development is either improvement, major rebuilding or new investments, they are not step 1 actions in the opinion of the Expert Group.)

67 Source: Publication 2002:72 by the Swedish National Road Administration

The coming Sulphur Emission Control Area (SECA) regulations will be a measure that can affect the choice of modes of transport, but this is initiated by the International Maritime Organization (IMO) and not a suggestion by the Expert Group.

Step 2: Measures that give more efficient utilization of the existing transport network
In this step more efficient air transport is included. Therefore the following measures are conceivable in step 2:

Rail transport

- Increased capacity on railways and synchronized and harmonized plans for railway development in designated corridors
- Common technical standards for rail transport including a solution to the challenge of different gauge in Finland and Sweden. Several solutions have already been tried and rejected, but work continues[68] in order to find an efficient way to solve this technical problem.
- A harmonized and common operational and maintenance standard on railways
- Implementation of ERTMS/ETCS[69] in the railway system

Sea transport

- Measures to increase safety at sea
- More efficient administrative routines and customs clearance at ports
- Measures that facilitate new passenger and cargo services by sea between Russia and Norway in the Barents Region, e.g. efficient procedures in ports and modern facilities for passengers (terminals), waste handling etc.

Road transport (see more details in next subchapter on possible road measures)

- Common requirements for winter equipment for heavy goods vehicles (tyres and chains) to increase road safety
- Continued bilateral agreements on traffic safety
- Work towards a common operational and maintenance standard on roads, such as common standards on the accepted friction levels
- Make information on road conditions and road weather in the Barents Region more easily accessible to tourists and cargo transports through measures such as increased sharing of such information between the countries, increasing mobile phone coverage along the roads and for instance producing a mobile app with updated information on Barents roads. The development of Intelligent Transport Systems (ITS) is important and efforts should be made to take advantage of this technology in the Barents Region. Increase the use of GPS/GLONASS opportunities.
- Increased number of rest areas along roads for both heavy goods vehicles and tourists

Aviation

- Improve flight connections in the Barents Region

All modes of transport

- Improved weather forecasting to make both sea and road transport safer
- Measures to increase accessibility for the disabled, children and the elderly
- More efficient administrative routines, visa procedures and customs clearance at borders
- Environmental measures

68 There are ongoing studies by the Swedish Transport Agency
69 European Rail Traffic Management System/European Train Control System are standardized systems for signalling, control and train protection to enhance cross-border interoperativity. ETCS is actually a component of ERTMS.

Step 3, Improvement measures
In this step we have also included more measures at airports. The Expert Group have considered the following measures in step 3:

- Increased bearing capacity on the road network and adjustment to longer vehicles
- Work toward harmonization of permitted axle loads in the Barents Region
- Synchronized and harmonized road development plans based on common standards for construction and reconstruction
- A minimal total road width of 8 m between important hubs for international traffic in the Barents Region
- Traffic safety measures
- Measures at prioritized airports to increase the possibilities for air cargo and to meet demands for international passenger transport
- Development of prioritized ports with modern facilities and investments in increased fairway depth for larger vessels
- Good road and rail connections to ports

Step 4, New investments and major rebuilding measures
This step consists mainly of large railway investments. The Expert Group has discussed a few large railway projects. If such projects were to be realized they would be step 4 measures.

6.4 MORE DETAILED ANALYSIS OF POSSIBLE MEASURES FOR ROAD TRANSPORT

This subchapter give an overview of facts on the different standards for road transport in the different countries. The lack of common standards is considered a problem by transport companies, for instance for transports of fresh seafood from Norway through Sweden and Finland to its final destination in Russia or Asia (by plane from Helsinki). The Expert Group will revert to the need for harmonizing standards in Chapter 7 “Proposed measures by the Expert Group”.

6.4.1 REQUIREMENTS FOR GEOMETRIC DESIGN OF ROADS

The Expert Group has looked at each country’s requirements for geometric design of roads. The minimum requirements for the horizontal and vertical curvature vary somewhat.

The minimum requirements for road width for road networks with low daily average traffic also vary somewhat.

