Barents Region Transport and Logistics

Case Studies

Kolarctic CBC

EU FINLAND NORWAY RUSSIA SWEDEN

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Chapter 1

Background

MAIN GOALS OF THE STUDY

The objective for the study is to promote the development of logistics competitivity in the Barents region. Utilization of opportunities in the business environment is an important approach. The study offers measures to meet climate and environmental challenges. As a result this study leads to a concrete road map for smart and carbon neutral transport system development in the Barents Region.

The future of the economy, industrial structures and logistics depends on the accessibility of the Barents Region. Accessibility consist of physical accessibility and connectivity to diverse markets and regions. In addition its sensitive nature and culture demands sustainability as a fundamental mindset. The five themes in this case study relates to improving connectivity and increasing sustainability of the Barents Region.

Objectives by themes

EU Green Deal and Smart Mobility	Evaluation of impacts and opportunities of EU Green Deal and Smart Mobility strategies and correspondent strategies in Norway and Russia to the future of the Barents Region.
Modal shift	Examination of possibilities to construct multimodal transport chains in the Barents Region and therefore to find alternative transport solutions instead of long distance road transport.
Promotion of alternative energy sources in the transport system	Creation of an operational overview of the supply network development of alternative energy sources. The coverage of the supply network will take into account the main road network, connected regions and border crossing traffic and transport chains.
ITS and winter maintenance of transport infrastructure	Identifying the measures of smart mobility to rationalize logistics system. Focus is on data gathering, refining and sharing. This leads to more predictable processes and better service level of transport infrastructure in diverse user groups.
Road map for promotion of smart and carbon neutral transport system in the Barents Region	Creation of a road map to promote smart and carbon neutral transport system in the Barents Region based on previous stages of the study.

THE FRAMEWORK

Stage 1 EU GREEN DEAL & SMART MOBILITY STRATEGIES

- Analysis of EU Green Deal effects on the Barents Region
- Detailed examination of EU Green Deal and Smart Mobility strategies
- Analysis of Carbon Neutrality and Smart Mobility strategies of Norway and Russia
- Importance of the strategies to the development of traffic and freight transport systems in the Barents Region

Stage 2 MODAL SHIFT

- Analysis of present development projects and financial support systems
- Analysis of the highest freight transport volumes and transport infrastructure used in the Barents Region
- 2-3 examples of border crossing transport chains
- Preconditions and selection of measures to form multimodal transport chains

Stage 3 ALTERNATIVE PROPULSION POWERS

- Overall picture of operational preconditions of alternative energy sources in the Barents Region
- Road map proposal to develop the distribution network of alternative fuels in short and longer periods
- Estimation of the extent and economical framework of the distribution network of alternative fuels

Stage 4 ITS & WINTER MAINTENANCE

- Present state of ITS applications in the field of winter maintenance
- Best practices in ITS and winter maintenance
- Road map proposal for improvement of accuracy in logistics and traffic safety through winter maintenance tools

Stage 5 ROAD MAP

Key actions and responsibilities

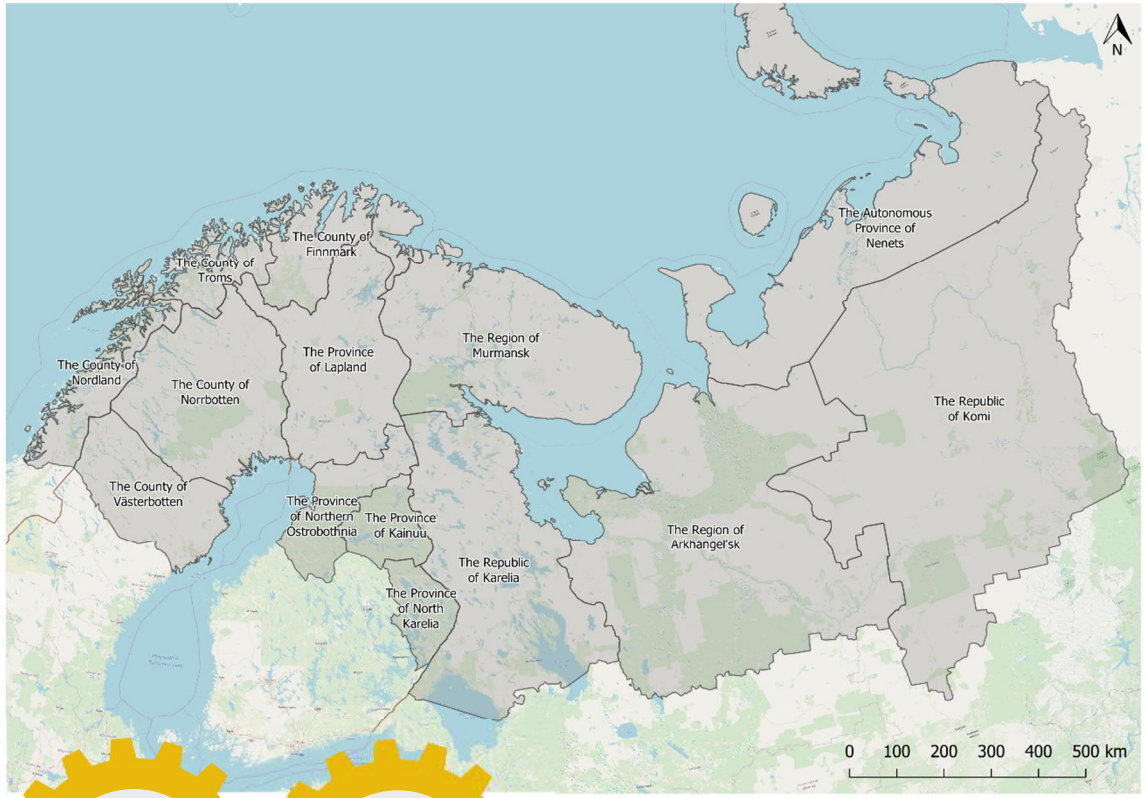
EU GREEN DEAL & SMART MOBILITY
Evaluation of opportunities and effects in each stage

KEY EVENTS DURING THE PROJECT

February	March	April	May	June 1st w
Kickoff workshop	Webinar EU GREEN DEAL	Workshop I MODAL SHIFT	Workshop II PROPULSION POWERS	Workshop III ITS & ROADMAP

BARENTS REGION TRANSPORT AND LOGISTICS – SYSTEM OVERVIEW

GLOBAL COMPETITIVINESS & VITALITY	• All the layers create competitivity for the Barents region	Transport system goals
BUSINESS LIFE AND TOURISM	• Transport and mobility needs of business and tourism	Demand
POPULATION	• Residents of Barents – demand for mobility services	
CLIMATE & ENVIRONMENT	• Transport emissions and supporting infrastructure	Preconditions
SAFETY	• Safety of different transport modes	
MOBILITY & TRANSPORT AND DATA SERVICES	• Goods • People	Services
PROPULSION POWERS & NETWORK	• From fossil fuels to alternative fuels and their respective distribution networks	Enablers
TRANSPORT INFRASTRUCTURE	• Road, rail, sea, air networks • Transshipment facilities	



This study examines the Barents transport system from three key perspectives: modal shift, alternative propulsion powers and ITS in winter maintenance cases. The cases are based on previous studies carried out in the BRTL project on world logistics market, green logistics and ITS. EU Green Deal and Smart Mobility strategies are cross-section examinations in this study.

Chapter 2

EU Green Deal & Smart Mobility strategies

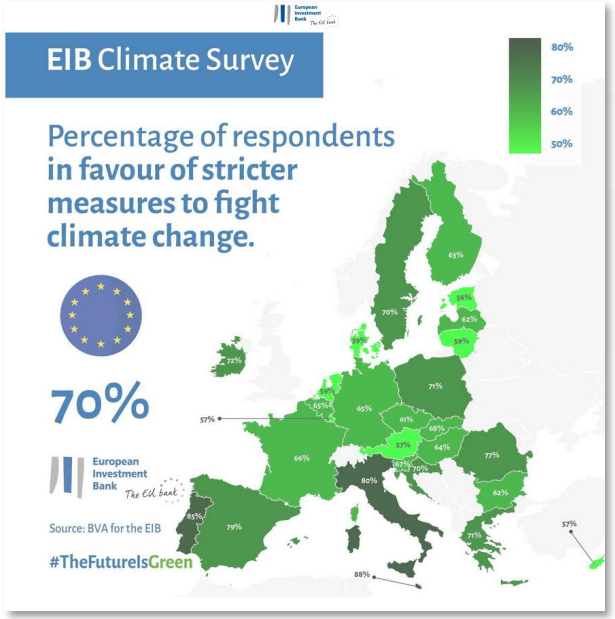
BACKGROUND OF THE EU GREEN DEAL

Sustainability challenges are behind the EU Green Deal

In the EU, climate change and environmental problems are increasingly seen as key challenges for the development and safety of the union. EU citizens, as well as private companies and public institutions have been pushing EU and national governments to response to increasing environmental risks, both physical and transformational. Due to the increasing stakeholder pressure, EU has been forced to create an ambitious plan to develop EU towards climate neutrality and to protect and restore the biodiversity.

CLIMATE

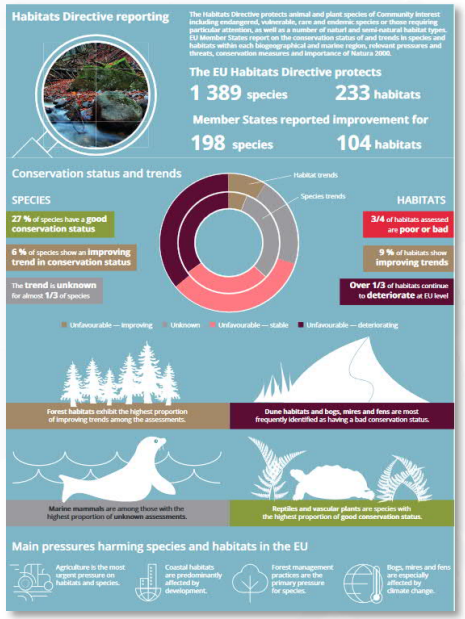
Existence of the climate crisis in no longer topic for political debate and majority of EU citizens are favouring stricter climate measures



EIB Climate Survey 2020

BIODIVERSITY

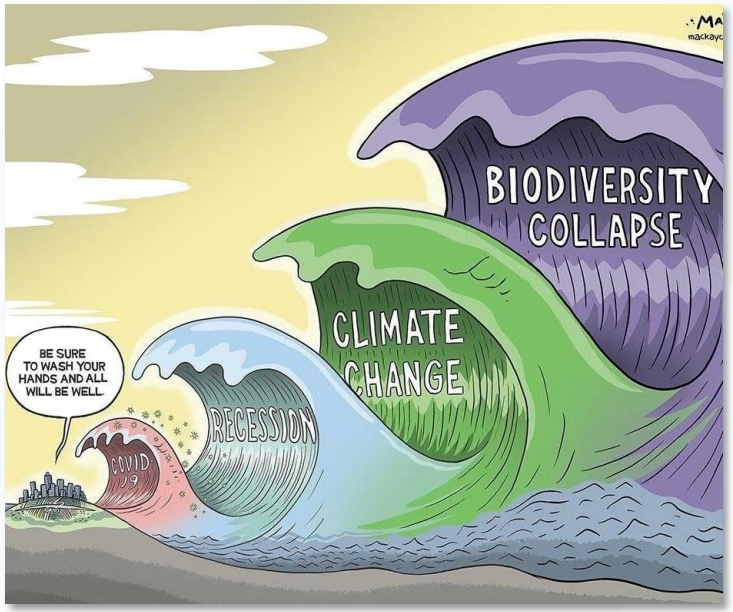
Within the past few years, the urgency to stop and even reverse the loss of biodiversity has emerged on a strategic EU level



State of Nature in EU 2013-2018 Report

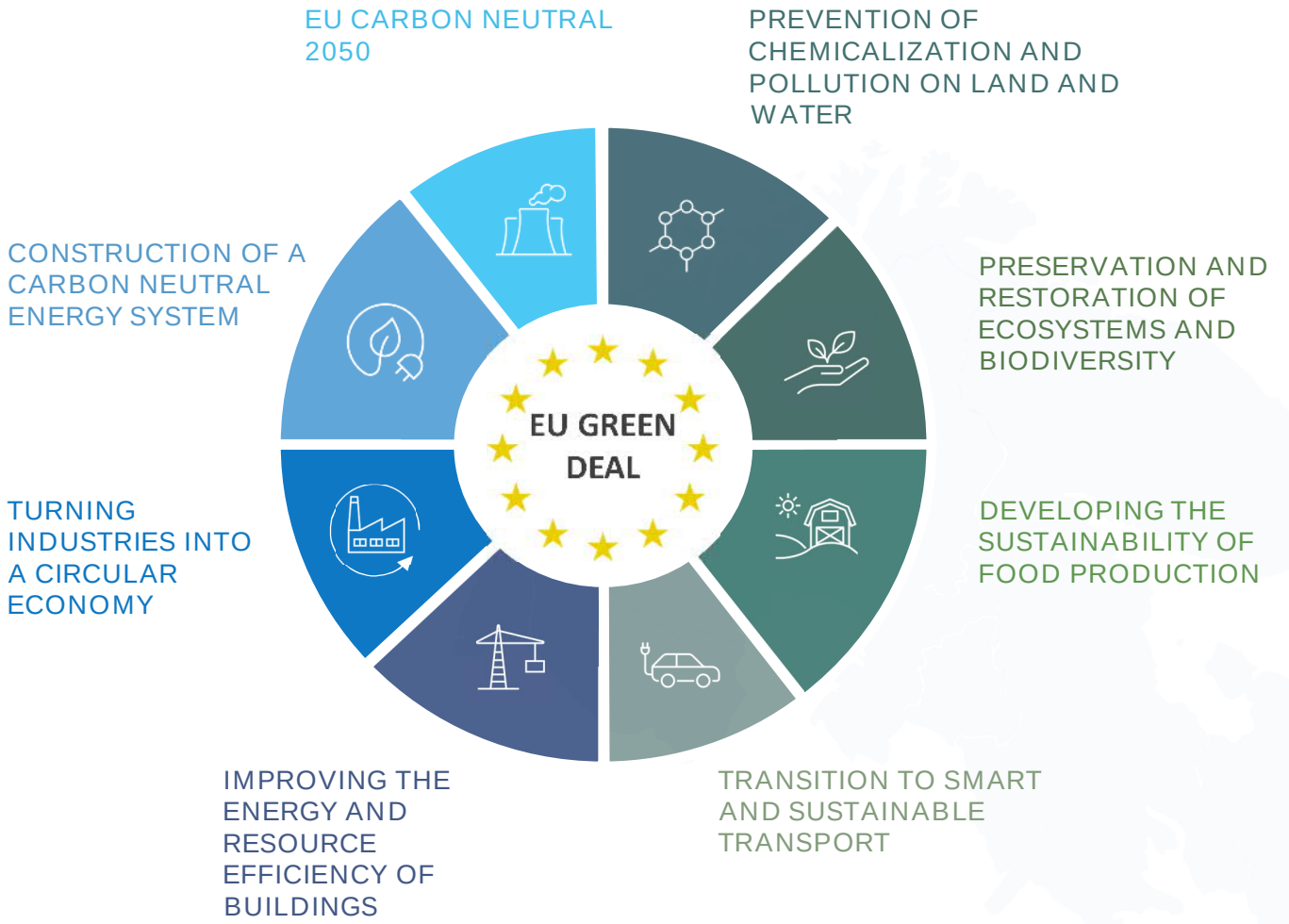
COVID 19 < CLIMATE < BIODIVERSITY

Impacts of Covid 19 has been devastating, but the worsening climate change and the biodiversity collapse would have even more severe impacts



EU GREEN DEAL AND MAIN THEMATIC AREAS

EU Green Deal is the EU's strategic growth agenda for 2021-2027 - the most significant reconstruction program since World War II. The program includes eight thematic areas including several sub areas and targets. The action program includes regulative changes, financing initiatives and reforms of the main EU's steering mechanism.



KEY EU GREEN DEAL ACTIONS

- 1000 BN EUR OF NEW FUNDING FROM THE UNION
- SECTOR SPECIFIC REGULATORY CHANGES
- DEVELOPMENT OF EU STEERING MECHANISMS
- NATIONAL BINDING CLIMATE AND ENVIRONMENTAL LAWS

Because of the covid-19 EU Green Deal has not received much attention in the media, but eu has been preparing the program all the time

The program started in january 2021 and first implications will become visible during this summer

!

EU GREEN DEAL COMPARED TO THE PREVIOUS EU'S ENVIRONMENTAL PROGRAMS

EU Green Deal and difference compared to the past environmental programs

EU has always been driving further the environmental matters, but EU Green Deal differs greatly from the past programs.

In the past, climate and environmental issues have been part of the EU's strategic growth agenda, now the Green Deal is the driving force behind everything EU plans and executes – EU'S POLITICAL PRIORITY #1

Climate change is advancing and stakeholder pressure on the EU is growing. The targets are more ambitious than ever before and the target level is constantly being raised – CONTINUOUS NEED TO DEVELOP AND TIGHTEN TARGETS

Through the EU Green Deal, EU itself is allocating significantly more funding to green actions and research. At the same time, private equity market is facing significant changes in investment priorities – SIGNIFICANT CAPITAL RE - ALLOCATION

The EU Green Deal is a tremendous opportunity for cleantech industries and know-how. The need for green solutions will increase significantly and the EU will provide significant amounts of funding for this - OPPORTUNITY

THE EU GREEN DEAL IS NOT A TEMPORARY POLITICAL AGENDA OR WILL. EU GREEN DEAL IS A SOCIETY-WIDE RECONSTRUCTION PROGRAM, WHICH STRENGTHENING, NOT WEAKENING, IMPACTS ARE DRIVING

EU GREEN DEAL AND ITS PREPATION PROCESS

How to follow and analyse EU Green Deal?

EU has been preparing several sub strategies under the umbrella of EU Green Deal during the past year. The sub strategies sets the targets for more concrete measures will be planned and executed during the forthcoming years. To understand the EU Green Deal and predict further implications, relevant for the Barents region and its mobility development, close attention must be paid for the strategic initiatives and renewed regulations and directives.

HOW TO READ THE EU GREEN DEAL?

STRATEGIES → **OBJECTIVES**

Thematic strategies e.g.:
- Circular Economy strategy
- Chemical strategy
- Plastic strategy
- Biodiversity strategy

Industry-specific e.g.:
- Forest strategy
- Methane strategy
- Smart Mobility
- Renovation Wave

COMISSION'S WORKING PROGRAMMES

REGULATION → **DIRECT IMPACTS**

- A significant number of regulatory changes that affect national legislation
- Significant changes in the definition of green investments, products and solutions
- Industries are driven by recycling, material, energy efficiency, and emissions sanctions
- Own EU climate law

CONTROL MECHANISM → **IN-DIRECT IMPACTS**

- Reforming EU emissions trading
- Imposition of carbon border mechanism
- Review of emission targets in the effort sharing sector
- Consumption-based material taxes (e.g. plastic tax, proposed)
- Linking corona recovery support to Green Deal targets (partly)

FINANCING → **FINANCING OPPORTUNITIES**

- Initially, € 1,000 billion in funding for climate and environmental measures
  - Currently, € 500 billion from the EU budget is earmarked for these measures
- 37% of the interest rate recovery, or EUR 278 billion, will be allocated to investments under the Green Deal
- Funding is distributed through national institutions and directly through various EU financial instruments

EU GREEN DEAL AND FORTHCOMING IMPLICATIONS

EU Green Deal in 2021

Commission publishes proposal for first EU Green Deal action package in summer 2021, including large reform package Fit For 55 in which EU sets and reforms key measures to meet 2030 climate milestones. Fit For 55 package includes reforms of main steering elements, such as Emission Tradin System. In addition, Commission will present their plan for Carbon Border Adjustment Mechanism among many other reforms

EU GREEN DEAL PACKAGE

- FIT FOR 55 PACKAGE
- CIRCULAR ECONOMY PACKAGE
- BIODIVERSITY AND TOXIC-FREE ENVIRONMENT PACKAGE
- SUSTAINABLE AND SMART MOBILITY

1. REVISION OF THE EU EMISSIONS TRADING SYSTEM (ETS)
2. CARBON BORDER ADJUSTMENT MECHANISM (CBAM)
3. AMENDMENT TO THE RENEWABLE ENERGY DIRECTIVE
4. REVISION OF THE REGULATION ON THE INCLUSION OF GREENHOUSE GAS EMISSIONS AND REMOVALS FROM LAND USE, LAND USE CHANGE AND FORESTRY (LULUCF)
5. REVISION OF THE ENERGY TAX DIRECTIVE

ALTOGETHER 12 DIFFERENT INITATIVES IN FIT FOR 55

- REDUCTION OF EMISSIONS ALLOWANCES
- INCLUSION OF SHIP AND LONG DISTANCE FLIGHTS IN THE EMISSIONS TRADING SCHEME
- IN DISCUSSIONS: TO MOVE BUILDING HEATING AND WASTE INCINERATION UNDER ETS

↓

- Allowance prices are projected to rise sharply compared to the long-term average (approx. 7€/CO2t.) Already now the markets have anticipated forthcoming changes and the price is on the rise (35€/CO2t).
- ETS is expanding to other industries and areas of our societies. Production costs will rise in many industries
- Production prices of energy and emission intensive industry goods will rise

↓

- Stronger incentive to reduce greenhouse gas emissions
- More and more money will be allocated to the development of low-carbon technologies and solutions through ETS
- The level of profitability of emission-reducing solutions and technology will increase significantly!