6.4.2 FACTS ON THRESHOLD VALUES FOR VEHICLES

The following maximum threshold values apply to vehicles in the different countries:

	Total weight
Russia	40 tonnes
Finland	76 tonnes (in some corridors up to 100 tonnes)
Sweden	60 tonnes (in some corridors 90 tonnes
Norway	50 tonnes (in some corridors 60 tonnes)

	Total length
Russia	12.00 m (in some corridors 20.00 m)
Finland	25.25 m (in some corridors more)
Sweden	25.25 m (in one corridor 30m is testet for timber transports)
Norway	19.50 m (in some corridors 25.25m)

	Maximum possible vehicle height on existing roads
Russia	4.0 m
Finland	4.4 m
Sweden	4.5 m (on some roads or road sections reduced)
Norway	4,5 m (on some older roads or road sections reduced to 4.0 or 4,2 m)

Table 8: Threshold values for vehicles

Finland is increasing the maximum total vehicle weight from 60 to 76 tonnes from 1 October 2013. In addition, even heavier vehicles up to 100 tonnes will be tested on several routes.

Sweden has increased the maximum total vehicle weight from 60 to 90 tonnes on selected sections of roads where a large volume of iron ore and timber is transported.

Norway has increased the maximum total vehicle weight from 50 to 60 tonnes on several of the roads in the corridors.

Russia has the lowest maximum total vehicle weight at 40 tonnes. Exceptions are not made for single corridors.

Roads with a total permitted weight of 90 tonnes in Sweden are currently associated with domestic freight, but in the future it might be desirable for the same freight haulage to travel on both the Norwegian and Finnish road networks.

6.4.3 DEFINITION OF BOTTLENECKS ON ROADS

The Expert Group provides the following definition of bottlenecks as a basis:

Road width

- Sections with an asphalted road width of less than 6 metres.
- Sections with an asphalted road width of less than 7 metres in combination with other conditions that impair the traffic flow quality.

Horizontal geometry

- Sections with a horizontal radius of less than 50 metres.
- Sections with a horizontal radius of less than 150 metres in combination with other conditions that impair the traffic flow quality.

Vertical geometry

- Sections with a gradient of more than 6% over a length of more than 500 metres.

Free height

- Sections with a maximum that causes problems for the cargo traffic in the border-crossing corridors

Speed limit

- 60 km/ hour or less for a distance of more than 4 km (this is seen in areas with so-called "ribbon development" where houses are built in a continuous row along a main road)

6.4.4 REGULARITY

High regularity on the road network is particularly important for industrial freight haulage. There is an expectation that freight should be delivered in accordance with the calculated driving time and the agreements entered into.

In the Barents Region the greatest challenges are in winter with snow and ice conditions. The problems can be classified as follows:

- Problematic mountain passes with drifting snow; road closure or convoy traffic.
- Avalanche or falling ice; road closure due to avalanche or risk of avalanche.
- Slippery road surface; reduced speed, or traffic flow on the road stops due to problems with other vehicles.
- Irregularities (traffic limitations); the weakening of the bearing capacity of the roads caused by the spring thaw

In recent years greater problems of traffic regularity on the roads have been recorded due to increased precipitation and flooding.

A general problem with the road network in the Barents Region is that the roads are far apart from each other and there are few alternative routes in the vicinity. Road closure consequently entails long detours. Avalanche and falling ice is a challenge that is particularly associated with the Norwegian road network. Improvement of sections with avalanche problems is a high priority.

Slippery road surfaces lead to traffic flow problems.

The Expert Group has identified the following measures:

- The maintenance standard on winter roads must be improved, and a common maintenance standard for roads (friction levels, immediate operations, acceptable snow levels on roads) in the prioritized international corridors in the Barents Region should be drawn up.

- Even if the maintenance standard on winter roads is improved, it will be necessary to attach and remove chains on vehicles. New and better areas should be provided where this can be safely carried out.

- Common requirements for the equipping of vehicles in winter must be introduced (e.g. standards for tyres and use of chains) as well as for the skill proficiency level of drivers with regard to winter driving on roads.