EU GREEN DEAL AND FORTHCOMING IMPLICATIONS

EU Green Deal in 2021

One of the packages that will be presented this summer is the Sustainable and Smart Mobility package which will bring concrete around the established Smart Mobility Strategy. One of the main implications is the revised TEN-T regulations which will guide EU's CEF (Connecting Europe Facility) financing instrument's allocations for further infrastructure financing rounds.

EU GREEN DEAL PACKAGE

- FIT FOR 55 PACKAGE
- CIRCULAR ECONOMY PACKAGE
- BIODIVERSITY AND TOXIC-FREE ENVIRONMENT PACKAGE
- **SUSTAINABLE AND SMART MOBILITY**

- NATIONAL AND EU INVESTMENT IN TRANSPORT INFRASTRUCTURE
- TARGETED FUNDING UNDER THE CONNECTING EUROPE FACILITY AND OTHER RELEVANT EU SCHEMES.

- EU will invest in different infrastructure investments around the Europe to develop the network, but simultaneously national governments are expected to invest in the development initiatives as well.
- As a result, EU aims to have 2030 fully integrated *core* TEN-T network in place which will significantly reduce logistics costs and ease businesses to transfer their goods around the Europe but also from and into Europe.
- Passenger safety and usability and connectivity of different transport methods will improve

1. REVISION OF THE DIRECTIVE ON INTELLIGENT TRANSPORT SYSTEMS, INCLUDING A MULTIMODAL TICKETING INITIATIVE
2. REVISION OF THE REGULATION ON THE TRANS-EUROPEAN TRANSPORT NETWORK (TEN-T)
3. EU 2021 RAIL CORRIDOR INITIATIVE, INCLUDING THE REVISION OF THE RAIL FREIGHT CORRIDOR REGULATION AND ACTIONS TO BOOST PASSENGER RAIL
4. DEVELOPMENT OF POST-EURO 6/VI EMISSION STANDARDS FOR CARS, VANS, LORRIES AND BUSES

EU GREEN DEAL AND SMART MOBILITY

EU published ambitious Smart Mobility strategy in the winter 2020-2021. The strategy sets high level targets for the development of the mobility sector. EU has communicated that transportation is one of the key development areas in EU including significant investment packages

MAIN OBJECTIVES

BY 2030

- at least 30 million zero-emission cars will be in operation on European roads
- 100 European cities will be climate neutral
- high-speed rail traffic will double across Europe
- scheduled collective travel for journeys under 500 km should be carbon neutral
- automated mobility will be deployed at large scale
- zero-emission marine vessels will be market-ready

BY 2035

- zero-emission large aircraft will be market-ready

BY 2050

- nearly all cars, vans, buses as well as new heavy-duty vehicles will be zero-emission.
- rail freight traffic will double
- a fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high speed connectivity.

ACTION AREAS

Three main action groups each including several sub-actions groups:

SUSTAINABLE

- Boosting the uptake of zero-emission vehicles, vessels and aeroplanes, renewable & low-carbon fuels
- Creating zero-emission airports and ports
- Making interurban and urban mobility healthy and sustainable
- Greening freight transport

SMART

- Making connected and automated multimodal mobility a reality
- Boosting innovation and the use of data and artificial intelligence

RESILIENT

- Reinforce the Single Market (TEN-T)
- Make mobility fair and just for all

EU GREEN DEAL IN THE BARENTS REGION - MOBILITY

Most of the EU Green Deal implications are currently unknown, however some implications can be predicted already today, although uncertainty remains high until final regulative proposal from the Commissions are published.

EU GREEN DEAL

FIT FOR 55

TEN-T NETWORK

- TEN-T network development initiatives will also improve logistis networks in the Nordic region
  - Crucial time to be active and jointly seek for cross-border development initatives!

REVISION OF THE EU EMISSIONS TRADING SYSTEM (ETS)

- EU is reducing emission allowances faster than anticipated before increasing manufacturing costs of carbon intensive production
- ETS will be most likely expanded to the maritime sector increasing the logistics costs
- 10% less allowances are given for air traffic, increasing logistics costs
- Road transport may be moved under the ETS

CARBON BORDER ADJUSTMENT MECHANISM (CBAM)

- Carbon border would afffect on especially steel and mining industry, lashing an additional cost for goods brought from countries where production do not meet EU's carbon requirements
- In the short-run this can affect import and export transport volumes between EU and Russia

DEVELOPMENT OF POST-EURO 6/VI EMISSION STANDARDS FOR CARS, VANS, LORRIES AND BUSES

- The commission is set to launch new emission standards in Q4/2021.
- New standards will speed up the commercialization of next gen low-emission vehicles, helping the industry to cut down emission and logistics costs

- EU GREEN DEAL WILL BRING MORE REGULATION AND COST PRESSURE ON LOGISTICS SECTOR
- SIMULTANEOUSLY EU GREEN DEAL OFFERS SIGNIFICANT FINANCIAL OPPORTUNITIES TO DEVELOP LOGISTIC NETWORKS

EU GREEN DEAL IN THE BARENTS REGION - MINING

The role of the mining industry in the EU's Green Deal is significant. Electrification of the society, including transportation, require substantial amounts of new metal minerals. EU is boosting the growth of the EU's mining industry and the circularity at the same time, securing the demand for industrial manufacturing purposes while reducing dependency on imported raw materials.

EU GREEN DEAL

FIT FOR 55

REDUCING EMISSIONS FROM TRANSPORT – ELECTRIFICATION IN THE CENTER

- The need for minerals to be used in batteries is growing significantly
- The need for the development of battery technology is growing significantly
- Low-carbon production is becoming an even more important competitive advantage

REFORM OF THE EMISSIONS TRADING SYSTEM

- Prices of fossil energy sources will increase
- Raw material prices imported from low-cost countries will rise (carbon border mechanism)

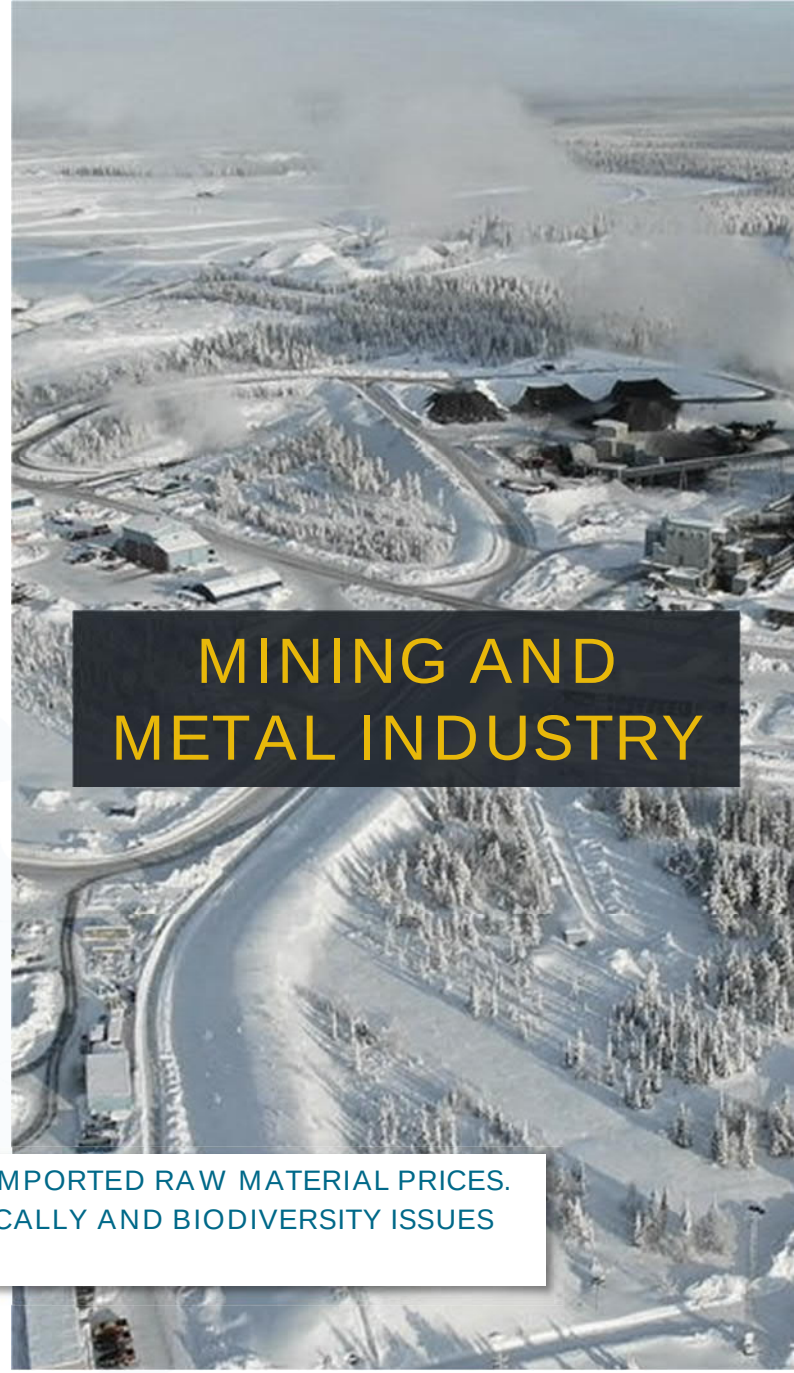
IN PREPARATION

THE PROTECTION OF BIODIVERSITY IS EMPHASIZED

- The need to develop mining methods which reduce land use and impact on the environment
- Europe and global scale demand growth for new methods

RECYCLING REQUIREMENTS FOR CRITICAL MINERALS AND RAW MATERIALS

- The recycling of battery minerals will become a significantly larger industry



- EU GREEN DEAL WILL FURTHER STRENGTHEN DEMAND FOR BATTERY MINERALS, AND RAISE IMPORTED RAW MATERIAL PRICES.
- SIMULTANEOUSLY, ENVIRONMENTAL IMPACTS FROM MINING WILL BE EXAMINED MORE CRITICALLY AND BIODIVERSITY ISSUES WILL BECOME VITAL IN THE PERMIT PROCESSES AND IN THE LICENSE TO OPERATE

EU GREEN DEAL IN THE BARENTS REGION - FORESTRY

From the broader economic perspective, the forestry's role in the EU Green Deal is creating concerns in the Barents region. In the future EU may take much stronger control on forest usage and national policies, while converting the industry towards climate neutrality and maximization of carbon sinks

EU GREEN DEAL

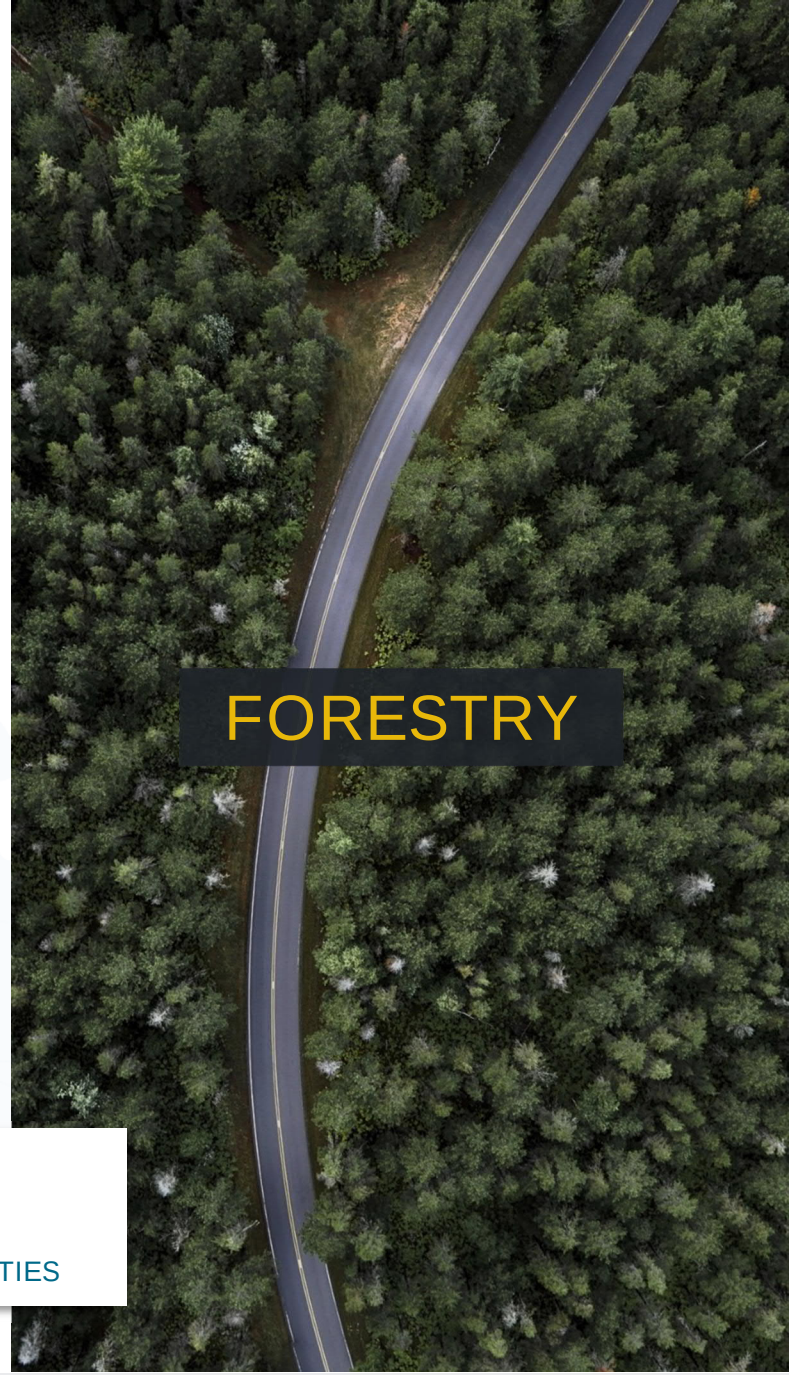
FIT FOR 55

- **AMENDMENT OF THE RENEWABLE ENERGY DIRECTIVE TO ACHIEVE THE NEW 2030 CLIMATE TARGET**
- **REVIEW OF EMISSIONS IN THE LULUCF SECTOR**
  - Emissions from the energy use of biomass will be critically assessed
  - In the long run, bioenergy may no longer be classified renewable as-is today
- **REQUIREMENT TO PREVENT DEFORESTATION**
  - In future, wood from areas where logging causes deforestation cannot be imported into the EU
    - Raises the price of raw materials for European and certified forests
    - Demand for Nordic forest management expertise increases worldwide

IN PREPARATION

- **SINGLE USE PLASTIC (SUP) -LAW**
  - Substituting raw materials are needed to replace plastic
  - A significant opportunity for bio-based raw materials
- **THE PROTECTION OF BIODIVERSITY IS EMPHASIZED**
  - Demand increase for methods developing the biodiversity of commercial forests
  - Protection of the most sensitive areas
  - The EU will increase funding for protection and restoration measures
- **EU CARBON SINKS**
  - There may be significant restrictions on the use of forests if the EU starts controlling carbon sinks
  - EU will increase and develop funding mechanism for carbon sinks

- THE COST OF BIOBASED ENERGY MOST LIKELY WILL INCREASE
- DEMAND FOR SUBSTITUTING BIOMATERIALS WILL INCREASE SIGNIFICANTLY
- DEMAND AND USAGE OF WOOD WILL INCREASE
- SIGNIFICANTLY INCREASED FUNDING FOR BASIC FOREST RESEARCH AND INNOVATION ACTIVITIES



SMART MOBILITY AND CARBON NEUTRALITY STRATEGIES AND GOALS IN NORWAY

CLIMATE ACTION PLAN 2021-2030

Climate action plan describes actions on how Norway will achieve its climate target and at the same time create green growth.

Norway has published an action plan which will enable to exceed assigned target from the EU for non-ETS emissions, which is to reduce non-ETS emissions by 40 % by 2030.

Main policy instruments are: taxation of greenhouse gas emissions, regulatory measures, climate-related requirements in public procurement process, information on climate-friendly options, financial support to develop new technologies and initiatives to promote research and innovation.

Some highlights from the plan:

- Green tax shift: Gradually increase the taxes on greenhouse gas emissions to about NOK 2000 per tonne CO_2 equivalent by 2030 (current level about NOK 590).
- Phasing in low- and zero-emission technology: Introduce requirements that ensure zero emissions in public purchases, for example, of cars and smaller vans from 2022. Government will also facilitate rapid development of charging infrastructure.
- Biofuels: As a minimum hold on the current turnover volume of biofuels. Biofuel quotas for off-road diesel and fuel for shipping from 2022.

Norway's Climate Action Plan (Meld. St. 13 (2020-2021))

THE NATIONAL TRANSPORT PLAN 2018-2029

Next update of the National Transport Plan 2022-2031 is to be published in 2021.

"A transport system that is safe, enhances value creation and contributes to a low-carbon society"

Transport plan sets forth transport goals and strategies in a long-term perspective and presents, for example, the main investment projects.

In the plan the Government has established multiple steps in order to reduce CO_2-emissions from transport:

- By 2025 all new passenger cars and light vans sold shall be zero-emission vehicles.
- By 2025 all new urban buses shall be zero-emission vehicles or use biogas.
- By 2030 all new heavy duty vehicles, 75 % of new long distance coaches and 50 % of new trucks shall be zero-emission vehicles.
- Furthermore, the distribution of freight in the largest urban centers shall have almost zero emissions by 2030.

Norway will also introduce a blend-in requirement for sustainable biofuel in aviation, target is 30 %.

National Transport Plan 2018-2029 (Meld. St. 33 (2016-2017).

GOVERNMENT'S ACTION PLAN FOR GREEN SHIPPING

"Norway's maritime industry is a world leader in the development of low- and zero-emission solutions"

This action plan presents Norway's policy to:

- Cut domestic greenhouse gas emissions,
- Strengthen the Norwegian maritime industry, and
- Play a part in the global technological developments needed for the world to achieve the targets of the Paris Agreement.

Norway targets to reduce emissions from domestic shipping and fisheries by half by 2030. Ambition is to promote development of low- and zero-emission solutions in all vessel categories.

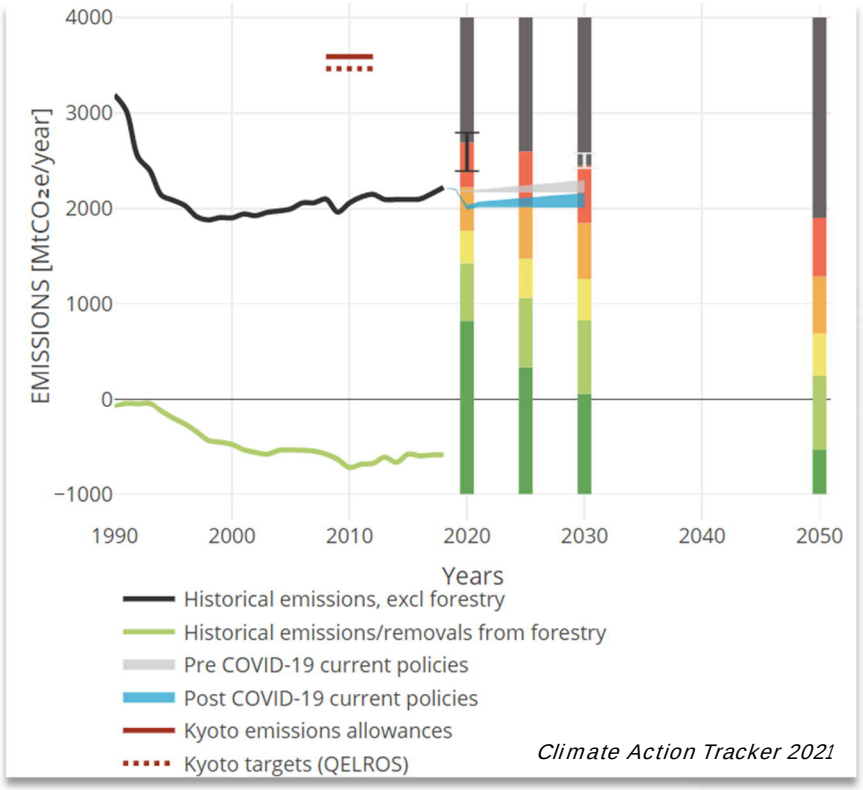
- Aim is to have Norwegian ports, wherever feasible, to be emission-free by 2030.
- Norway will also facilitate the rapid development of charging infrastructure to keep pace with the expanding use of electric modes of transport.

Also, the possibility to introduce a biofuel quota for shipping is being reviewed.

The Government's action plan for green shipping (2019)

SMART MOBILITY AND CARBON NEUTRALITY STRATEGIES AND GOALS IN RUSSIA

Russia has signed the Paris Agreement and is targeting 30% reduce in emissions from 1990 levels to 2030, yet the overall actions towards this goal are still to be seen.



Climate Action Tracker 2021

Russia has concentrated the post-COVID-19 recovery, in tax cuts, credit holidays, direct subsidies for businesses and income support for citizens.

In the newest Energy Strategy to 2035, Russia is continuing to develop the oil and gas industries with a strong emphasis on expanding natural gas exports.

Russia's Audit Chamber, which is responsible for monitoring the Russian budget and analyzing government spending warned in January that climate change could knock up to 3% of Russia's GDP per year by 2030 and expressed their concerns on the unability to prioritize the environmental actions in the National Projects' execution.

CAT 2021, The Moscow Times (2020)

CAT rates Russia's current 2030 emissions target (25-30% below 1990 levels) as "Critically Insufficient". If Russia were to adopt its proposed updated 2030 target of a 33% reduction below 1990 levels, this would improve Russia's rating to "Highly Insufficient". According to CAT, in order to be contributing its fair shar to limiting global warming to 1.5 °C the emission targets of Russia should be more ambitious.

GASIFICATION

The Ministry of Energy is running an investment project to support building LNG fueling infrastructure and also the creation of small capacity LNG plants. The aim of the projects is to stimulate the demand for LNG and the attractiveness to invest in int. The related federal authorities are also building interdepartmental coordination to coordinate the activities related to gazification.

In 2020 the Ministry of Energy created a roadmp that defines measures to remove existing obstacles in acdelerated gasification.

Safe and High-Quality Roads National Project aims to renew the passanger traffic fleet in urban areas. During the past year 654 units of passanger fleet were replaced with modern ones. The new fleet is mainily using compressed natural gas.

RUSSIAN GOVERNMENT IS OVERALL INTERESTED IN SUPPORTING THE EFFICIENCY OF TRANSPORTIATION. THE LACK OF GOVERNMENT-LEVEL AMBITIOUS STRATEGIES ON GREEN TRANSITION DOESN'T RESTRICT THE POSSIBILITIES FOR COLLABORATION.

SMART MOBILITY AND CARBON NEUTRALITY STRATEGIES AND GOALS IN RUSSIA

The Russian National Projects are the main development plans of the Russian Government. The focus of the National projects is on economic growth and technological development. The main focus in terms of mobility, is the urge to develop the main infrastructure and support the digital transformation

DIGITAL TRANSPORT SYSTEM

When it comes to digital solutions in transportation, Russia is willing to invest in order to create more efficiency and speed in transportation.

The Ministry of Transportation has been issued in February to prepare a plan for digital transformation in the transportation industry. Although such plan doesn't currently exist, both the national government and local governments have invested in digitalization and creating more smart mobility solutions.

For instance, there are multiple cooperation projects between the Finnish and Russian authorities that are concentrated in developing PPP-models in more digital and efficient border-crossing practices and solutions.

Investing in digital solutions and infrastructure support also Russia's target to support the economy through more swift logistics within the vast country.

One of the main transportation routes Russia invests in is the Green Silk Road (Belt and Road Initiative) together with China. In this initiative, too, the digital and smart solutions are largely present.

The Russian Ministry of Transportation (2021)

PROJECT THEMES

- *EDUCATION*
- *CULTURE*
- *ECOLOGY*
- *SCIENCE*
- *HEALTH CARE*
- *DIGITAL ECONOMY*
- *DEMOGRAPHY*
- *LABOR PRODUCTIVITY*
- *HOUSING AND URBAN DEVELOPMENT*
- *INTERATIONAL COOPERATION AND EXPORT*
- *SAFE AND HIGH QUALITY ROADS*
- *SMALL AND MEDIUM BUSINESSES*
- *COMPREHENSIVE PLAN FOR THE MODERNIZATION AND EXPANSION OF THE MAIN INFRASTRUCTURE*

TASS (2020), The National Projects (2021)

KEY TOPICS RELATED TO SMART AND GREEN MOBILITY

Ecology projects are covering waste disposal and recycling, preservation and improving the quality of water and reducing air pollution. No significant activities related to decreasing transportation emission levels.

Digital transformation is part of many projects. Especially Digital Economy project aims to accelerate the building of digital infrastructure that will enable digital and smart mobility development.

Decreasing the transportation times throughout the Russian Federation is the main goal of the development of the main infrastructure.

Targeting to become the main transit-hub between EU and China and attracting more logistics flows pushes investments in technological development in the main routes.

TASS (2020), Meduza (2020), The Russian Ministry of Transportation (2021)

Chapter 3

Modal shift in the Barents region

TOWARDS MODAL SHIFT
- EU AND BARENTS REGION PERSPECTIVE

EU Sustainable and Smart Mobility Strategy 2020 – Modal shift perspectives

The European Green Deal calls for a substantial part of the 75% of inland freight carried today by road to shift to rail and inland waterways. Short-sea shipping and efficient zero-emission vehicles can also contribute to greening freight transport in Europe. Urgent action must therefore be taken given the limited progress achieved to date: by example, the modal share of rail in inland freight had dropped to 17.9% by 2018 from 18.3% in 2011.

To support the greening of cargo operations in Europe, the existing framework for intermodal transport needs a substantial revamp and must be turned into an effective tool. Options to revise the regulatory framework such as the Combined Transport Directive as well as introducing economic incentives for both operations and infrastructure should be considered.

Multimodal logistics must be part of this transformation, within and beyond urban areas. The scarcity of transshipment infrastructure, and of inland multimodal terminals in particular, is pronounced in certain parts of Europe, and should be given the highest priority. Missing links in multimodal infrastructure should be closed. Moreover, the transport system should work more efficiently overall with improved transshipment technologies. The EU needs the multimodal exchange of data, plus smart traffic management systems in all modes. Ultimately all transport modes for freight must come together via multimodal terminals.

In recent years, innovative companies have demonstrated that rail freight can operate reliably and be attractive to customers. However, many domestic rules and technical barriers still hinder performance. Rail freight needs serious boosting through increased capacity, strengthened cross-border coordination and cooperation between rail infrastructure managers, better overall management of the rail network, and the deployment of new technologies such as digital coupling and automation.

Similarly, while successive action programmes have helped inland waterways transport to largely maintain its modal share, actions are necessary to preserve this accomplishment and seize the untapped potential in a sustainable way, both along TEN-T corridors and in those inner cities where inland waterways can green the last mile of city logistics.

In addition, TEN-T support for the Motorways of the Sea has succeeded seeing more cargo transported more sustainably, through short-sea shipping. The EU must now also lead by example and make European maritime areas sustainable, smart and resilient

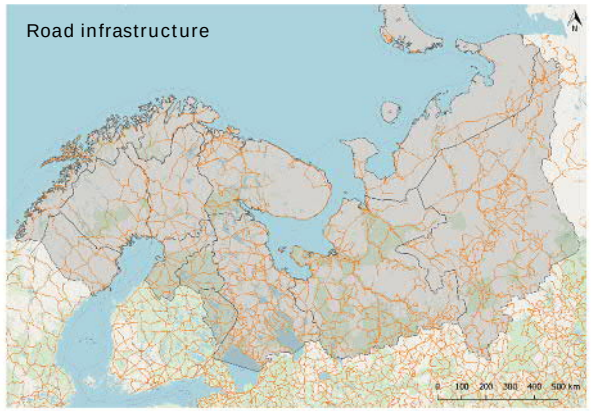
European Commission 2020. Sustainable and Smart Mobility Strategy

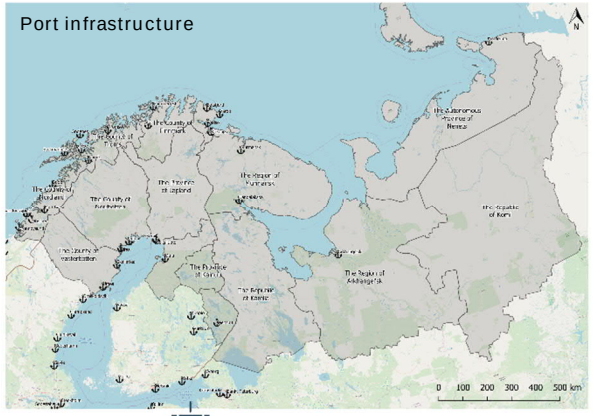
In this chapter, we examine the possibilities of modal shift in the Barents region

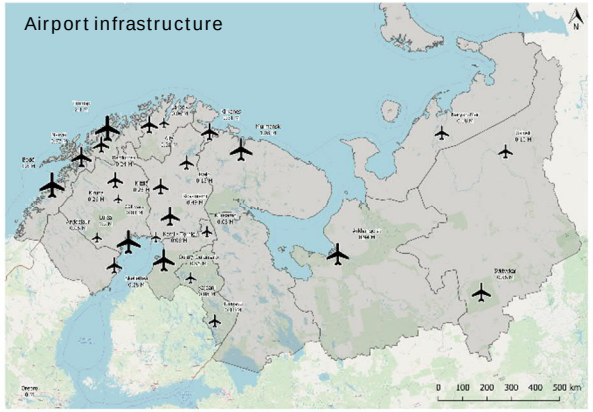
To find modal shift possibilities, it is essential to understand the preconditions for effective transport chains and the features of each transport mode. By applying this information with existing goods flows in the region, potential for modal shift can be found. The chapter also analyzes the current funding mechanisms for shift from road to rail or sea.

Through a few case studies it can be shown that certain routes have potential for modal shift. With these cases the bottlenecks and the necessary infrastructure investments can be recognized. The results can then be used to advance the search for funding from different EU sources that are described at the end of the chapter.

FREIGHT TRANSPORT MODE FEATURES IN THE BARENTS REGION







	Road transport	Rail transport	Maritime transport	Inland waterway transport	Air cargo
Capacity	Dozens of tonnes	Hundreds of tonnes	Thousands or tens of thousands of tonnes	Thousands of tonnes	Dozens or hundreds of tonnes
Optimal range	Dozens or hundreds of kilometers	Dozens or hundreds of kilometers	Hundreds or thousands of kilometers	Hundreds or thousands of kilometers	Hundreds or thousands of kilometers
Speed	~70-80 km/h	Speed: ~70-80 km/h	~25 km/h	~44 km/h	450-900 km/h
Description	Part of nearly all transport chains. Large scale of vehicle sizes and types that are optimal for different situations. Last mile solutions are optimal for smaller vehicles and large trunk transport can be done with large and long trucks.	Optimal for factory-to-port and terminal-to-terminal transport with large volumes and relatively long distances.	Optimal for global transport with massive volumes.	Inland vessels are suitable for large volumes and factory-to-factory transport for ex. between Finland, Russia, Sweden and central Europe.	Is the most expensive mode per tonne kilometers but speed and distance are the competitive factors.
Barents	Road transport is used by all industries in the Barents region.	The forest, mining, energy, metal and chemical industries use rail transport in process transport and product transport. Intermodal transport is used in grocery and salmon transports	All export and import industries use shipping in global transport.	Inland shipping is used by energy technology companies and the forest industry.	Air cargo is used mainly by the technology industry in spare part and component deliveries. Also, the salmon farming industry in Norway has started to use air cargo.
Example of cost per tonne-km	0,115 € (tractor + container)	0,017 € (19 container train)	0,0013 € (83 000 dwt container ship)	0,023 € (large container ship, 745 tonnes)	0,18 € (full freighter 86 tonnes)

Cost's source: Panteia (2020). Cost Figures for Freight Transport – final report

REQUIREMENTS FOR MODAL SHIFT
FROM ROAD TO RAIL OR SEA

THE NEED TO TRANSPORT GOODS FROM A TO B

What kind of cargo?

How much of cargo and with what kind of frequency?

What is the transport distance?

Requirements for shift from road to rail or sea

- Suitable for standardized load units
- Suitable for middle range cargo values. Low value (bulk) and high value (high tech) cargo is less suitable

- Larger volumes with frequent shipments

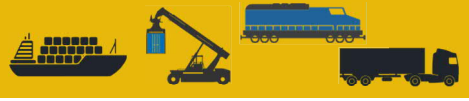
- The longer the distance is, the more cost-efficient large volume transport modes become

Is there sufficient infrastructure?
- Network capacity and logistics facilities

Are there services available?
- Logistics operators
- Service level: quality and punctuality

What are the requirements that the transport customer sets?

Requirements for shift from road to rail or sea



- Capacity of the respective transport networks
- Connected infrastructure facilities that enables modal shift

- Customer oriented operators: road, rail and sea transshipment and 3PL, 4PL and 5PL operators with enough capacity

- Cost efficiency, punctuality, time frames and other factors such as environmental requirements

The preconditions set by the transport modes: capacity, speed, price, safety, security and environment

The preconditions set by regulations

CHOOSING THE OPTIMAL DOOR-TO-DOOR TRANSPORT CHAIN

Choosing the right modes of transport

Choosing the mode of transport is influenced by the availability of services, operating models, costs, service level and various means of steering measures. Each transport mode has its own strengths and weaknesses and an optimal operating environment.

The Green Deal goals naturally lead towards the most carbon-neutral solutions possible, with the advantage that the pursuit of cost and energy efficiency both lead in the same direction.

In addition, various support instruments may guide the formation of the transport chain. However, the change or development of the transport system cannot be built mainly on financial support but is largely based on using the strengths of different modes of transport in their specific areas of application.

Transport chain is always a door-to-door solution where first or last mile in most cases must be performed by other transport modes than rail or sea transport. Evaluation of opportunities for modal shift should always include examination of the whole transport chain including all phases. Otherwise, there is a serious threat of sub-optimization.

MODAL SHIFT BENEFITS AND COMPETITIVENESS OF DIFFERENT TRANSPORT MODES

Logistical benefits from modal shift if the criteria on the previous page is met

- Each mode is used in their optimal operational environment respective to time and cost
- Reduced total transport costs
- Higher load factors and better utilization of existing capacity
- Less empty backhauls due to modal shift and cargo consolidation
- Added value for transport customers
- Reduced environmental footprint and less congestion on the road network

Driving forces and other factors behind different transport modes from modal shift perspective

- Strong political will to promote rail transport in the EU, also main target for infrastructure investments
- Bottlenecks in the infrastructure and lack of services hinder growth
- Fragmented transport flows reduce possibilities for rail transport

- Political will to promote short sea shipping
- A lot of port infrastructure available for diverse product groups

Competitiveness has increased constantly as a result of many factors

- The dimensions and mass of vehicles has increased
- The development of large general cargo systems with terminal structures has brought efficiency
- Lots of operators and competition keep the prices low
- Low salary costs of Eastern European drivers
- Flexible and efficient transport mode, capable to react to demand fluctuations

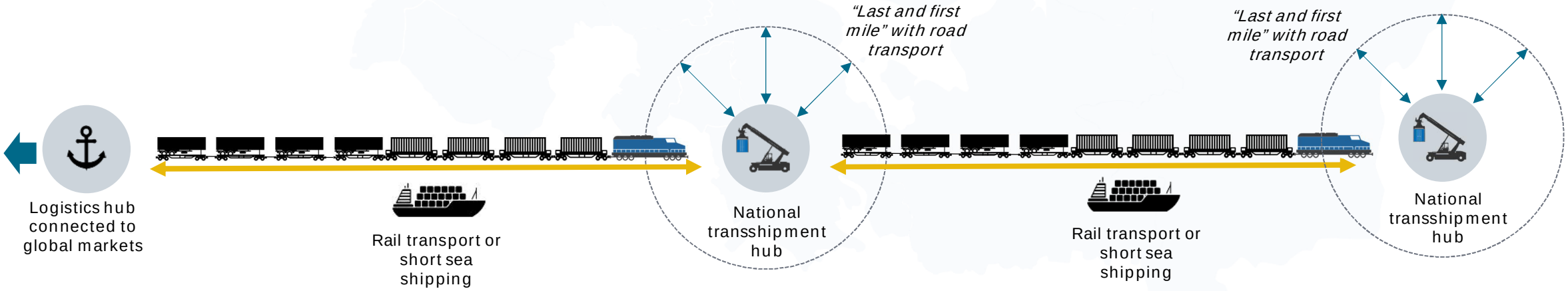
Threats for competitivity

- Carbon prices might increase faster than zero emission fleet and respective infrastructure is being produced and built

- Political will to promote inland waterway transport
- The waterways are limited to the southern part of the Barents region
- Currently year-round operations are not possible, future investments enables bigger and ice classified vessels, and longer operation period

- Many products produced in the area are not suitable for air cargo
- Difficulties in finding return cargo and lack of capacity due to the pandemic
- Air cargo mainly operated by passenger planes and thus needs decent passenger flows too

An intermodal transport chain example



NATIONAL TRANSPORT PLANS AND MODAL SHIFT – A SNAPSHOT OF THE GOALS AND MEASURES

NORWAY - NATIONAL TRANSPORT PLAN 2018–2029

The cost of freight transport shall be reduced, the comparative advantages of each transport mode shall be exploited, and more freight transport should shift from road to rail and sea.

A dedicated package for investment in railways to improve the competitive conditions for freight transport includes allocating 18 billion NOK to terminals and increased capacity by building more and longer passing loops and connecting lines. To strengthen maritime transport, grants will be given to shipowners who shift freight from roads to sea, to ports that improve their efficiency and environmental performance and to cooperation among ports. These grants will amount to approximately 3.7 billion NOK during the plan period. Measures will also be taken to improve mobility on roads to accommodate more efficient transport of goods.

The government has introduced an incentive scheme for shifting freight from road to sea and will implement measures to stimulate more environmentally sound and efficient ports. The Government will furthermore stimulate the use of environmentally friendly transport technologies, alternative fuels as well as more efficient transport and logistics.