6.4.5 ROAD TRAFFIC SAFETY

Improvement of bottlenecks will have a positive effect on traffic safety. Run-off-road collisions represent a significant proportion of the accidents on the lightly trafficked road network in the Barents Region. Relevant measures to reduce the extent of injury caused by run-off-road collisions will be soft design of ditches and verges or erection of barriers.

Well-rested drivers are important for traffic safety. Provisions for driving and rest periods stipulate that drivers of heavy goods vehicles should regularly take short or longer breaks. There is a need for continuous enforcement measures regarding the driving and rest regulations. Cooperation on controls along border roads can be considered.

Wildlife collisions are a challenge shared by all countries. Exchange of best practice on how to avoid such accidents would be useful.

There is an existing common training and exchange of expertise on rescue operations on roads (tunnels, avalanches, etc) through the “Barents Rescue” exercise that is undertaken every second year. The main focus of the international exercise is sea transport, but all modes are included.

7 THE EXPERT GROUP'S PROPOSED MEASURES

7.1 MEDIUM-TERM MEASURES (12–15 YEARS)

This chapter presents the measures proposed by the Expert Group. They are divided into measures for mid-term implementation and long-term implementation. The proposals are based on the discussions in the Expert Group's eight meetings in the period January–September 2013 and the studies and documents made available to the Expert Group. The Expert Group sees the first Joint Barents Transport Plan as the start of a process and believes that more detailed and clearer recommendations can be made further down the road.

Even though the mandate asks for measures on a mid-term and long-term basis, many of the proposals should be accomplished as soon as possible.

Under each corridor in Chapter 5 the Expert Group has pointed out key challenges, planned development and further potential. Planned improvements should be implemented without delay, and where possible there should also be bilateral contact as soon as possible for further discussions about joint planning and future strategies.

Each project has its own characteristics, and planning close to the borders should be handled with extra awareness about plans and standards on the other side of the border. Joint planning should always be considered. It might also be a good idea to plan common operational and maintenance standards on important border-crossing infrastructure. It might be considered whether a first step to a possible joint planning for developent of a particular corridor could be a joint bilateral agreement on a "development strategy" for the corridor in question.

The proposed feasibility studies should be done in the immediate future.

7.1.1 MEDIUM-TERM MEASURES FOR ROAD TRANSPORT

It is the opinion of the Expert Group that harmonization of standards for road transportation in the four neighbouring countries will give a more efficient transport system in the Barents Region. As described in the previous chapter, there are different standards on maximum total vehicle weight and length, road width and road vertical geometry. This causes problems on a daily basis for international cargo transports in the Barents Region. Since the standards are national, this issue needs to be raised at the national level in each country.

The Expert Group proposes that the countries should jointly carry out an assessment of the possibilities of increased harmonization in this area.

The Expert Group's investigations on national road standards indicate large differences. It should be possible to agree on a common minimum standard for road width on the road corridors prioritized by the Expert Group.

The Expert Group proposes that a minimum of 8 metres of asphalted road width should form the basis of improvements to the road network in the international corridors in Chapter 5.

Assessments should also be made on having bilateral agreements on selected corridors prioritized in this document when it comes to total vehicle weight, total length and minimum gradient.
The Expert Group proposes that neighbouring countries look into the possibilities of bilateral

agreements on common standards of total vehicle weight and length, on permitted axle loads and on minimum gradient on the international road corridors described in Chapter 5.

In the opinion of the Expert Group, bottlenecks on the road network are particularly problematic for the heavy freight haulage that is comprised of utility freight. It is the opinion of the Expert Group that measures to improve bottlenecks must be prioritized for all roads in the corridors in Chapter 5.

The Expert Group proposes that elimination of bottlenecks (according to the definition in the previous chapter) should be prioritized in national budgets to reach the objective of good internal connectivity between the Barents countries and good external links to world markets.

Good information on driving conditions on the different road sections is important for drivers to be able to plan their journeys.

The Expert Group proposes that a common system should be established for real-time information on driving conditions on the international roads in the Barents Region.

Rest areas for lorry drivers (both for shorter breaks and overnight breaks) increases road safety and also supports the objective of a more efficient transport system.