NORWAY – UPDATE NATIONAL TRANSPORT PLAN 2022-2033

New transport plan highlights two main targets, zero carbon society by 2050 and 40 % reduction by 2030 and increasing transport safety targets. The plan indicates that share of sea transport of all the freight transport is very high in Norway. To achieve even more effective freight transport system, efficiency is key element to be increased in all the transport modes. This means heavier and longer vehicles in both rail and road transport. Investments on rail capacity is mentioned in the plan as a measure to increase the role of rail transport system and to offer increasing opportunities for modal shift to railways. Efficiency targets include also technological development and digitalization as a tool. Regarding road transport system, safety issues in cities and villages has seen main target for development.

FINLAND – NATIONAL TRANSPORT PLAN 2021-2032

Transport services promote transport efficiency and emission reductions, e.g. through digitalisation and enabling the transition to more sustainable modes of transport. Shipping operating conditions will be developed considering the potential of inland waterway transport. In order to facilitate this, studies will be carried out on the possibilities for improving logistics efficiency and reducing emissions, promoting combined transport and assessing the impact of transit traffic in support of development measures.

Rail network maintenance and development funding will increase.

RUSSIA – NATIONAL TRANSPORT PLANS / STRATEGIES

The Russian Federation has released Transport strategy up to 2030. It is not directly related to modal shift, which is quite natural, because almost 90 % of all the freight transport tonne-kms are already operated by rail transport. After the transport strategy, Russia has updated its manufacturing strategy, which has transport as one topic. Transport strategy is mainly focusing on increasing efficiency, speed and capacity of rail transport system. This includes investments on rail network and removing bottlenecks. Also high-speed railway investments for passenger transport is one key topic as well as investments in modern technologies and digitalization to reach targets set in the transport strategy.

SWEDEN – NATIONAL FREIGHT STRATEGY

For freight transport to be able to take place at an increasing extent on rail and shipping, more intermodal transport is needed. A significant obstacle for intermodal transport arrangements is the cost of transshipment. Automated reloading and innovative solutions for smooth reloading can contribute to reduce costs. Carriers need incentives to dare to offer arrangements with intermodal solutions and transport buyers need incentives to choose transport by rail and shipping even if it includes transshipment.

Actions

- A national coordinator for increased domestic shipping and short sea shipping shall be appointed.
- More inland waterways. The government has commissioned by the Swedish Transport Agency to review more water areas could be classified as so-called inland waterways.
- Continued dialogue and collaboration for increased sea transport. The government has initiated a dialogue with ports, municipalities and other relevant actors about the opportunities to on different ways of working together
- Investment in intermodality with a focus on railway
- In order to increase the incentives to choose transport arrangements which includes shipping and rail the government intends to analyze the need for that and how intermodal transport can be promoted
- The state owned Jernhusen AB as a driving-force. Jernhusen AB has a key role in the work of increasing combined freight transport by rail, for example by facilitating and developing technology and business opportunities for transshipment to and from railway.
- The government intends to conduct a review of GreenCargo AB to get a clearer picture of the company's situation both in short and long term in order to create a basis for assessment and review of possible future strategic alternatives for the company's operations. Government's goal is a well-functioning freight traffic by rail and a competitive Green Cargo AB.
- Improve the information in transshipment to make it easier to plan intermodal transport operations

CURRENT NATIONAL TRANSPORT AIDS FOR TRANSPORT

FINLAND

Areas eligible for transport aid

Transport aid may be granted for the transport of products processed by a small or medium-sized-enterprise when the product has been processed in the provinces of Lapland, Northern Ostrobothnia, Central Ostrobothnia, Kainuu, North Karelia, North Savo or South Savo, or in Kannonkoski, Karstula, Kinnula, Kivijärvi, Kyyjärvi, In the municipality of Pihtipudas, Saarijärvi or Viitasaari.

For which transports is transport aid granted?

Transport aid may be granted for the transport of products processed by small and medium-sized enterprises located in the eligible areas. The aid applies to road and rail transport beginning from the place of processing and for the part transported in Finland. In the case of abroad transport, support may be granted for the part of the transport carried in Finland.

If the product has been produced in the above-mentioned areas, transport aid may also be granted for port activities that take place in the municipality of Merikarvia or to the north in the ports of the Gulf of Bothnia or in the ports of Saimaa.

To whom is transport aid granted?

Transport aid may be granted to an SME which has processed the products to be transported and which, as the consignor, has paid the transport fee to the carrier. There are many industries that are not eligible for the aid. The aid requires the products to be processed so for example raw materials are not included in the aid. Also, forestry, agriculture, energy production and distribution, mining, steel industry, to mention a few, are excluded.

Centre for Economic Development, Transport and the Environment 2021

Transport distance (rail/road)	Aid percentage
266-400 km	9 %
401-600 km	13 %
601-800 km	17 %
801- km	20 %

NORWAY

Transport support is paid to companies in some regions and in certain industries, which produce their own goods and ship them over 340 kilometers. The transport can take place by train, boat, plane or truck.

Regjeringen 2021

SWEDEN

Transport aid can be granted for transport from Norrbotten, Västerbotten, Jämtland and Västernorrland counties. The aid applies to transports of goods and products that have undergone significant processing.

- The transport must be longer than 401 km.
- Transport must take place by rail, in commercial transport by road or by sea.
- The shipping cost must be reasonable and dependent on distance and weight. The cost must be stated in the invoice from the carrier or forwarder.
- If the transport distance does not amount to 401 kilometers, but the transport has partly been carried out within Finnish or Norwegian territory, the Finnish or Norwegian route may be credited. Transport aid may, however, only be paid for the part of the transport that has been performed within Swedish territory.
- The transport subsidy varies between 5-45 percent of the approved transport cost and is based on the municipality in which the company has its production operations.
- A production site can receive a maximum of SEK 15 million in transport subsidies per calendar year.

Trafikverket 2021

RUSSIA

In Russia transport aid is connected to export. Russian manufacturers may get compensation for part of the costs actually incurred in transporting their products to foreign markets. The transport system is also quite different, when in Russia main transport flows relates to transport volumes of large-scale industries both in procurement and deliveries, and these are high-volume very efficiently operated transport flows.

Russia has directed significant funds to corridor level transport infrastructure investments. These are development programs for example regarding Northern sea route or investments to Northern industrial clusters including transport systems. These are versatile investment and development programs, which are not only directed to support transport system.

PRESENT FUNDING MECHANISMS FOR SHIFT FOR ROAD TO RAIL OR SHIPPING

NORWAY

ECO-BONUS FOR MARITIME COMPANIES

- Introduced in February 2017 as a three-year test scheme
- Beneficiaries: Shipowners
- Open to all segments of maritime transport
- Based on external cost savings on Norwegian territory
- So far (February 2021), the subsidies total NOK 175 million
- 8 shipping companies have received grants
- The aid is available also for the year 2021

Color Line AS awarded NOK 33.8 million

The project "Road to sea" aims to establish a new ro-ro line between Oslo and Kiel. The new route differs from Color Line's existing Oslo – Kiel route, for example in that the new route will be independent of the driver on board. Thus, dangerous cargo that otherwise goes on the road can be transported by sea with the new offer. The start-up for the new route is set for 9 January 2019. A total of 1.4 million tonnes of goods can be transferred during the support period.

ECO-BONUS FOR RAILWAY COMPANIES 2019-2021

- The support scheme is a measure to get more goods on track by strengthening the companies that operate combined transport (containers, etc.) and wagon loads. It is this type of transport that is in direct competition with heavy transport on the road.
- The scope of the subsidy scheme is estimated to be just under NOK 90 million a year for the next two years. The exact amount will be returned to the government in the current budgets.

Kystverket 2021

SWEDEN

ECO-BONUS FOR MARITIME COMPANIES

The eco-bonus system, which was introduced in Sweden in December 2018, aims to stimulate the transfer of freight transport from road to shipping, and to reduce emissions of air pollutants and greenhouse gases.

For the period 2018–2020, the government has calculated a budget for the support of SEK 50 million annually. The support is directed to shipowners who conduct shipping with vessels that are registered in the ship register in an EEA country and where the vessels' journeys include at least one unloading or loading of transferred goods in a Swedish port. Support may be provided to cover part of the operating costs or to finance the purchase of transshipment equipment to provide the planned transport arrangements. Support for operating costs shall be added together with other state support and may not exceed a total of 30 percent of the operating costs for the transport arrangement in question.

The eco-bonus continues in 2021

In total, an eco-bonus of SEK 94.5 million is granted. The four projects that receive support are:

- AB Rederi Gotland - SEK 74,222,947 for transfer of goods from road to shipping between Nynäshamn and Rostock.
- Wallenius Marine AB - SEK 6,587,253 for transfer of goods from road to shipping in Mälardalen.
- IW Line Rederi AB -12 625 999 SEK for transfer of goods from road to shipping between Norrköping and Kapellskär.
- AB Flivik Shipping - SEK 1,055,025 for the transfer of goods from road to shipping in the Kalmar / Copenhagen area.

ENVIRONMENTAL COMPENSATION FOR RAILWAY COMPANIES 2018-2019

In June 2018, the Swedish government decided to set aside SEK 389 million for 2018 and SEK 174 million for 2019 to strengthen the railway's competitiveness and contribute to a transfer of freight transport from road to rail. Freight train operators and those who organize rail transport can apply for the support which is paid retroactively for transport work performed on railways in Sweden. The support is based on the number of transported tonne-kilometers and is paid in arrears for completed transport work.

However, a maximum of 30% of the total cost of rail transport and up to 50% of the eligible costs may be paid. A condition for receiving the aid is that the environmental compensation granted must be reflected in the price paid by the buyer of the freight transport. The Swedish Transport Administration is responsible for administering the environmental compensation.

ENVIRONMENTAL COMPENSATION FOR RAILWAY COMPANIES 2021–2025

In order to continue to contribute to a transfer of freight transport from road to rail, the government has budgeted SEK 400 million per year during 2021–2025. The European Commission has now notified the aid.

A PROPOSAL FOR AN EXPANDED ECO BONUS FOR INTERMODAL TRANSPORT 2019

The proposal is based on the current Swedish ecobonus system directed at maritime transport but is more specifically designed to stimulate intermodal transport solutions. Transshipment costs are found to be substantial and that they also make up a much larger share of the total cost of carriage by rail and ship than carriage by road.

Simulations show that with reduced transshipment costs of 10 %, road transport would decrease by 2 % and increase by 2.5 % for rail transport and 0.7 % for shipping calculated with current transport work. Such a transfer is estimated to reduce carbon dioxide emissions by approximately 60,000 tonnes. The total environmental benefit of reduced carbon dioxide emissions and other air pollutants, as well as effects on infrastructure, is estimated at a total of approximately SEK 100 million.

Trafikverket 2021

FINANCIAL SUPPORT SYSTEMS FOR INTERMODAL TRANSPORTATION IN THE EU

COUNTRY	SUPPORT SYSTEM	AMOUNT OF SUPPORT	HOW IT WORKS	GOALS
Belgium	Aid for transshipment terminals for intermodal rail and inland waterway transport, 2019-2023	The support is paid per train or container and amounts to a total of EUR 70 million over five years (2019–2023), of which EUR 30 million is set aside for rail subsidies and EUR 40 million for shipping. For shipping, this means around EUR 8 million per year for shipping and EUR 6 million for rail. Half of the sum is paid by the Flemish region and half of the three ports included in the support program, namely the publicly owned port companies in Zeebrugge, Antwerp and Ghent.	The aid is directed to railway companies and terminal operators where the beneficiaries are selected through a procurement procedure (call for tender).	The Commission has approved the Belgian State aid scheme to reduce competitive disadvantages and reduce transshipment costs in order to efficiently combine road transport in collection terminals for rail and inland waterway transport
Poland	Aid for intermodal transport	The exact amount of the aid is not stated in the decision, but the aid intensity was 50% of the eligible costs	The aid aimed to modernize and extend the existing intermodal terminals that existed in ports, among other places. This would contribute to reduced delivery times, reduce the risk of damage to goods and provide users with real-time information about the location of the shipment.	Develop intermodal transport as an alternative to road transport and to increase competition for intermodal transport in Poland, thus shifting the transport of goods from road to rail.
Austria	Support for innovation promotion programs for intermodal freight transport, 2015-2020	30 percent of costs regarding the following: • Procurement of technologies and systems to improve combined transport systems, such as innovative transshipment and loading technologies, logistics systems and communication systems. • Equipment for intermodal transport such as containers, special vehicles and cargo units, adaptations of semi-trailers. Costs relating to feasibility studies and preparations for international cooperation as well as costs for related staff training can be supported by up to 50 percent. The maximum amount per project or per year is 800,000 euros. The budget for the period 2015–2020 is EUR 18 million, or EUR 3 million per year.	Transport companies such as transshipment and logistics companies, freight forwarders, port operators, shipping and railway companies can apply for the aid. In order to check that the aid is used as intended and with the expected transfer, the aid is paid out step by step and in proportion to the proven progress of the project. Use of purchased equipment must be guaranteed during the depreciation period or at least five years. If the conditions are not met, beneficiaries may be liable to repay the aid with a 4% interest.	The program aimed to transfer 5,000 million tonne-kilometers from road transport to other modes of transport during the 2015 to 2020 support period.
France	Transshipment aid to players in the logistics chain, 2013-2017	The budget for the support was a total of EUR 140 million between 2013-2017 with an estimated average payment of approximately EUR 28 million per year. The amount of aid is fixed and amounts to approximately EUR 15-20 per transshipped unit. The level of support is determined in annual budget decisions and formalized with each beneficiary through an agreement entered into between the state and the beneficiary.	Beneficiaries were transport companies as well as freight forwarders (with financial responsibility for the transport) from the EU and Switzerland who conduct or mediate intermodal transport by rail or by sea in France with a distance of at least 80 km.	Reduce the disadvantages of loading and unloading goods by combined transport, compared to having only truck-to-door transport. The aid was intended to stimulate intermodal transport by rail and shipping.

Trafikanalys 2019 – en breddad ecobonus

FINANCIAL SUPPORT SYSTEMS FOR INTERMODAL TRANSPORTATION IN THE EU

COUNTRY	SUPPORT SYSTEM	AMOUNT OF SUPPORT	HOW IT WORKS	GOALS
Italy	Aid to railway undertakings and organizers of rail transport in the Province of Bolzano, 2017-2019	Aid for freight transport on the route was 33–43 per cent of the eligible costs. The aid corresponds to the costs of non-internalized costs for railways and provides a compensation of 0.44–0.56 cents per tonne-kilometer for goods transported on the route.	The aid goes to multimodal transport operators (MTOs) and to railway companies transporting goods on a 12-mile transit route across the Alps along the Brenner, an international transit route through the Alps that connects Germany, Austria and Italy.	The aid was intended to promote a modal shift from road transport to freight transport by rail. The general goal was to reduce the environmental, health and social consequences of heavy vehicle traffic.
UK	Freight Facilities Grant scheme in the UK 2018–2023 (SA49518)	According to the latest decision, the program extends over a six-year period and amounts to 24 million pounds. The aid level is a maximum of 50 percent and is based on environmental benefits (external costs) and on additional costs for reloading in comparison with costs for whether the goods were to be transported by road.	The aid is broadly designed and includes investment costs in different kinds of freight infrastructure such as railways, shipyards, loading equipment etc.	The support program was first introduced in 1974 to stimulate the transfer of freight transport on the way to more environmentally friendly modes of transport. It has since been extended for several periods and now also includes inland shipping as well as coastal and short sea shipping.
Italy	"Marebonus" for shipping companies, 2016-2018	The expanded support runs from 2016 to 2018 with a total budget of EUR 138.3 million (45.4, 44.1 and 48.9 per year, respectively). The support is paid at a maximum of 30 percent of the transport cost for the line.	Beneficiaries are shipping companies (shipowners) flagged in an EU country that operate ro-ro or ro-pax traffic on new or existing routes between more than 40 Italian ports. In order for a project to be eligible for support, at least two criteria must be met from a list of options (reduced environmental effects, implementing ITS systems etc.)	Marebonus aims to support the transfer of freight transport by road.
Germany	German start-up aid for intermodal transport, 2010	The aid was paid at a maximum of 30 percent of the eligible costs for a maximum of a three-year period.	Support was provided for investments in various forms of load carriers, railway vehicles and other goods handling equipment, costs for using the infrastructure for railways and inland waterways, as well as for personnel costs and costs for maintenance and equipment in connection with the new the transports	It aimed to reduce the financial risk associated with the introduction of combined transport solutions using rail and inland waterways within the German state of Saxony and to and from neighboring regions and Member States.

Trafikanalys 2019 – en breddad ecobonus

TRANSPORT VOLUMES AND INFRASTRUCTURE IN THE BARENTS REGION

Analysis of the opportunities for modal shift in the Barents Region needs recognition of both industrial structure and extent of transport infrastructure. The highest road transport volumes are related to the location of population centres. Industrial production units are also located close to biggest cities due to the connection between population and structures of diverse businesses. This is shown on the map of road transport flows.

Road and rail transport

Mining sector, energy, forestry and production of raw materials for industrial processes are special character of transport flows in the Barents Region. These form the highest transport volumes in rail transport as is shown in the enclosed map of rail transport flows.

One special characteristic of the transport system in the Barents Region is sparse transport infrastructure network both in road and rail. In addition, rail network doesn't exist in the northernmost part of the Barents region except railway from Sweden to Norway (Luleå-Kiruna-Narvik), which mainly serves mining ore, but also grocery, fish and passenger transport. Railway to Murmansk and railway to Vorkuta are mainly related to coal transport. Transport of fertilizers and its raw materials forms high volume transport flows on the Murmansk railway.

Waterway transport

There are ways to utilize coastal short sea shipping in the sea areas. In addition, there is an inland waterway transport system available in Finland in Lake Saimaa district, which is connected to the Baltic Sea and also to Russian inland waterway transport network to all the directions, even to the Barents Sea. Short sea shipping and coastal sea transport is an available alternative in all the countries in the Barents Region. As a whole, Barents Region has a lot of port infrastructure in varying sizes. The service supply both on sea and inland waterways largely covers the region.

Opportunities for modal shift

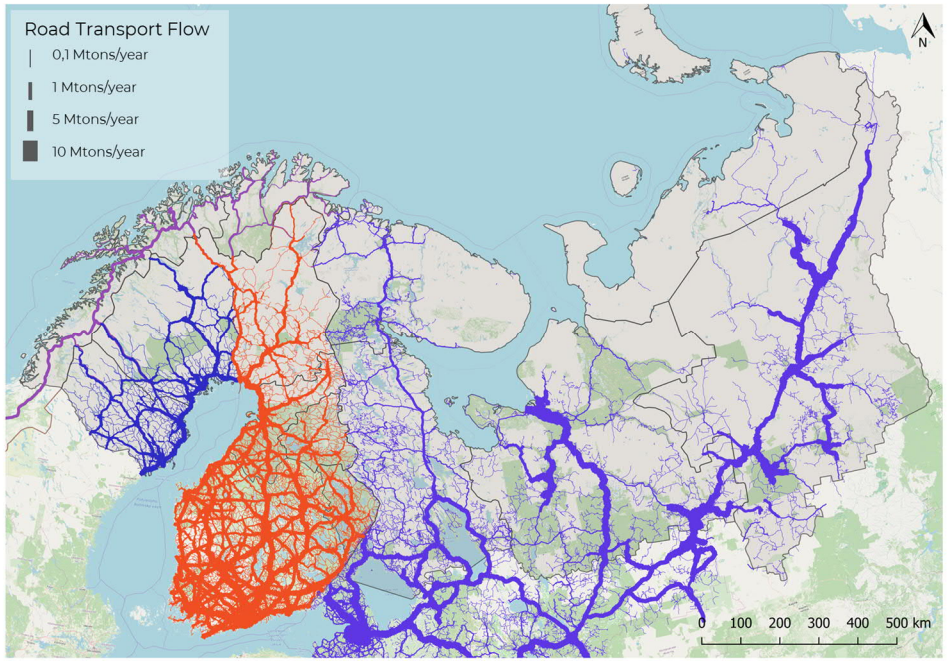
Based on the situation described above, there are quite limited opportunities for modal shift in long distance transport. The infrastructure and transport services are lacking. At the same time there are already very high volume transport flows on railways and railway network suffers from lack of capacity in some areas.