The Expert Group proposes that rest areas on the prioritized corridors in Chapter 5 should be seen as a relevant measure both to increase safety and to improve the efficiency of the transport system.

The Expert Group proposes that rest areas on the prioritized corridors in Chapter 5 should be seen as a relevant measure both to increase safety and to improve the efficiency of the transport system.

The Expert Group proposes that the numbering E93 of the road between Alta, Norway and Karesuando, Sweden should be changed to E45 as this route is a natural extension of the existing E45 route through Sweden.

7.1.2 MEDIUM-TERM MEASURES (12–15 YEARS) FOR RAIL TRANSPORT

The Iron Ore line/the Ofoten line

There are significant challenges with regard to capacity on the section of railway between Kiruna and Narvik. In addition to the possibility to run more trains on the line, the current situation also affects train punctuality and the possibility of carrying out maintenance work on the line.

Swedish and Norwegian authorities have jointly carried out an assessment to evaluate necessary measures in the short, medium and long term. The Expert Group supports the recommendations made in the assessment.

The Expert Group proposes that the following measures must be implemented as rapidly as possible:

- **Technical measures with regard to maintenance and renewal of the track bed.**
- **Increase capacity by extending the existing crossing sections and constructing new crossing sections.**
- **The Expert Group are looking forward to the results of the ongoing strategic study of measures and its forthcoming proposals for measures to improve capacity along the line.**

Rail connection between Finland and Sweden in Haparanda/Tornio

There is a difference in gauge between railways in Sweden/Norway and railways in Finland/Russia. This causes bottlenecks both in passenger and freight transport.

The Expert Group proposes that further efforts should be made to find solutions for efficient transhipment of freight between railways with gauge difference to improve connectivity between Barents countries.

Nikel – Kirkenes: considerations regarding construction of a new railway section

Russia has a comprehensive rail network, and today there is a railway as far as Murmansk and onward to the town of Nikel which is close to the Norwegian border. The distance between Nikel and Kirkenes is approximately 40 km. The basis of freight for a new rail link could be ore and minerals, forest products, fertilizer, petroleum, seafood and containers.

The Expert Group proposes that the countries consider elaborating a joint Russian – Norwegian feasibility study on the building of a rail link from Nikel to Kirkenes, a distance of approximately 40 km.

Salla – Alakurtti: considerations on construction of the missing railway connection in corridor Kemi – Kandalaksha – Murmansk

There is a 60 km long missing link between the railways in Salla and Alakurtti. Building this missing section will increase both the internal connectivity between Barents countries and the external link to world markets. Such an opportunity is of particular interest to the mining industry of Finland. Regional authorities and organizations now have plans for an updated feasibility study, based on an earlier survey[70].

The Expert Group proposes that national transport authorities look into the conclusions of a feasibility study which is planned by regional authorities to see if a positive effect from connecting the Russian and Finnish railway system in the Barents Region is demonstrated.

7.1.3 MEDIUM-TERM MEASURES (12-15 YEARS) FOR SEA TRANSPORT

Ports and services

As described in Chapter 5, several ports in the Barents Region play an important role in international sea transportation today, or they have the potential to do so in the future.

The Expert Group proposes that development of key ports should be seen as a relevant measure to create new opportunities for industries in the Barents Region. The Expert Group proposes that particular attention should be paid to developing the ports of Murmansk, Kirkenes and Narvik.

There are a number of other measures that can have a positive effect on the efficiency of sea transportation in Barents. These include measures within the area of customs and visas.

The Expert Group proposes that relevant bodies continues to find more efficient administrative routines, visa procedures and customs clearance routines.