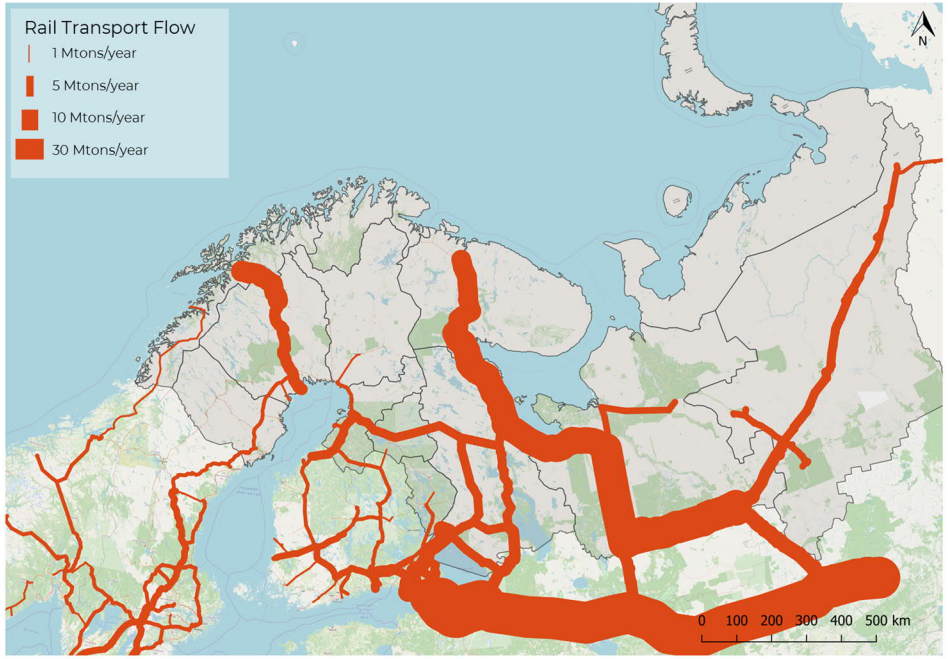
All the transport modes have their own characteristics, strengths and utilization areas. This is important to consider when estimating opportunities for modal shift. There are forward-looking investment projects both in extension of railway infrastructure to the north and seaport infrastructures, which may offer increasing opportunities for modal shift in the future. Extension of railways in Norway from Fauske to Troms and in Finland Arctic Railway Corridor to Kirkenes are examples of this kind of development, which are possible earliest in 2030-2040.

Capacity problems and bottlenecks may locate also outside the Barents Region, which affects the transport system in the Barents area. For example, in Finland the capacity problems on the main railway connection in south-north direction reflects also to the north and sets limitations to utilize for example combined transport.

Road transport will remain important

Due to the above-mentioned characteristics of the area, road transport system is in a crucial role in the region. General cargo, grocery transport and industrial transport is operated by road. Flexibility, availability and extent of the road network also in border-crossing directions highlights the role of road transport in the region. It is important to take into consideration that road transport is also effective and increasingly sustainable mode of transport. Increasing dimensions of vehicles and therefore effectivity of road transport has increased. Technological development is very fast and new biofuel products are increasingly available. Basically, if you have one truck load of cargo, currently it's most effective transport mode is road transport.





NORWAY
– CURRENT SITUATION OF MODAL SHIFT

Norwegian freight rail transport

There are several freight train companies that have or are in the process of establishing themselves on the Norwegian market. There are now a total of ten train companies that have a permit to transport goods on Norwegian rails. In 2019, there were seven. CargoNet is the largest intermodal transport operator which operates an extensive network around Norway. (see map on the right)

For example, on the Åndalsnes-Oslo section, the freight train company Onrail will establish itself with combined transport (containers). As of 9 September, CargoNet has started a new arrangement between the Port of Gothenburg and Oslo. The Swedish company BLS Rail has also started up timber transport to Norske Skog.

Bane Nor 2020

Short sea shipping is getting a boost from ecobonus

Since 2017, the Norwegian Coastal Administration has provided grants to shipowners to establish new sea transport services that can compete with road transport

- So far (February 2021), commitments of up to NOK 175 million have been pledged to subsidies to 8 shipping companies.
- To date, these have moved 760,000 tonnes of goods from the road to the sea. This corresponds to almost 47,000 fewer trucks along Norwegian roads,
- This results in a reduction of approximately 21,000 tonnes of CO2 equivalents.

Kystverket 2021

TRONDHEIM-BODO INTERMODAL TRAIN SERVICE, "THE FOODTRAIN"

Norwegian rail freight operator CargoNet launched a new intermodal connection between Trondheim and Bodø in 2019. It carries up to 52 semi-trailers in each direction. With the help of the new freight service, CargoNet will be able to remove up to 13,000 semi-trailers from the roads of Northern Norway annually and shift this cargo to railways.

Companies

The connection was arranged by CargoNet in a partnership with ASKO (Norway's largest grocery wholesaler), Meyership (Norwegian logistics company based in Mo i Rana) and Nova Sea (Norwegian salmon farming company). The collaboration was initiated by ASKO, which wanted a green shift with a greater focus on the environment and traffic safety.

Rail service and goods

- The new rail freight connection runs daily with several stops between the terminals: Mosjøen, Mo i Rana and Fauske.
- Northbound freight consists of mainly daily consumer goods
- Southbound consists mostly of salmon transport to Europe
- The service could be connected with CargoNet's intermodal link from Trondheim to Oslo in the future

Truck company perspective

Norwegian Truck Owners Federation considers the new line as good news. The new transport route for salmon will create an increased need for local Norwegian transport operators to transport the salmon from small towns to the nearest transshipment point for train transport.

The new transport option means that there will be shorter days for the drivers. They do not have to be away from home for weeks to deliver goods to Europe. They will simply run short routes to and from the production sites to the nearest transshipment site. With this solution, the stakeholders believe that they can recruit more young Norwegian drivers.

Modal shift benefits

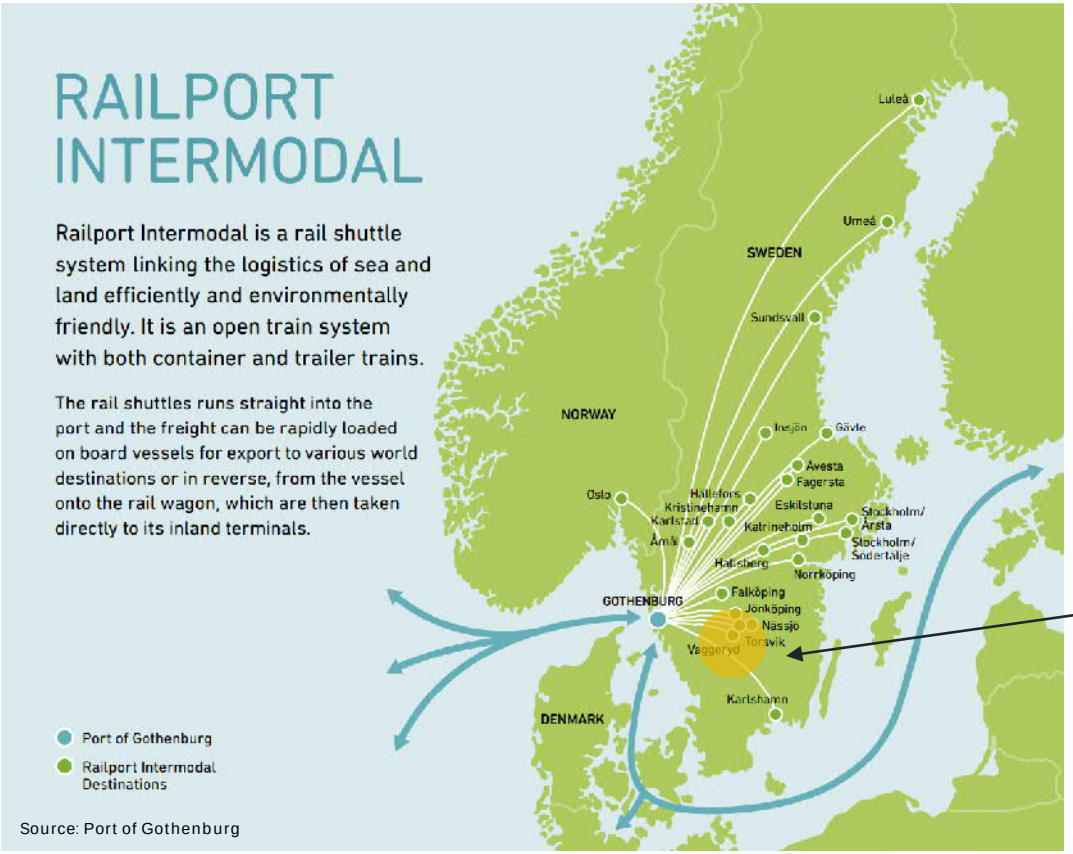
- All the parties regard the new rail freight connection as a convenient tool to reduce their costs.
- At the same time, such rail services contribute to the shift to rail. The environmental benefit from the new CargoNet's service is estimated at more than 6,000 tonnes of CO2.
- The service reduces congestion on roads in Northern Norway

Railfreight.com 2020

Photo: CargoNet

Photo: Frank Lauritz Jensen

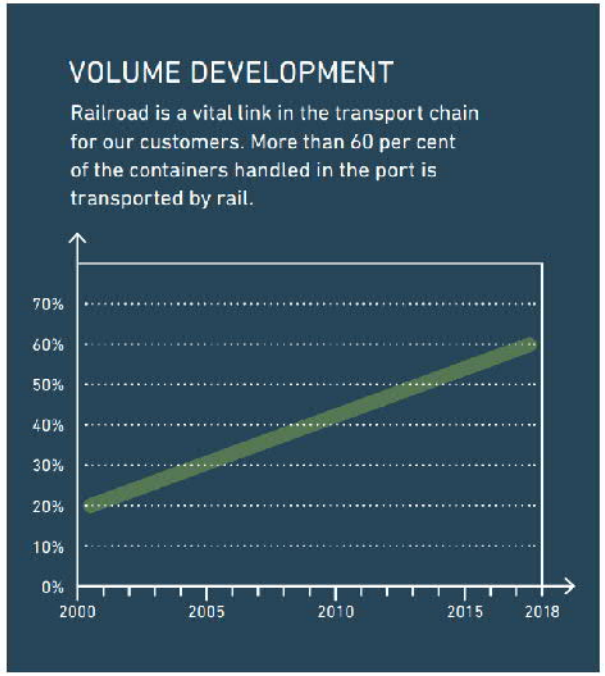
SWEDEN
– CURRENT SITUATION OF MODAL SHIFT



Source: Port of Gothenburg

Sweden has a long history of intermodal transport. Railport intermodal is an intermodal system where the seaport of Gothenburg is connected to the hinterland intermodal terminals by rail. Containers and trailers are transported by rail between the intermodal terminals and the port of Gothenburg. Last and first mile transports are carried out by road transport.

The system includes about 20 intermodal terminals, most of which meet the criteria of a dry port (includes customs clearance). 6 different operators are responsible for the rail transport. In addition to the system, there are also Railport Green Cargo intermodal and Railport conventional systems.



REDUCED ENVIRONMENTAL IMPACT

Moving goods from lorries to electrified trains has significant environmental benefits. Each year, the railport intermodal system shuttles save 53,000 tons of carbon dioxide emissions. That would equal he emissions from 23,000 passenger cars during one year.

ENVIRONMENTAL IMPACT FACTOR	DIFFERENCE BETWEEN TRAIN AND LORRY 2016*
Fuel, diesel	22,600,000 cubic meters
Carbon dioxide (CO_2)	53,000 tons
Nitric oxide (NO_X)	260 tons
Hydrocarbons (HC)	3 tons
Particles/dust (PM)	3 tons

*IVL 2016

Source: Port of Gothenburg

VAGGERYD INTERMODAL TERMINAL, "DRYPORT"

Companies

For several years, Green Cargo has been operating the so-called Båramo shuttle between the combined terminal in Båramo in Vaggeryd municipality and Gothenburg seaport.

The shuttle has been operated since 2016 in partnership between Green Cargo, PGF Terminal and GDL. GDL has the commercial responsibility and is responsible for the road transport to and from the terminal, Green Cargo runs the trains and PGF operates the terminal which is leased by Vaggeryd municipality. The business has been successful, and transport has increased.

Rail service and goods

- 84 TEU train connection 6 times a week between Gothenburg and Vaggeryd
- Yearly volumes of 52 000 TEU (2020)
- Area of operations is a 50 km radius from the terminal
- The main export flow is comprised of timber products of Waggeryd Cell – 20 units of 40ft containers per day
- The import flow consists of retail customer deliveries
- The dryport is located 200 km from Gothenburg seaport

Båramo Terminalen

FINLAND – INFRASTRUCTURE AND SERVICES FOR MODAL SHIFT ARE LACKING

Finland had a working combined transport system until the year 2014, when the route from Helsinki to Oulu was closed. Previously there were combined transport routes from Kemi/Tornio to Tampere, Turku and Helsinki. The rolling stock still partly exists and there are combined terminals in Oulu and Turku, but the capital region is missing one. Also, in Tampere there is opportunity to load combined transport trains.

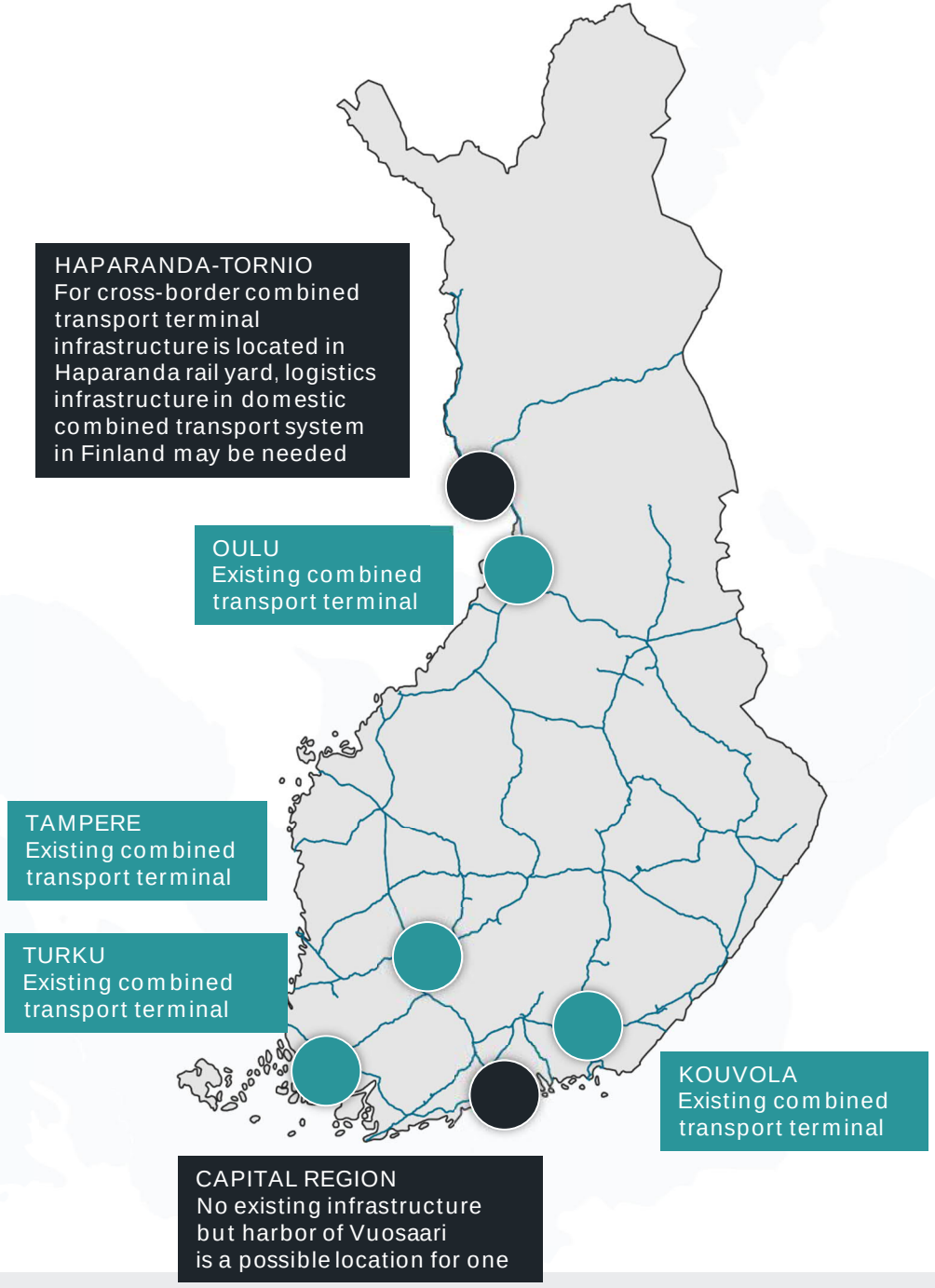
In 2010 there was a lot of effort to widen the combi transport network in Finland. As a result, a study found a lot of potential for combined transports to many directions in Finland and many operators and other interest groups were interested in development of the new transport system which had operated between Helsinki and Oulu from the early 1990's.

Currently there is a new challenge in moving road transport vehicles to the railways. In Finland, new dimensions of road transport vehicles increased, and the new height of vehicles is 4,4 meters. This makes these trailers and vehicles impossible to transport by train. Trailers in overseas transport is still possible to use in combined transport as well as older equipment in general. But modern vehicles are out of question without investments to even lower rail wagons.

Recent study on combined transport possibilities in Finland 2020

- The study finds that combined transport in Finland would be profitable if there would be a train with 20-25 trailers/trucks running daily between Helsinki/Turku and Oulu. This would reduce the CO2-emissions by 9 000 tonnes per year. The system would replace 25 to 30 % of the current truck traffic between Helsinki/Turku and Oulu.
- If there would be a 10% ecobonus (the Swedish ecobonus proposal) for this system, the total cost for the state would be about EUR 1 million annually.
- The study finds that a combined transport aid would give 15x more environmental benefits in comparison with the current state funded electric car purchase aid.
- The main barriers for implementation of a combined transport system are the timetables and punctuality of the railway system and the lack of a combined terminal in the capital region.

Taloustutkimus 2020



FREIGHT TRANSPORT SYSTEM IN RUSSIA
– MODAL SHIFT PERSPECTIVE

Barents Region in Russian part is sparsely populated area, with few bigger cities: Arkhangelsk, Murmansk and Petrozavodsk. There are a lot of production structures and refining chains in mining and energy. Huge investments both for production processes and logistics (sea ports and railways) are under construction in the Region.

Sea ports have large volumes

There are a few high volume sea ports, Murmansk as a western hub for Northern Sea Route with fast increasing transport volumes (already 60 million tonnes per year). Sea port of Sabetta has also growing transport volumes due to huge investment projects to LNG production close to the Barents Region. Although Yamal is not located in the Barents Region, it has a lot of reflections to transport systems in the Barents. Also sea port of Dudinka has increasing significance with investments in Norilsk mining and production processes, which reflects to the increasing volumes in Murmansk area. These development processes indicate also increasing transport volumes in NSR corridor.

Investments on ice-breaker fleet, ARC7-class cargo vessels and LNG carriers for NSR traffic. At the moment, there is ongoing development to integrate existing NSR to global logistics system and connect major sea transport hubs on each continent together. Russian Federation has said in 2018, that the NSR would become the key role to the development of the Russian Arctic and Far East regions. Russia set ambitious goal of increasing the cargo volume in the NSR to 80 million tonnes by 2024. This is mainly based on above mentioned LNG investment projects, but also as a transit transports of energy, mining products, containers and general cargo.