Safety at sea

Increased mining in the Barents Region, increased petroleum activity in the Barents Sea and increased traffic through the Northeast Passage require better safety measures. Several measures are described in Chapter 5:

- Finalization, adoption and implementation of the international code of safety for ships operating in polar waters (Polar Code), which would cover the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in polar waters

70 "Salla – Kandalaksha Railway Study", Regional Council of Lapland and Murmansk Regional Government (2008-2009)

- The need for revision of the STCW convention (Standard of Training, Certification and Watchkeeping Convention) for seamen in Polar waters
- The need to develop a functioning system of communication (broadband satellite communications) in Polar waters
- The need for more hydrographical surveys and development of complete charts, improvement of infrastructure for navigation and improved forecasts related to weather, waves and ice conditions
- The need for a joint traffic monitoring system; the establishment of a joint Barents VTMIS (Vessel Traffic Monitoring and Information System), including seamless sharing of traffic data from AIS, Satellite AIS and other relevant sources
- Harmonization of national rules, regulations and procedures in the area, to achieve greater predictability and lessen the administrative burden on the mariner
- Extend the newly established Barents Ship Reporting System (Barents SRS) to cover the entire Barents Sea region
- The need for an improved system for search and rescue to ensure:
    - Early warning
    - Efficient detection equipment
    - Efficient mobilization and presence of rescue resources
    - Efficient coordination and execution of rescue operations
    - Efficient personal rescue equipment
    - Efficient use of non-governmental (non-SAR) ships to be in the area of any emergency situation

The Expert Group proposes that a custom-made system for safety at sea should be implemented in the Barents Region to meet the challenges of these particular waters.

7.1.4 MEDIUM-TERM MEASURES (12–15 YEARS) FOR AVIATION

International air traffic in the Barents Region is very sparse. Improved flight connections in the Barents Region could substantially improve the communications for passengers between the main agglomerations in the region. This could contribute to the positive development of trade and industry, and support tourism and cultural exchange throughout the region. The supply of air transport services is the responsibility of the market economy and the airline companies. However, public authorities must facilitate the establishment of new services.

The Expert Group has pointed to a number of relevant measures in Chapter 5:

- If needed, bilateral agreements for international flights between the Barents countries should be updated
- Influence the airline companies to cooperate and to open for fare combinability to make it easier and more attractive for the public to take advantage of existing and possible new east-west flight options
- Swedish and Finnish authorities and stakeholders should do further analyses in order to create a basis for an open discussion on possible hub solutions.
- Start-up support for new international services if this is necessary to achieve the objective of creating new opportunities for important industries in the Barents Region.
- Relevant authorities and stakeholders in Norway, Sweden, Finland and Russia should maintain a continuous dialogue with relevant airline companies about the development of east-west flight connections in the Barents Region. New initiatives are not possible without close cooperation between national and local authorities and airline companies.

The Expert Group proposes that flight connections in the Barents Region should be facilitated by both national and regional levels in the different countries.

7.2 MEASURES ON A LONG-TERM BASIS (15–30 YEARS)

The Expert Group's proposal for long-term measures is mostly connected to rail transport. There should, however, also be further work on harmonization in all modes of transport across the national borders on a long-term basis.

For instance there are transport flows between northern Nordland county and Finnmark county via Sweden and Finland that can be developed. The Expert Group suggests that the improving of road infrastructure on the roads in question could be investigated further on a long term basis.

Several ports in the Barents Region play an important role in international sea transportation today, or they have the potential to do so in the future. The development of robust and efficient Barents seaports is crucial and the development of the ports of Murmansk, Kirkenes and Narvik is important also in the long term perspective.

The Bothnian rail corridor: Improved robustness and capacity in the northern part

In Sweden, the northern part of the Bothnian rail corridor is important to ensure good communications in north-south direction, mainly for the industry, but also for passenger traffic. The existing railroad is sensitive to disturbances and studies have identified several measures to improve robustness and increase the capacity. If a major disruption occurs at Main Line through Upper Norrland, north of Vännäs, there is need of alternative transport options. Maritime transport and the Inland railway line are examples of options that are used today. In recent years, there have been investigations of new coastal railway between Umeå and Luleå, the North Bothnia Line (270 km). The railway aims to improve the capacity, robustness and commuting by supplementing the existing single track in the hinterland. The North Bothnia Line has a low socio-economic viability and has not been prioritized in relation to other actions in the latest proposal for a long term plan from the Swedish Transport Administration.

The Expert Group proposes that the need for improved robustness and increased capacity should be considered in the future plans for long term development of transport infrastructure in Sweden.

Svappavaara – Pajala – Kolari; possibilities of a new branch to the Iron Ore line

On behalf of the Swedish Government, the Transport Administration is investigating the possibility to construct a new railway between Kaunisvaara and Svappavaara as there is an increasing need for transportation in the area around Pajala. Ore mining is underway and a 110-kilometer long railway is discussed as an alternative to the present freight with trucks. A new railway could be operational at the earliest in 2022. Joint financing of the railway by industry and state needs to be considered as the business economic benefit is large. When the project shows socioeconomic profitability but with large uncertainties in the benefits and costs, the Transport Administration has suggested a deeper investigation. It is important that Sweden and Finland cooperate with regard to the potential of further extension about 100 km into Finland. Total length of the new railway considered is approximately 200 km.

The Expert Group proposes, if the construction of a railway line from the Iron Ore line to the mining region across the border to Finland proves profitable and feasible, that it should be considered in the future plans for long term development of transport infrastructure.

Rovaniemi – Sodankyla – Kirkenes: construction of new railway

The main argument for a possible new connection is rail access to an ice-free Barents port for the Finnish mining industry. Finland has recently investigated[71] the construction of a new rail link. Markets are primarily ore and minerals from the Pajala/Kolari – Sodankyla – Savukoski belt. A link of this type will entail construction of approximately 460 – 470 km of new railway. Norway has expressed interest in this Finnish initiative, but no joint studies or planning have commenced yet.

71 The study "Traffic requirements for the mining industry" (2012/2013)

Much of the freight that will be carried on this railway will be the same ore and minerals that are envisaged as being transported on a possible new branch of the Iron Ore line. The realization of only one of these options will therefore be considered. Construction of a railway will subsequently have an impact on the need for development of the port of Kirkenes.

The Expert Group proposes that further studies should be made to investigate a new railway between Rovaniemi and Kirkenes via Sodankyla.

The Iron Ore line/the Ofoten line: construction of double tracks

This railway is proposed included in the TEN-T core network. A number of midterm measures are suggested by the Expert Group. These measures will however only increase capacity to 40 trains a day. This capacity may not be sufficient in the long term. Norwegian and Swedish transport authorities are therefore, among other measures, considering a full double-track solution for this railway line. The development of the railway and the ports of Narvik and Luleå is closely interlinked. Capacity in the ports needs to be increased in parallel with the increased capacity of the railway. The port of Luleå has received TEN-T funding for necessary investigations and planning in respect to this.

The Expert Group proposes that Norway and Sweden should continue to cooperate closely on the development of this railway line. A full double track solution should be considered in their investigations.

8 INTERNATIONAL FINANCING OF MEASURES

8.1 SOURCES OF FUNDS

National budgets are the main resources for financing transport infrastructure in the Barents Region, but there are also other possibilities:

- Domestic and foreign loans
- Road tolls
- Public-Private Partnership (PPP)
- Funding by industry
- International funding
    - o Loans from consortium of banks
    - o International capital markets (shares, bonds etc.)
    - o Loans, grants and guarantees from international institutions (the European Investment Bank, the European Bank for Reconstruction and Development, the Nordic Investment Bank, the World Bank etc.)
    - o Grants from the EU
    - o Assistance and support provided by the EU and other international organizations (including the Northern Dimension Partnership on Transport and Logistics Support Fund)

Domestic and foreign loans are common in all countries in the Barents Region. Road tolls are primarily used in Norway, while PPP is used in Finland, Norway (three projects) and Russia.

International funding is more common In Russia, and the two EU countries (Finland and Sweden), than in Norway. However, international funding can play an important developmental and dynamic role.

Funding by industry for infrastructure is not very common, but should be further considered. In Finland there is a system of loans from industry. Every transport investment is contemplated separately, but in many cases the mining companies have financed the construction of access roads to the mines and are reimbursed from the government budget several years later, when the mine is in operation. This speeds up the construction of the needed infrastructure.