Rail transport is in heavy use

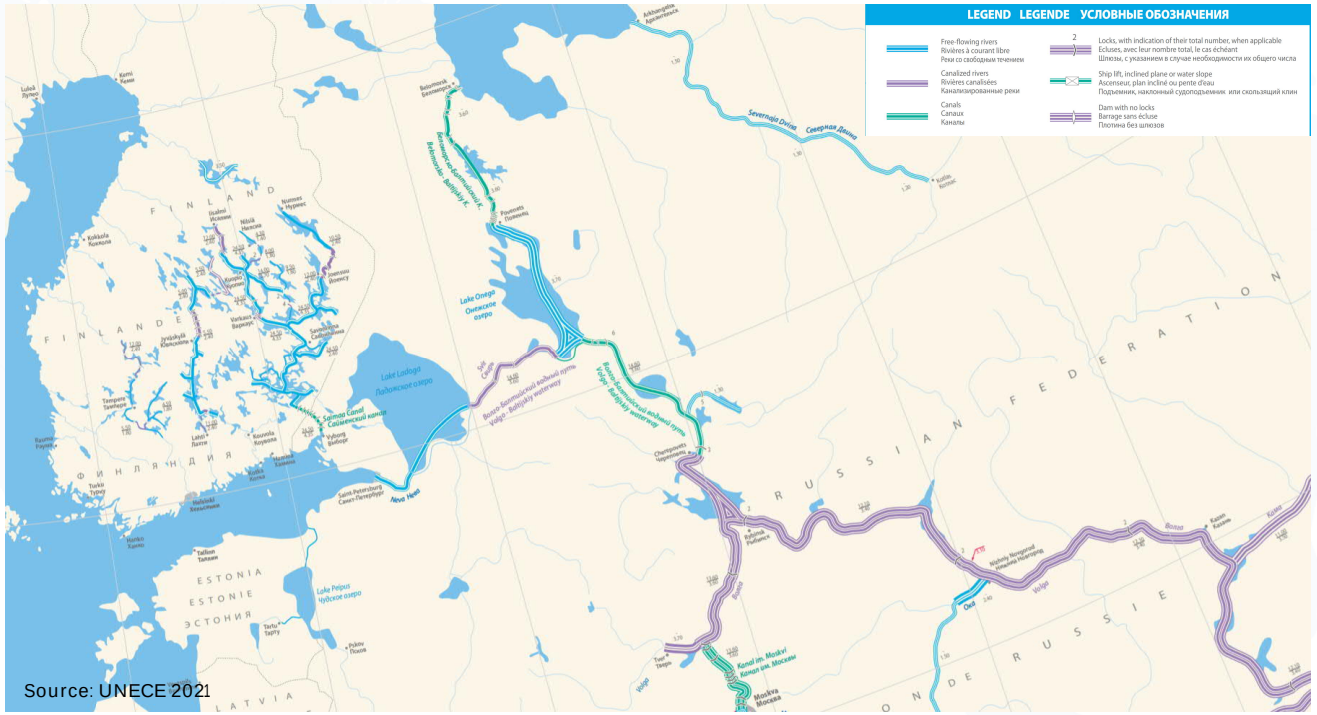
Freight transport system in Russia is mainly based on very effective rail transport system with high transport volumes. Road transport is mainly focused on shorter distances and areal transport needs. Thus it's difficult to find opportunities for modal shift in great extent in freight transport systems in Russia.

Especially in the Barents Region freight transport system utilize rail and sea transport systems in a very effective way serving high volume industrial value-adding chains.

Extensive inland waterway transport system

Russia has also extensive inland waterway transport network and system available. There are very high volume routes and at the same time accessibility to large areas in diverse directions. Operations are possible only about 6 months per year, which leads to need for alternative transport solutions, usually by train. Inland waterway transport system is very competitive also for project deliveries., where products have large dimensions. Other limitation is, that inland waterway transport system is open only for Russian vessels, which have river transport registration.

It is important to take into consideration, that although Russia has different approach to green transport topics than for example EU, it is very important driving force also in Russian transport system. Russia has a strong focus on Arctic areas and Russia meets severe economical and operational consequences in the Arctic, if global climate warming continues. Therefore, Russia is very active in forming effective transport systems and investments in utilization of cleaner fuels. For example, Novatek has announced an investment program together with Siemens to change LNG production to ammonia in Yamal. Ammonia is generally seen as a main future fuel solution for carbon neutral sea transport and vessel engine production is focusing on this at the moment



Source: UNECE 2021

Inland waterway system near Finnish and Russian border

SALMON TRANSPORT – CURRENT SITUATION

Total volume of salmon and other seafood transports from Norwegian High North area are approx. 0,4 million tonnes per year. This volume is estimated to grow to 1,6 million tonnes by 2050. In this case study three transport routes are evaluated as potential border-crossing freight transport flows for modal shift. Transport volumes on E8 main road are 160 000-200 000 tonnes per year from two origins, Skjervoy and Hammerfest. About 2/3 is transported from Skjervoy and 1/3 from Hammerfest. These are operated by trucks to Helsinki-Vantaa airport and further to diverse destinations in Asia. Part of the transport volume is transported to Finland, Sweden and Russia.

The third transport chain is the latest, called container rail transport Narvik-Haparanda/Tornio-Helsinki-China. At the moment this transport system is operated by road transport between Narvik and Helsinki and further to Asia by rail container transport. This route has a lot of potential in the future for diverse cargo types and forms a transport corridor between Asia-Helsinki-Narvik and further to Iceland, USA and Canada.

There are also direct air transports of salmon from Narvik (Evernes) to Asia. Qatar Airways is operating transport route Narvik-Doha-Asia to diverse destinations. This transport route is not taken into account in this case study, because it's not modal shift from long distance road transport. Though it is a very interesting and potential transport solution for the Barents region in the future.

Estimated transport costs are calculated from the Norway-Helsinki part of the transport chain

Loading of the salmon in semi-trailers

Road transport (22 net tonnes) to Helsinki-Vantaa or Vuosaari

Unloading the semi-trailers and loading in reefer containers

Rail transport or air cargo to China

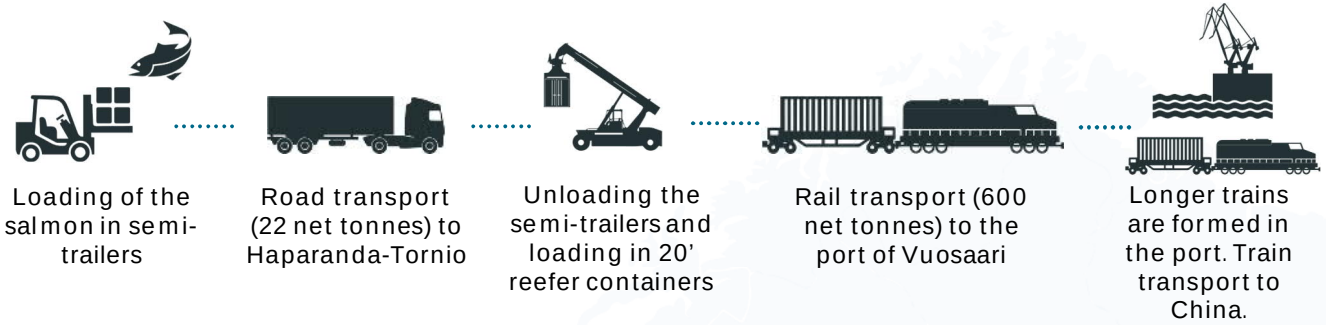
	Cost component	Narvik-Vuosaari (single truck)	Skjervoy-Helsinki (single truck)	Hammerfest-Helsinki (single truck)	27 trucks (average)
DIRECT TRANSPORT COSTS	Distance cost [EUR]	975	1 052	1 098	28 444
	Time-based cost [EUR]	625	669	695	18 100
	Loading and unloading [EUR]	42	42	42	1 141
SOSIO-ECONOMIC COSTS	Emissions [EUR]	48	51	54	1 392
	Infrastructure cost [EUR]	25	27	29	741
	Accident cost [EUR]	38	41	43	1 111
	Total cost [EUR]	1 754	1 883	1 960	50 929 €

Unit costs based on report: Cost Benefit Analysis IWW Saimaa 09/2018. Explanations included in the report.

Table: *Summary of calculations for transporting 600 tonnes of salmon from Norway to Helsinki by road transport.*

SALMON TRANSPORT –MODAL SHIFT OPTION

In the modal shift analysis, the road transport part of the transport chain is shortened. The goods are transported from salmon farms to Haparanda-Tornio terminal via road transport. In the terminal, the salmon is transshipped to reefer containers that are required for salmon transport. The containers maintain the correct temperature for the fish to stay fresh. The containers are loaded on a freight train. The wagons can fit two 20' reefers each. The calculation is done with a 10-wagon train that would carry around 600 net tonnes of goods. The goods are then transported from Tornio to the port of Vuosaari via the Finnish main railway line. In Vuosaari, longer trains are assembled ready to be transported to China via the Khorgos dryport. The transport cost calculation is done for the part between the salmon production and the port of Vuosaari. In some extent salmon transports can be operated by air freight transports from Helsinki-Vantaa airport as it operates at the moment. In that case, transport chain includes road transport in Helsinki from seaport to airport.



	Cost	ROAD Norway-Tornio average (27x22 net tonnes semi-trailers)	RAIL Tornio-Vuosaari (600 net tonnes)
DIRECT TRANSPORT COSTS	Distance cost [EUR]	12 929	5 926
	Time-based cost [EUR]	8 735	6 160
	Loading and unloading [EUR]	1 141	1 560
	Fairway dues [EUR]	-	883
SOSIO-ECONOMIC COSTS	Emissions [EUR]	633	-
	Infrastructure cost [EUR]	337	-
	Accident cost [EUR]	505	-
	Total cost [EUR]	24 280 €	14 530 €

Unit costs based on report: Cost Benefit Analysis IWW Saimaa 09/2018. Explanations included in the report.

Table: *Summary of calculations for transporting 600 tonnes of salmon from Norway to Helsinki.*

SALMON TRANSPORT
– CONCLUSION AND RECOMMENDATIONS

Clear benefits

The transport length in the case is in the optimal range for rail transport. Rail transport becomes more competitive the bigger the transport volumes are and the longer the transport distance by land is. So, it is no surprise that combining road transport flows in Haparanda-Tornio would provide savings both in transport costs and socioeconomic costs.

Requirements

Modal shift in this case requires infrastructure investments in Tornio-Haparanda region. There is need to develop a logistics hub in Haparanda-Tornio further for salmon transports and for general cargo in the future. There is already rail freight terminal in Haparanda rail yard, but for future purposes investments in more efficient operations for growing transport volumes would be needed. It would be a logistics node between road and rail transport. City of Tornio has also made plans to construct logistics area for logistics service providers and there is already an area reservation for logistics purposes mainly focused on road transport system.

There is also a need for electrification of rail track Tornio-Laurila (already decided) and over the border to Haparanda to operate the whole transport chain with electric driven trains. Otherwise, it would need a change of locomotive in Kemi shunting yard or usage of modern hybrid locomotives.

Transporting salmon from Narvik by train requires rail-to-rail loading facilities in Haparanda-Tornio due to different rail gauges between Finland and Sweden. There are also questions related to rail capacity in Sweden between Kiruna and Narvik in Norway. There is an increasing demand for mining products transport, general cargo, salmon and also passenger transport. There is lack of rail capacity for new transport flows. In Finland there are plans to remove bottlenecks on the main rail network from Kemi to Helsinki. Increasing freight transport in this rail route would demand more double track sections to be a fast connection for both passenger and freight transport.

It should also be considered, that seaport of Narvik is an effective logistics hub for bulk products. Container handling and transport of general cargo would require new investments to the seaport infrastructure including rail and road connections in different locations than present infrastructure.

It must also take into consideration, that these salmon transport routes and estimations of modal shift is based on present situation and availability of infrastructure and logistics services. There are a lot of other transport flows of sea food including salmon transported to diverse markets in Nordic countries, Europe and overseas. Therefore, transport solutions are not stable, but effective logistics solutions with a high service level are always attractive for diverse material flows.

Possibilities for larger combined transport flows

As stated earlier, Finland has had a working combined transport service running until 2014. Now, there are some studies taken to get the system working again. This case demonstrates that salmon transport could be an option to begin container train transport between Norway and Finland.

This shuttle service could serve also the Finnish South-North axis grocery transport which is currently done by road transport. Also, this service could be used by Finnish paper and cardboard industry near the logistics hubs.

Unit costs based on report: Cost Benefit Analysis IWW Saimaa 09/2018. Explanations included in the report.

	Cost	Road	Road + rail
DIRECT TRANSPORT COSTS	Distance cost [EUR]	28 444	17 265
	Time-based cost [EUR]	18 100	13 242
	Loading and unloading [EUR]	1 141	2 701
SOSIO-ECONOMIC COSTS	Fairway dues [EUR]	-	646
	Emissions [EUR]	1 392	633
	Infrastructure cost [EUR]	741	337
	Accident cost [EUR]	1 111	505
	Total cost [EUR]	50 929 €	35 330 €

Table: *Summary of calculations for transporting 600 tonnes of salmon from Norway to Helsinki. Road column describes the current situation and road + rail column describes a modal shift solution.*

Emissions	Road	Road + rail
CO2 [kg]	35 164,8	15 984,0
NOx [kg]	267,4	121,5
VOC [kg]	7,9	3,5
SO2 [kg]	0,1	0,0

Table: *Summary of emissions for transporting 600 tonnes of salmon from Norway to Helsinki. Road column describes the current situation and road + rail column describes a modal shift solution.*

In the modal shift option, C02-emissions would be reduced by 55 %. In the future, road transport emissions will be reduced, but from safety and infrastructure perspective, the costs remain.

MODAL SHIFT
– CASE FINNISH SAW INDUSTRY

Regions of North Karelia and Kainuu have many saw mills in diverse dimension and product supply. There are also opportunities for modal shift from direct road transport to rail and inland waterway transport. In practice all of these transport modes are in use delivering wood products to diverse markets. It should take into account, that inland waterway transport is not year round operating transport system, but sailing period is nowadays about 10 months a year. There are also investments plans and decisions to lengthening the locks in Saimaa channel. After that longer, modern and ice classified vessels can operate in Lake Saimaa district and this improvement makes inland waterway transports more effective and almost year round operating transport system. Other aspect is that export flows in inland waterway transports are mainly operated to European logistics hubs and further to Central European markets without visiting HaminaKotka sea port. Thus, the costs would be reduced greatly and the option would definitely be most competitive cost wise. Here we have used simplified analysis through sea port of HaminaKotka by all the transport modes.

Inland waterway system

Inland waterway transport system in Finland offers transport connections to Russian inland waterway transport network. This would serve export and import transport between Finland and Russia and further to CIS markets. This requires use of Russian vessels or transhipment in some sea port in the St. Petersburg region.

	Cost	Road	Road+rail	Road+ship
DIRECT TRANSPORT COSTS	Distance cost [EUR]	29 510	19 805	13 133
	Time-based cost [EUR]	20 015	24 828	13 046
	Loading and unloading [EUR]	6 080	14 400	38 080
	Fairway dues [EUR]	0	2 287	5 500
SOSIO-ECONOMIC COSTS	Emissions [EUR]	1 576	238	1 292
	Infrastructure cost [EUR]	678	102	262
	Accident cost [EUR]	1 018	154	394
	Total cost [EUR]	58 878 €	61 814 €	71 707 €

Table: *Summary of calculations for transporting 3200 tonnes of saw products from Kuhmo To HaminaKotka.*

Unit costs based on report: Cost Benefit Analysis IWW Saimaa 09/2018. Explanations included in the report.

CASE HAPARANDA-TORNIO HUB
- COMBINING THE BARENTS RAILWAY SYSTEM

Rail gauge 1 435 mm
Rail gauge 1 524 mm
Rail gauge 1 435 mm
Rail gauge 1 520 mm

Swedish and Norwegian rail transport systems are connected with each other and further to European rail transport network with technically the same rail gauge. There are already significant border-crossing transport volumes between Sweden and Norway both in the south and north.

Finnish and Russian rail transport networks are connected also well through many border-crossing stations and with about same rail gauge. There are already significant rail transport flows between Finland and Russia. Some of these transport flows are transit transport further to European and overseas markets. This transport network combination offers transport corridors to CIS and Asian countries and thus forms interesting northern alternative to the sea transport system between Europe and Asia with growing volumes.

What kind of action would support modal shift from road to rail from the Barents Region point of view?

One approach is to combine all the rail transport networks to each other in the most efficient way. This is a basis for creation of a Barents wide rail transport network which is connected to diverse directions further to potential markets. Main bottleneck in this approach is connectivity of rail network between Finland and Sweden. These have different rail gauges and therefore it requires construction of effective transshipment facilities. Therefore, there is potential for transport of cargo units, mainly containers and trailers.

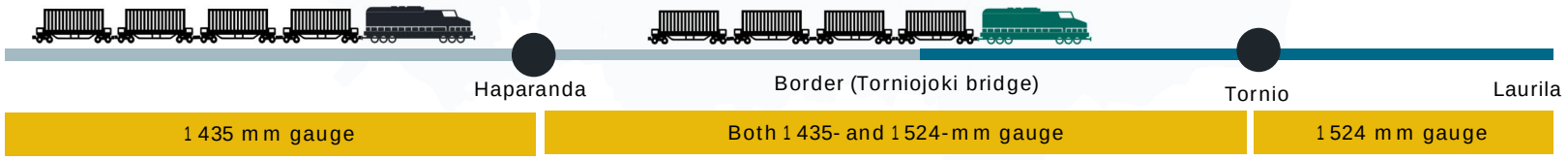
Development of connectivity through the whole Barents Region offers more opportunities for modal shift. At the moment there are diverse development plans and programs to proceed with these targets. For example, *Northern East West Freight Corridor* is one concept, which supports this idea. Rail container trains from Asia to Finland and further towards Narvik seaport is a transport corridor which has already started, although only from Asia to Helsinki in Finland is transported by rail and rest of the corridor is based on road transport. In the future this offers a versatile transport corridor between the Barents Region and Asia and also further to North America.

Key benefits

- Connected railway systems, which enables efficient multimodal transport chains
- New potential transport corridors with increasing connectivity
- Provides infrastructure supply that attracts suitable transport flows, thus providing an opportunity to reduce transport emissions

Transshipment facilities in Haparanda
- Unloading and loading of cargo units
- A terminal operator needed

In the case passenger transport is to be promoted, the change between trains would happen also at Haparanda.



Infrastructure requirements to start freight transport at the Finnish-Swedish border

- Laurila-Tornio-Haaparanta rail electrification and a new Torniojoki railbridge 24 MEUR (Väylä 2019)
- A solution for different rail gauges between Finland and Sweden: developing transshipment facilities more efficient in Haparanda and some rail tracks to the Tornio railway yard.
- Tornio has made area reservation for logistics center, which would support the role as a logistics hub regarding road transport system.

Other requirements

- Political will and understanding of the possibilities created
- A terminal operator
- Competitive rail service available in all countries
- Removing of bottlenecks on both the Narvik mining ore rail and Finnish main rail

HOW TO PROMOTE A MODAL SHIFT IN THE BARENTS REGION?

CHALLENGES TO BE SOLVED

- High transshipment costs have been suggested as one explanation for why the market has been slow to develop. Transshipment costs are substantial, and they also make up a much larger share of the total cost of carriage by rail and ship than carriage by road. As a result, compared to heavy goods vehicle transport, much larger freight volumes are required over longer distances to generate economies of scale for rail and maritime transport.
- The intermodal market consists of several different modes of transport with discrete market terms and various business models. Transport modes are in some cases in competition with each other and at this creates a challenge. On the other hand, with digital platforms and efficient transshipment, synergies can be found for all transport modes.
- In addition, the lack of access and connections to loading terminals, as well as capacity limitations in the rail network, could reduce opportunities and incentives to reload.
- The freight forwarder market is also relatively poorly developed, and there is a significant lack of firms able to coordinate and market transport solutions, which are attractive to customers in the intermodal transport market.
- Operating aid is considered to be more distortive for competition than investment aid and the EU Commission is often restrictive in approving operating aid other than temporarily and for shorter periods.

OPPORTUNITIES FOR THE BARENTS REGION

- Finland and Sweden can receive funds from the EU to promote a modal shift and intermodal transport, and to invest in rail and intermodal infrastructure.
- Extension of TEN-T network towards north is an important approach in infrastructure and connectivity development in the region. Main focus in infrastructure investments of the EU is related to TEN-T core corridors and therefore core corridor status is important to keep in focus in the Barents region. This needs also consolidation of national transport plans from border-crossing perspective in the region. In addition to rail network, TEN-T includes road, sea ports and airport networks, which are essential to combine to the complete system of examination.
- Creation of logistics hubs in strategic locations can offer competitive transport system for the Barents region, which utilize both road and rail transport systems in a very efficient way in border-crossing transport flows regarding Finland, Sweden and Norway. Total solution must be competitive on cost, transshipment and total transport time. At the same time the logistics service product can promote operations model towards sustainable and even carbon neutral system. Tornio-Haaparanta as a future logistics hub is one example of this approach.
- There are many railway connections available between Finland and Russia. At the moment there are restrictions by segment of goods, which border-crossing stations are available and Vainikkala is the only possibility to transport all type of goods, including food deliveries. In a case of significant volume increase other three border-crossing rail connections are also available to start transport of diverse type of goods and also container trains. This requires, however, a common will from Finnish and Russian part including rail operators.

An article by Pinchasik et al. describes a simulation of different policy measures and their effects on mode choice and emissions from freight transport in the Nordics

The study finds that Norwegian ecobonus scheme for rail yields larger modal shift away from road than a similar ecobonus for sea transport. Facilitating longer freight trains yields more modal shift but has high policy costs.

Effects of harmonizing policies across Nordic countries vary but can be strengthened by combining different measures.

However, even for scenarios with strong policy measures, reductions in $CO_{2,eq}$ emissions do not exceed 3.6% in 2030 while sometimes increasing local air pollution.

Modal shift policy should therefore not exclusively be regarded as environmental strategy, although it may contribute to other policy objectives.

EU FUNDING OPPORTUNITIES
– INFRASTRUCTURE PROJECTS

In the future EU's main transportation related goals are the development of the TEN-T Core and Comprehensive Networks. Infrastructure development is one of Union's key financing areas

EU's aim is to have the Core network fully integrated by 2030 and the Comprehensive network by 2050. Majority of the Barents region belongs to the Comprehensive network and. EU funded projects can include countries outside EU. New CEF Program 2021-2027 is under final review process and the program will start immediately after formal approval.

CONNECTING EUROPE FACILITY (CEF)

- The main financing instrument in EU to bolster infrastructure development
- New programme will start soon for 2021-2027 and calls for funding will start in Q2-Q3 / 2021
- 33,7 bn euros in which
  - 25,7 bn for transportation
  - 5,8 for energy
  - 2,1 for digital

▶ Priority will be given to further development of the trans-European transport networks (TEN-T), focusing on missing links and cross-border projects with an EU added value.

NATIONAL COVID-19 RECOVERY FUNDING (RFF)

- National infrastructure investment plans (in Finland 310M€ for energy transition, 320M€ for green and digital industrial investment, 40M€ for transportation)

INVEST EU

- EU guaranteed funding directly from EIB or authorized regional banks

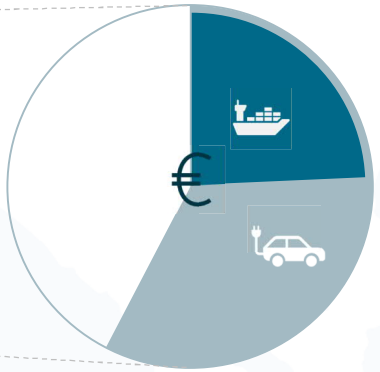
EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

- For regional development initiatives through regional councils
- React-EU projects

EUROPEAN FUND FOR STRATEGIC INVESTMENT (EFSI)

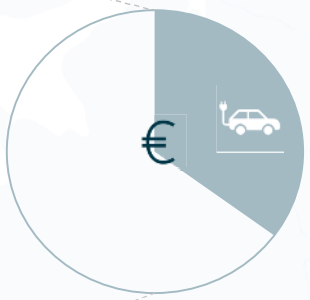
- EU's additional investment on a strategic development intiatives

Future funding allocation criteria in CEF



24%
for inland waterways and multimodal transport, and gas infrastructure -if enabling increased use of renewable hydrogen or bio-methane.

60 %
Must reduce transportation related greenhouse gases



30 %
Must reduce transportation related greenhouse gases and comply with EU's sustainable finance standards

All funded projects must have

CLEAR CLIMATE BENEFITS

DIGITAL REACH

EU FUNDING OPPORTUNITIES
– INNOVATION AND RESEARCH DEVELOPMENT

EU funding for private companies and research institutions in the field of Smart Mobility

- EU provides significant funding opportunities for technology researcher and developers
- In addition to the research measures, funding opportunities are also available for commercial development and scaling

Example:	*Research of new battery technology solution for Arctic environment*	*Commercial and technology development*	*Technology testing in a real market environment and pilot factory establishment*	*Large scale production ramp up*
STAGE OF DEVELOPMENT	RESEARCH OR INNOVATION ACTIONS	FURTHER DEVELOPMENT	INNOVATION DEVELOPMENT AND COMMERCIALISATION	SCALE-UP

Horizon Europe (multiple programmes)

- Large (ca. 20 members) & multidisciplinary consortia,
- Up to 75 % funding, typically 5-20 MEUR per project, max. four years

EIC Pathfinder

- Small (3-5 members, from at least three countries) & some calls also for single-applicants (for bottom-up or open topics only)
- Up to 75 % funding, up to 4 MEUR for a max. four-year project

EIC Accelerator

- For market-disrupting new innovations
- Green Deal & Digitalisation, and Health
- Grant: 0.5-2.5 MEUR (70 % of development costs)

Eurostars

- Led by R&D performing SME, max. three years
- Up to 50 % funding
- Avg. project is 2 MEUR, up to 50% funding
- At least two different countries

Innovation Fund

- To low-carbon technology demonstration projects
- 0-25M project funding, up to 50% of project costs

EIB financing*

- Venture debt / quasi-equity for growth stage
- Secured project financing

** Not grant funding.*

Multiple funding opportunities to accelerate research in innovation development & commercial scaling in the Barents region

MODAL SHIFT
Key points for the Barents region

1

Modal shift should not be pursued for the sake of it

It must be seen as a holistic transport system development work that improves logistical competitivity and brings added value to the transport customers. Many modal shift options are already in use in the Barents region, but there are still many other user cases available.

2

Modal shift is not to be exclusively regarded as an environmental action

Studies show, that even strong policy measures will only lead to relatively small emission reductions (few percentages). It has more to do with using each transport modes best qualities in each transport chain and maximizing the usage of infrastructure.

3

Modal shift requires infrastructure investments – EU Green Deal funding mechanisms should be used

From transport sector point of view, EU Green Deal is a funding mechanism focusing on TEN-T network. Most of TEN-T network in the Barents region belongs to the comprehensive network. In addition, there is a clear focus on multimodal transport systems, inland waterways and rail transport. All the investments must have clear climate benefits and digital reach. This approach offers a lot of opportunities for the Barents region because these support development of connectivity of the region.

4

Logistics hubs are critical nodes in multimodal infrastructure

Development of logistics facilities for terminal operations and transshipments are one key approach to promote modal shift in the Barents region. The region has a lot of potential for development of new transport solutions because there is an extensive rail network available between Scandinavia, Russia and Asia. Therefore, there are a lot of opportunities to construct new and alternative transport corridors to diverse directions by combining all the transport modes available in an effective way.

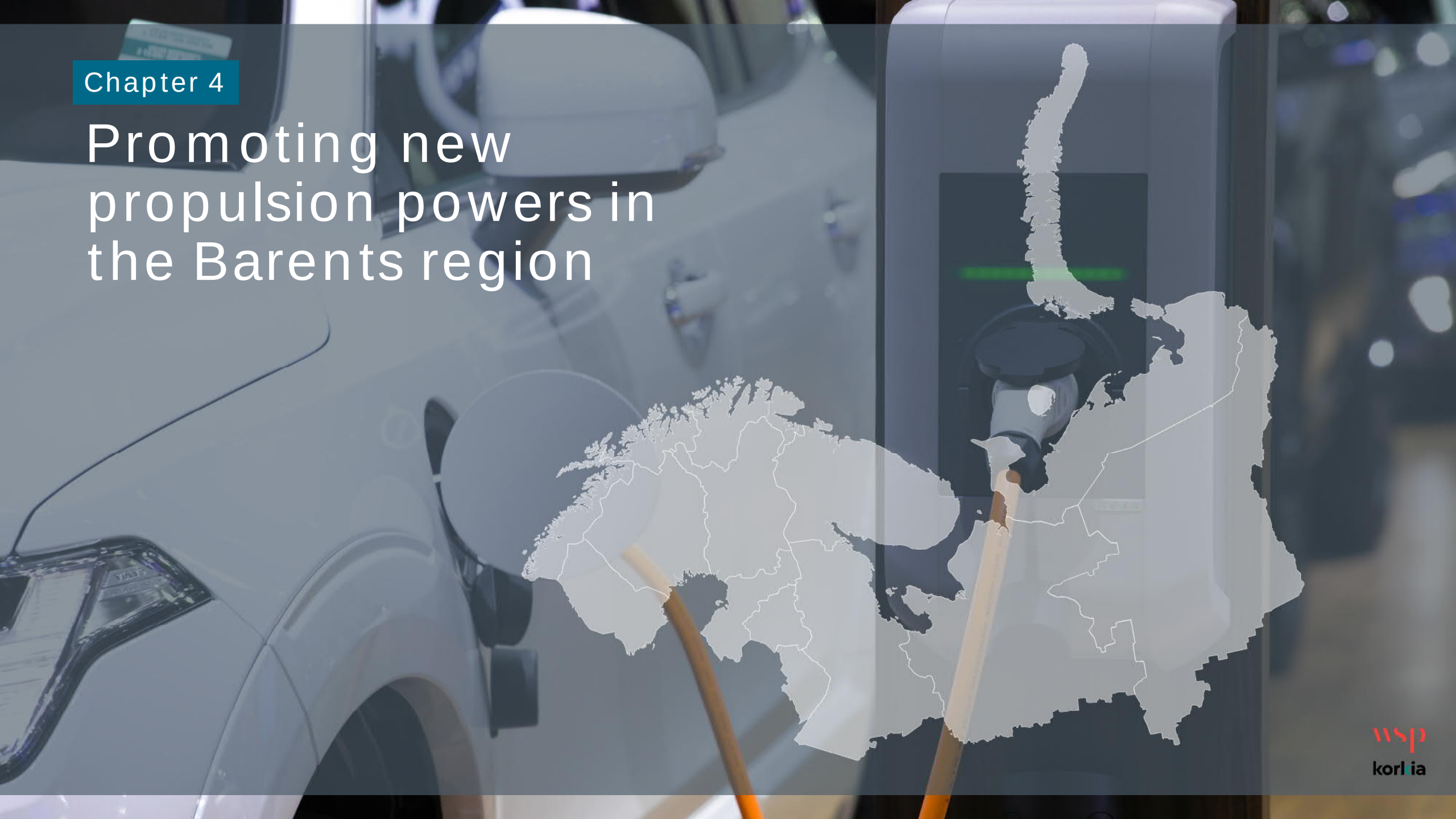
5

Modal shift needs a clear vision and target setting to form a competitive and sustainable transport system

Modal shift and intermodal transport systems must be seen from many perspectives and layers. Modal shift can be a political target which needs support and investments to proceed. Basically, a transport system has concrete product transport flows which have a product owner (or producer) and a customer. This transport system must be cost efficient with high service level and increasingly sustainable. Thus, a combination of looking at the big picture and local development is needed.

Chapter 4

Promoting new propulsion powers in the Barents region



EU SMART MOBILITY AND DIRECTIVE ON ALTERNATIVE FUELS INFRASTRUCTURE

EU Smart Mobility key points

The increased deployment and use of renewable and low-carbon fuels must go hand-in hand with the creation of a comprehensive network of recharging and refueling infrastructure to fully enable the widespread uptake of low- and zero-emission vehicles in all transport modes.

By 2025, the aim is to build half of the 1 000 hydrogen stations and one million out of 3 million public recharging points needed by 2030. The ultimate goal is to ensure a dense, widely-spread network to ensure easy access for all customers, including operators of heavy-duty vehicles.

The Commission will publish a strategic roll-out plan to outline a set of supplementary actions to support the rapid deployment of alternative fuels infrastructure, including in areas where persistent gaps exist. These would include recommendations on planning and permitting processes as well as on financing.

In the context of the upcoming revision of the Directive on Alternative Fuels Infrastructure (AFID), the Commission will consider options for more binding targets on the roll-out of infrastructure, and further measures to ensure full interoperability of infrastructure and infrastructure use services for all alternatively fueled vehicles.

Next to the revision of AFID, a revision of the TransEuropean Transport Network (TEN-T) Regulation and other policy instruments such as the recast Renewable Energy Directive and its accounting mechanism for electricity are prepared. The Commission will ensure alignment with the necessary grid investments under its initiatives under the EU energy system integration and hydrogen strategies.

Directive on deployment of alternative fuels infrastructure 2014 →

The Directive on the deployment of alternative fuels infrastructure 2014/94/EU introduces new EU rules to ensure the build-up of alternative refueling points across Europe with common standards for their design and use, including, for example, a common plug for recharging electric vehicles.

The revision of the Alternative Fuels Infrastructure Directive

The 2021 Commission Work Programme foresees the publication of the proposal in the second quarter of 2021. The Smart and Sustainable Mobility Strategy presented on 9 December 2020 lists the revision in its legislative action plan for 2021.

The required coverage by which the infrastructure must be put in place is shown in the table. The alternative infrastructure must be put in place by 2025.

Requirements in the Directive of alternative fuels infrastructure 2014

Mandatory	Fuels	Objectives/distance requirement
Yes	Electricity for vehicles	One recharging point per estimated ten electric vehicles (and for information purposes: at least every 60 km on TEN-T Core Network)
Yes	CNG	At least every 150 km on TEN-T Core Network and one CNG refueling point per estimated 600 CNG vehicles
Yes	LNG for vehicles	At least every 400 km on TEN-T Core Network
Yes	LNG for maritime vessels	Coverage of maritime ports with mobile or fix installations to enable the circulation on TEN-T Core Network
Yes	LNG for inland waterway vessels	Coverage of inland ports with mobile or fix installations to enable the circulation on the TEN-T Core Network
No	Hydrogen	At least every 300 km on TEN-T Core Network

ALTERNATIVE PROPULSION POWERS
- EFFICIENCY AND INFRASTRUCTURE

- BATTERY POWERED RENEWABLE ELECTRICITY
- HYDROGEN
- E-FUELS *Methane, methanol, dimethyl ether and ammonia*
- RENEWABLE DIESELS (HVO100 & BioVerno)
- BIODIESELS (E85,B100)
- BIOGAS (CBG & LBG)
- CNG & LNG

ENERGY EFFIENCY IN DIFFERENT STAGES: WELL TANK → TANK WHEELS

Vehicle type	Production efficiency	Delivery efficiency	Use efficiency	Total WTW (well-to-wheel)
BEV (Battery electric vehicle)	35...60%	81...84,6%	65...82%	18...42%
FCEV (Fuel cell electric vehicle)	23...69%	54...80%	36...45%	4...25%
ICEV (Internal combustion engine vehicle)	82...87%	99%	17...21%	14...18%

Source: Deloitte Fueling the Future of Mobility - Hydrogen and fuel cell solutions for transportation. Numbers for FCEV are based on a vehicle using hydrogen.

RESPECTIVE INFRASTRUCTURE

Battery electric vehicles (BEV)
- Charging infrastructure is required
- Fast charging is critical in public places, home charging can be slower

Fuel cell electric vehicles (FCEV)
- using hydrogen, new fueling infrastructure is required
- Also, fuel logistics is currently difficult and costly

Internal combustion engines vehicle (ICEV)
- New infrastructure is needed only for gasified products and liquid gases
- Existing infrastructure for can be used for e-fuels and renewable diesels

PROPERTIES OF DIFFERENT ALTERNATIVE PROPULSION POWERS

	Battery powered electricity	Compressed biogas (CBG) and compressed natural gas (CNG)	Liquefied biogas (LBG) and liquefied natural gas (LNG)	Renewable diesel (HVO)	Renewable diesel from forest industry	Green hydrogen	E-fuels (synthetic) methane, methanol, dimethyl ether
PROPERTIES	• Renewable or fossil energy stored in batteries that power an electric motor • Average range for electric passenger cars is around 300 km • Charging times depend on the charging current	• Made from waste and sewage water by digesting • Range for a semitrailer truck up to 500 km • Combustion engines can be altered to use CBG or LNG	• Liquid at -160C • Energy content 1:1,7 compared to diesel • Range for a semitrailer truck up to 1 000 km • Combustion engines can be altered to use LBG or LNG	• Hydrotreated vegetable oil • Made for waste and industrial residues	• Hydrotreated crude pine oil which is a residue from pulp production	• Made with renewable energy in electrolysis • In gaseous form in normal temperatures	• Carbon neutral and renewable fuels created with power-to-X process where renewable electricity, hydrogen (electrolysis) and captured carbon dioxide are used as inputs
ENGINE	Electric engine powered by battery electricity	Internal combustion engine	Internal combustion engine	Internal combustion engine	Internal combustion engine	Fuel cell powered electric engine	Fuel cells or internal combustion engines
LIFETIME CO_2 REDUCTION	-80%	CBG: -90% CNG: -15%	LBG: -90% CNG: -15%	-90%	- 80%	Nearly -100%	Depends if the carbon is captured from the air and if CO_2 is from bioindustry
POSSIBILITIES	• Best system efficiency • Enables smart electric grids • New battery technologies such as solid-state batteries could provide new opportunities	• Local and regional energy production (CBG) • Reduces energy waste (CBG)	• Good energy density • Long range with heavy vehicles	• Fit for all diesel engines • Burns purely • Local emissions are also reduced	• Fit for all diesel engines • Suitable for maritime • Eliminates sulfur oxide emissions, reduce nitrogen oxide emissions by 10% and fine particulate emissions by 50%	• Fueling is similar to current systems and it takes around 15 min to fuel a truck • Good energy density (1kg of H_2 = 1 gallon of diesel) • Production on site near wind power from excess energy	• Easier storage than for hydrogen • Easier integration with existing logistic infrastructure (e.g., use in gas pipelines, tankers, refuelling infrastructure)
CHALLENGES	• Not enough raw minerals to electrify all vehicles with current technology • Battery technology limits	• EU policies unclear • Limited amount of biomaterials • CNG is still a fossil-based fuel	• EU policies unclear • Limited amount of biomaterials • LNG is still a fossil-based fuel	• Limited raw materials and questions around palm oil plantations • Can't replace fossil diesel because supply is limited	• Supply limited to pulp production so volumes can't be increased without increasing deforestation	• Difficulties in transportation and storage due to gaseous form • Economical feasibility	• Carbon capturing and hydrogen production costs are still relatively high
OEMS	Wide range of companies in the battery electric vehicle value chain	Gasum, Scandinavian Biogas	Gasum, Scandinavian Biogas, Gazprom, Novatek	Neste	UPM	NEL ASA	At piloting stage