Countries within the EU can obtain **grants from the EU** which finances several projects and programmes, for example the EU has granted EUR 8 billion for the development of Trans-European Networks – Transport (TEN-T) in the period 2007-2013. These grants can be used for co-financing of studies related to projects (maximum 50%) and direct grants to works (maximum 20%, 30% for cross-border sections). There are also other forms of aid connected to, for example, interest rate rebates and risk capital participation. Finland and Sweden have received smaller grants from the EU for the TEN-T network in their countries.

The EU Cohesion and Structural Funds also play an important role in financing TEN-T. The Cohesion Fund finances strategic investments in transport in member states whose Gross National Income per inhabitant is less than 90% of the EU average. One of the structural funds, the European Regional Development Fund (ERDF), finances the development of regional transport investments, designed to ensure access to the TEN-T network, ensure connections between the centre and periphery, and to develop regional public transportation. Finland and Sweden have received some support for smaller projects from the ERDF.

The European Investment Bank (EIB) is the financing institution of the EU. EIB plays a crucial role in the development of the TEN-T by offering various instruments, such as loans, risk capital, guarantees, and facilitating instruments. In November 2012, the EIB and the European Commission signed a cooperation agreement to officially launch the pilot phase of the Project Bond Initiative. Using a capital contribution from the EU budget to mitigate its risks, the EIB offers a credit enhancement product called the project bond instrument (PBI), designed to achieve a single A-rating and thereby facilitating a long term bond issue as an alternative to bank loans.

The Nordic Investment Bank (NIB) finances projects that strengthen competitiveness and enhance the environment. NIB offers long-term loans and guarantees on competitive market terms to its clients in the private and public sectors. NIB is owned by Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden.

The Northern Dimension Partnership on Transport and Logistics (NDPTL) is a cooperation platform in the field of transport and logistics for 11 member states and the EU. The main goal is to improve the major transport connections and logistics in the Northern Dimension region to stimulate sustainable economic growth at the local/regional and global level by focusing on a limited number of priorities that reflect both regional and national priorities in a balanced way. NDPTL has recently established an NDPTL Support Fund that can support studies which are needed to prepare project implementation. This includes preparatory, feasibility, evaluation and validation studies, and any other technical support measure, such as reconnaissance of the sites concerned and the preparation of the financial package. NDPTL can also support projects on soft measures targeted at removal/reduction of non-infrastructure related bottlenecks, such as congestion at national borders and inefficiencies of logistics nodes. The NDPTL Support Fund provides at the maximum 50% of the project cost for their member countries. Finland, Norway, Russia and Sweden are all members of the NDPTL and can therefore apply for grants from the NDPTL Support Fund.

Transport infrastructure in **Russia** is mainly financed through the budgets of different levels (federal, regional and municipal) which are aimed at developing transport infrastructure. The Russian Direct Investment Fund (RDIF) was founded in 2011 to invest in the most prospective sectors of economy. There are also two other main suppliers of funds for large-scale infrastructure projects in Russia; Bank for Development and Foreign Economic Affairs – VEB (Vnesheconombank) and the financial holding VTB Group (Vneshtorgbank). Both banks are owned by the Federal Government. Only a limited number of private companies invest in transport infrastructure at the moment. The investing companies in Russia are mostly state-owned or state-controlled monopolies.European Union funds have not been widely used in Russia yet. However, some large-scale projects of transport infrastructure development are expected to be partly financed by the European Regional Development Fund (ERDF). There are other financial institutions acting in Russia, such as the Word Bank, the Eurasian Development Bank and the Nordic Investment Bank.

The Iron Ore line/the Ofoten line example could be an pilot for innovative approaches to financing of large investments in border-crossing infrastructure. If a double-track solution is prioritized in the next National Transport Plan, Norwegian authorities will be open to joint investment and joint financing with Sweden. An agreement clarifying the sharing of cost and responsibilities will form the basis for such a joint development. A cooperation will likely also include coordination of maintenance, choice of technical solutions and common regulatory standards on both sides of the border. Norwegian authorities are also open to an innovative approach to private funding of railways in the same way as for roads, sea and air. Toll roads are very common in Norway while the railway has traditionally been financed 100% by the state. Three crossing sections on the Ofotbanen are already under development with financial contributions from the main private users of this railway. The desire of private industry to use 750 m long trains has triggered the ongoing extension of these crossing sections.

The Kirkenes Declaration of June 2013 welcomes the proposal by the Russian Federation to investigate the possibility of establishing a financial mechanism in the Barents Region to support project activities and to facilitate making full use of the region's investment potential. Such a financial mechanism could be a good solution for financing new or upgraded infrastructure in the Barents Region.

8.2 FINANCIAL STRATEGY FOR MEASURES IN THE JOINT BARENTS TRANSPORT PLAN

The Expert Group proposes the following financial strategy:

- National budgets must probably be the main source of financing for measures in the Barents Region.
- For preparatory studies and support projects on soft measures targeted at removal/reduction of non-infrastructure related bottlenecks, the option of applying for grants from NDPTL should be considered.
- For preparatory studies of infrastructure projects in Finland and Sweden, and especially cross-border projects, the option of applying for grants from the EU should also be considered.
- For smaller investment projects in Finland and Sweden, the option of applying for grants from the European Regional Development Fund (ERDF) should be considered.
- For possible large-scale and cross-border investment projects, the option for international funding such as TEN-T grants, EIB and NIB should be considered.
- For possible large-scale projects in a single country, the host country has to decide how to finance the project (loans or not, road tolls or not, PPP or not, etc.).
- When an industry has a major interest in new or improved infrastructure, it should be considered whether and how the industry can contribute to funding.
- If a project in another country is especially important for a neighbouring country, the possibility for co-financing should be considered.

All border-crossing projects or projects near to the border should be handled with particular awareness of the possibilities of cooperation on financing. All projects will have their special tasks, and should be handled individually.

9 RECOMMENDATIONS FOR FURTHER WORK

The first version of the Joint Barents Transport Plan has mapped ,described and proposed development strategies for important border-crossing corridors by road, rail, aviation and sea.

The region's great potential with regard to several industries will challenge our way of planning and developing infrastructure. All export industries need an efficient transport system and all neighbouring countries can contribute to developing a strong and sustainable transport network, both within the region and to the world markets. Rethinking on planning, financing and cooperation will be needed. The cross-border perspectives are fruitful and can open up new possibilities, create new ideas, and give stakeholders new opportunities to find solutions for the future.

This first version of the Joint Barents Transport Plan has made proposals on how to achieve more efficient transport in the region. The plan should be seen as an important first step for future improvements. The joint work has gathered a considerable amount of information and pointed out the most important border-crossing corridors in the Barents Region.

The benefits of transport authorities working together across borders, sharing knowledge and developing joint strategies are both necessary and valuable for the Barents cooperation to succeed. Implementation of existing national plans will contribute to more efficient transport, and there are considerable possibilities for further cooperation between the countries in the region.

Each national state need to have ownership of the Joint Barents Transport Plan. As the Expert Group has in practice only had a few months to elaborate this plan, it has to be followed up by additional work. The Expert Group proposes some further steps:

- Consultations on the plan in each country and presentation to other interested parties at both regional, national and international level, and additional work where indicated in the document
- Additional work where pointed out in the document
- Further work on new versions of the Joint Barents Transport Plan

The additional work includes further studies and planning for several of the corridors. The Expert Group suggests that it be considered whether some of these further studies can be conducted as joint cooperation projects between the technological universities in Arkhangelsk, Oulu, Luleå and Narvik on assignment from Barents Euro-Arctic Transport Area.

The additional work also includes suggestions for immediate action to make bilateral agreements on common planning for some of the corridors. Application for funding of such planning could be submitted to the Northern Dimension Partnership of Transport and Logistics.

The follow-up of proposals in this document is the responsibility of the Finnish chair of Barents Euro-Arctic Transport Area from October 2013. The work should be coordinated with other important initiatives in the region. The Expert Group thinks that the preparation of a new version under the Finnish chairmanship (autumn 2015) should be considered, and subsequently a revised plan every four years as an input to national transport plans in the four countries.

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THE BARENTS EURO-ARCTIC REGION

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