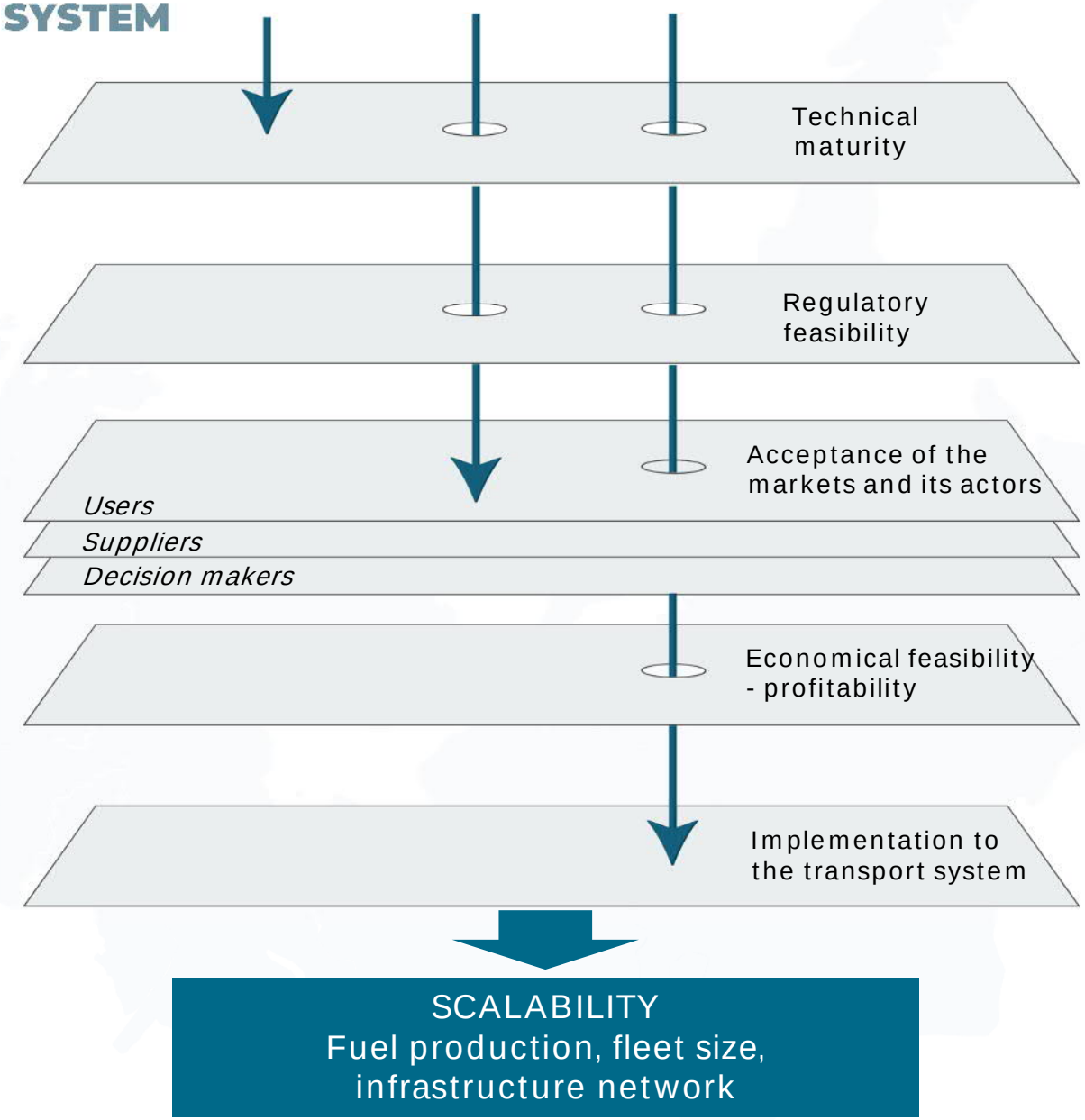
IMPLEMENTATION OF NEW TECHNOLOGIES AND PROPULSION POWERS IN THE TRANSPORT SYSTEM

All the forementioned propulsion powers are technologically feasible but their technical maturity varies

All the forementioned propulsion powers are generally accepted in different forms of regulation. But there is still development needed on different levels.

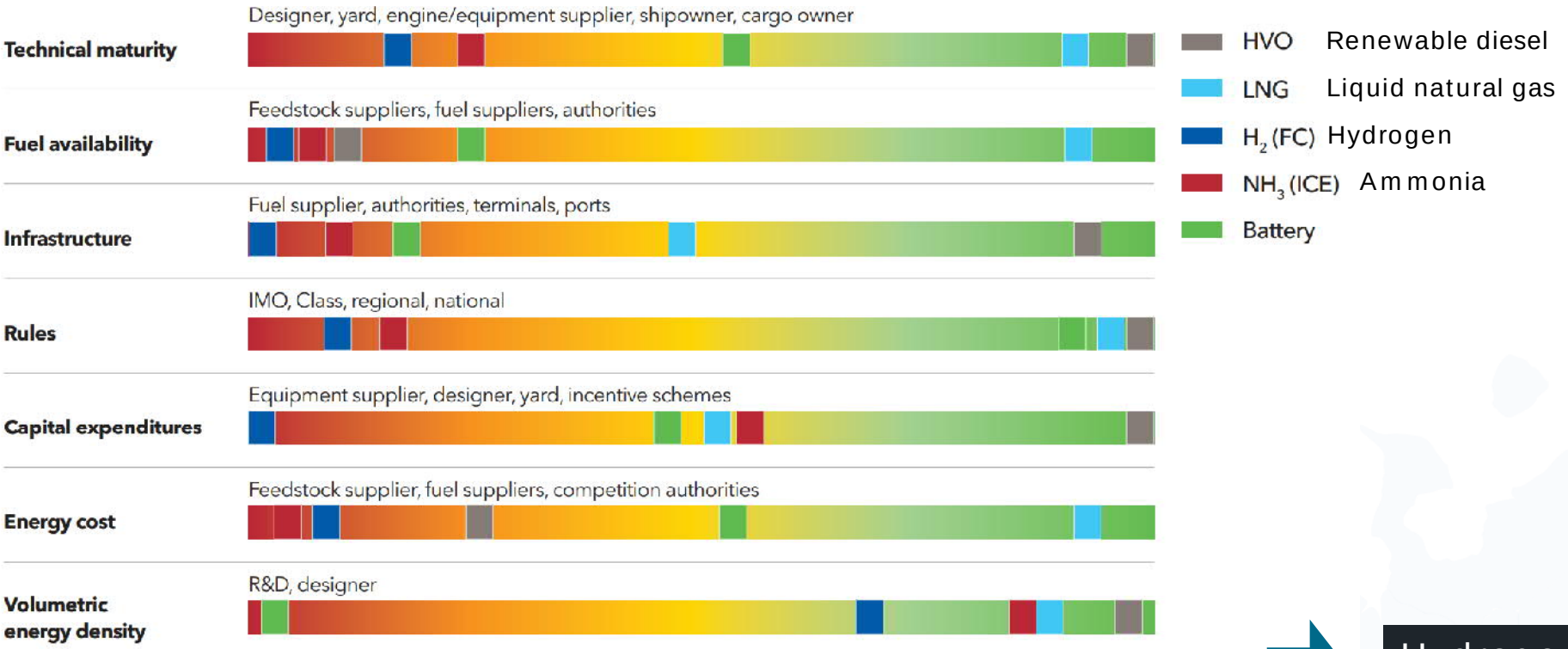
Renewable diesel is largely considered a good alternative. For BEVs, range anxiety and vehicle prices are still barriers in many cases. For hydrogen and e-fuels, the lack of scale and suppliers limits the notoriety.

BEVs are estimated to reach price parity with respective ICEVs by 2023. Hydrogen and e-fuels are in many cases still too expensive for large scale production.



CASE MARITIME

The Alternative Fuel Barrier Dashboard: Indicative status of key barriers for selected alternative fuels



Technical maturity – refers to technical maturity level for engine technology and systems.
Fuel availability - refers to today's availability of the fuel, future production plans and long-term availability.
Infrastructure – refers to available infrastructure for bunkering.
Rules – refers to rules and guidelines related to the design and safety requirements for the ship and onboard systems.
Capital expenditures (capex) – Cost above baseline (conventional fuel oil system) for LNG and carbon-neutral fuels, i.e. engine and fuel system cost.
Energy cost – reflects fuel competitiveness compared to MGO, taking into account conversion efficiency.
Volumetric energy density – refers to amount of energy stored per volume unit compared to MGO, taking into account the volume of the storage solution.

Source: DNV GL 2019

Hydrogen based fuels are still in early stages of development

PROPULSION POWERS FROM THE BARENTS AREA COUNTRIES POINT OF VIEW

NORWAY

Key strategies
- The Norwegian climate strategy for 2030
- National transport plan 2018-2029
- The Norwegian Government's hydrogen strategy 2020
- Handbook for infrastructure for alternative propulsion powers for transport 2019

BEV
- Largest charging network
- Over 50 % of current passenger car sales are EVs
- Electric vehicles are exempt from vehicle registration tax and VAT

Biogas
- Focus on heavier vehicles
- Enova's program for investment support for the establishment of biogas production will contribute to an increased supply of biogas. Enova also supports the purchase of heavier biogas vehicles and associated filling infrastructure.

LNG
- A good alternative in shipping

Hydrogen / E-fuels
- Lots of piloting focusing on shipping and heavy vehicles
- Fuel cell vehicles are exempt from vehicle registration tax and VAT.

SWEDEN

Key strategies
- Klimatklivet is an investment program supporting local and regional measures aimed at lowering GHG emissions
- Ladda bilen is an investment support program aimed at developing charging infrastructure administered by the Swedish environmental protection agency.
- National hydrogen strategy is being prepared (ready in July 2021)

BEV
- The bonus malus system is applied on top of the existing vehicle tax on vehicles registered after 1 July 2018. The system includes passenger cars and light trucks and buses up to 3.5 tonnes. Battery electric vehicles (BEV) and hydrogen vehicles receives the highest possible bonus set at SEK 60,000.

Biogas
- All gas vehicles receive a fixed bonus of SEK 10,000.

Biofuels in general
- The Swedish pump law states that filling stations that sell more than 1,000 m3 of gasoline and diesel a year are obliged to sell renewable fuels such as E85, biogas, HVO100 and B100. Charging infrastructure cannot replace the requirement to sell renewable fuel, however HVO100 can replace ethanol or B100.

FINLAND

Key strategies
- Fossil free transport roadmap 2020
- National Energy and Climate Strategy for 2030
- Distribution network for alternative propulsion powers in transport 2017
- National biogas program 2020
- National hydrogen roadmap for Finland 2020

BEV
- Incentives for battery electric vehicles (BEVs) are offered in the form of a €2000 purchase subsidy from the Finnish government (Traficom 2020).
- The Government offers incentives for building EV charging infrastructure. Grants for 16 public fast charging stations are offered up to 35 percent of investment costs

Biogas
- Available biogas for transport 2,5 TWh by 2030 and 10 TWh by 2045

Renewable diesel
- Finnish company Neste is one of the leading renewable fuels producer globally

Hydrogen / E-fuels
- By 2030 there will be 20 hydrogen fueling stations so that the distance between stations is 300km and each station's catchment area is 150 km.
- E.g. LUT, ST1 and Wärtsilä have studied the requirements for e-fuels in Finland

Biofuels in general
- Finland has a biofuel admixture policy, stating that fuel suppliers are obligated to blend their road transport fuels with at least 15% biofuels in energy content.
- A goal is set that 30% of the content of all fuels sold in 2030 will be biofuel energy

RUSSIA

Key strategies
- Russia's Energy Strategy to 2035.

LNG
- Russia has a lot of oil and gas production, and there are many LNG productions in operation or in construction phase in the Arctic. By far LNG provides the cleanest form of energy available from fossil fuels. LNG also meets mining and industrial production in the Barents region.
- Focus on LNG in maritime transport of NSR with increasing amount of LNG powered fleet in the Arctic. Replacing traditional fuels with more sustainable LNG. Advantages in availability in long term and also compliance with the IMO target settings.
- Russia has committed to Paris climate agreement and Russian Arctic is an area which is going to suffer most of climate warming causing huge costs for infrastructure. This is one reason why Russia is very active in development of new technologies in transition from fossil fuels to renewal propulsion powers. The sectoral plan for adaptation to climate change in the field of transport is being developed for a reduced carbon footprint.
- The rapid transition in global energy markets especially in Europe has changed plans and moves focus on ammonia production instead of LNG. For example, Novatek has announced plans for this kind of change in their Ob plant investment project. Natural gas remains the main energy source in Russia and significant change is not expected before 2040.

Hydrogen
- Hydrogen belongs to Energy strategy of Russia and there are studies done for hydrogen production plants.
- Piloting by gas industry and nuclear power plant site is targeted to 2023-24. Hydrogen export goals quite minor compared to other energy sources by 2035.

STATE FUNDING MECHANISMS FOR ALTERNATIVE FUEL DISTRIBUTION NETWORKS IN THE BARENTS REGION

NORWAY

Enova is the state-owned company that provides funding for Norway's transition to a low-emission society.

Support for charging infrastructure

Enova's purpose is to make it attractive for more people to use an electric car, by providing a basic offer of fast chargers in selected areas where there is still a need for public support and the network is not yet developed.

In 2020, commitments were made to 25 fast charging stations in Troms and Finnmark. The support was 65 MNOK in total. By the end of the year, 7 of these charging stations have already been established. In September 2020, a competition was announced for Nordland and Namdalen.

Enova can support up to 100% of approved investment costs within the minimum technical requirements. The application process at Enova is normally completed within 4-8 weeks.The charging infrastructure must be completed and in operation no later than 18 months after a decision from Enova.

Support for biogas production, infrastructure and vehicles

Enova has contributed to technology development to produce advanced biofuels and stimulated the further development of the value chain for biogas by supporting production facilities for biogas and the purchase of commercial vehicles with associated filling infrastructure. In 2020, NOK 98.2 million was given in support of two production plants for biogas. Support was also provided for a biogas filling station and 87 trucks, mainly tractors powered by liquefied biogas. The increasing number of projects on biogas trucks leads to more knowledge about the benefits and challenges of using the vehicles. The number of cars available in the market is increasing, and that the delivery of cars is no longer a barrier.

Support for hydrogen fueling stations

Since 2015, Enova has provided support to nine publicly available hydrogen filling stations. No aid has been granted after the year 2019. In addition to infrastructure support, Enova has also helped to realize innovative projects that use hydrogen.

Enova 2021

RUSSIA

The government of Russian Federation has decided investments and conducted action plans for increasing LNG delivery network for transport vehicles. Russia has also developed strategic planning documents for the increasing use of alternative fuels, for example a concept for the development of production and use of electric transport for the period up to 2030, a strategy for the development of transport production with a reduced carbon footprint and an action plan for development of the energy storage systems industry including measures to support the production and location of the minimally required infrastructure of electric charging stations.

Rosseti, a Russian power company, has been the most active in pursuing a charging infrastructure for electric cars, installing more than 250 stations since 2013. The company will not work without regional support, since there are big capital investments needed. Rosseti will build another 1,000 charging stations by 2025. The main difficulty is the problem of local electric capacities. Often the company finds that it's impossible to increase capacity in areas it wants to build stations, or that increasing capacity would be prohibitively expensive. (Bellona 2020)

FINLAND

Finnish Energy Authority regulates and promotes operation of the electricity and gas markets, emission reductions, energy efficiency and the use of renewable energy. It also provides support for alternative fuel infrastructure. Support can be given to gas fueling stations, local public transport electric charging stations and for fast and slow public charging stations.

Infrastructure support shall not exceed 35% of the eligible costs in the case of high-capacity vehicle recharging points, and otherwise up to 30%. The support can be granted if the investment wouldn't otherwise be done and municipalities that don't have existing infrastructure are prioritized.

Public charging infrastructure got 4,8 MEUR of funding between 2017-2019. In 2020, 3 MEUR was reserved for gas fueling stations and 1,76 MEUR for fast charging systems.

Infrastructure support for public charging stations and gas stations and for home and work charging stations are included also in the Fossil Free Roadmap's first phase that the government made a resolution on in May 2021.

Finnish Energy Authority 2021

SWEDEN

The Swedish Transport Administration offers investment support for the expansion of public fast charging stations for charging vehicles. The support applies to certain places in connection with major roads that do not have fast chargers. A network of fast chargers makes it possible for more people to drive on electricity.

The Swedish Transport Administration has SEK 150 million to grant to support the construction of charging infrastructure for three years, 2020 - 2022. It is possible to apply for up to 100 % of the investment cost. However, it is not possible to apply for support for the operation of the fast charging stations, only for the investment cost.

In 2021, the Swedish Transport Administration has granted investment support for 39 new public fast charging stations in connection with the major state roads, where such are lacking in Västerbotten, Västernorrland, Jämtland, Gävleborg and Norrbotten. Ten different players are granted SEK 45,350,899 million to establish 39 fast chargers.

Klimatlivet program also provides support for wide variety of carbon emission reduction projects such as biogas production and fueling stations.

Trafikverket 2021

One public CSS DC fast charger reduces yearly emissions in Sweden by 12 884 kg CO_2-ekv

OVERVIEW OF LOW EMISSION PROPULSION POWERS FOR TRANSPORT IN THE BARENTS REGION

Green Transport in the Barents region 2020 recommendations

Make electrification a top priority

Focus on passenger cars. For heavy trucks and buses, it is less clear what path to choose.

Charging infrastructure plans for passenger vehicles. Heavy vehicles require alternative options.

Set common goals for deployment of green transport infrastructure

To achieve a basic functionality in the green transport infrastructure (ensuring the possibility to get from point a to point b within the region), goals should be set for the primary road network. Based on average operating range of EVs and gas vehicles, standard requirements could be set. As an example, the Swedish national strategy on deployment of fast-charging infrastructure states that public fast charging possibilities should be available every 100 km along primary roads. Setting these target values also enables to identify where necessary infrastructure is absent, thus enabling a feedback to national levels on need of policy incentives

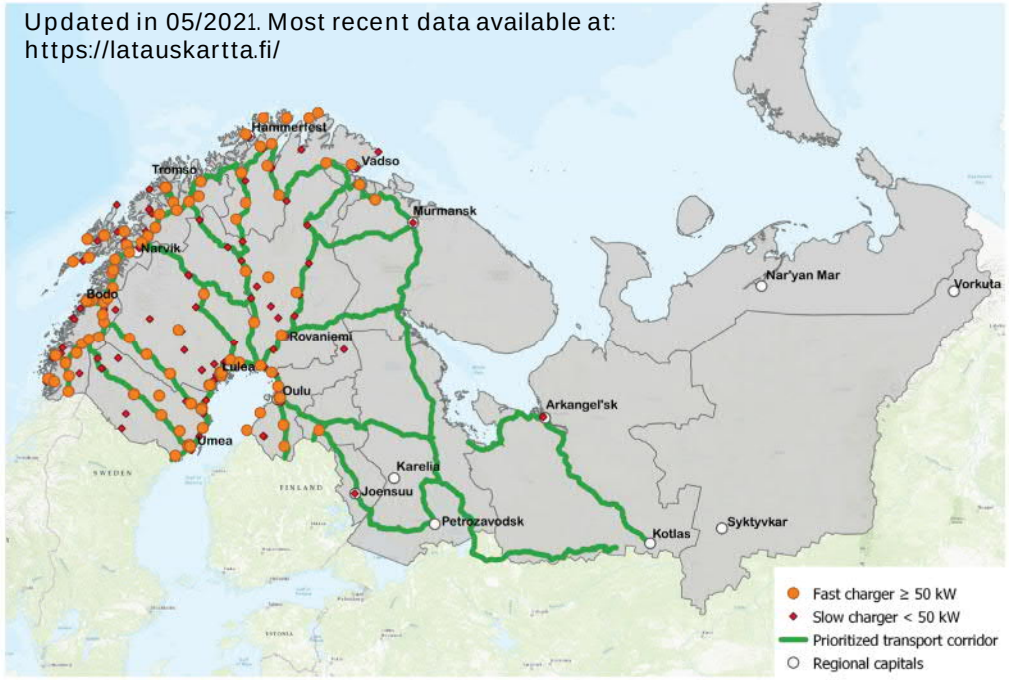
Using EU regulations and existing transport corridors, the case studies are determined and required infrastructure is calculated

Implement public instruments that enable commercial infrastructure deployment

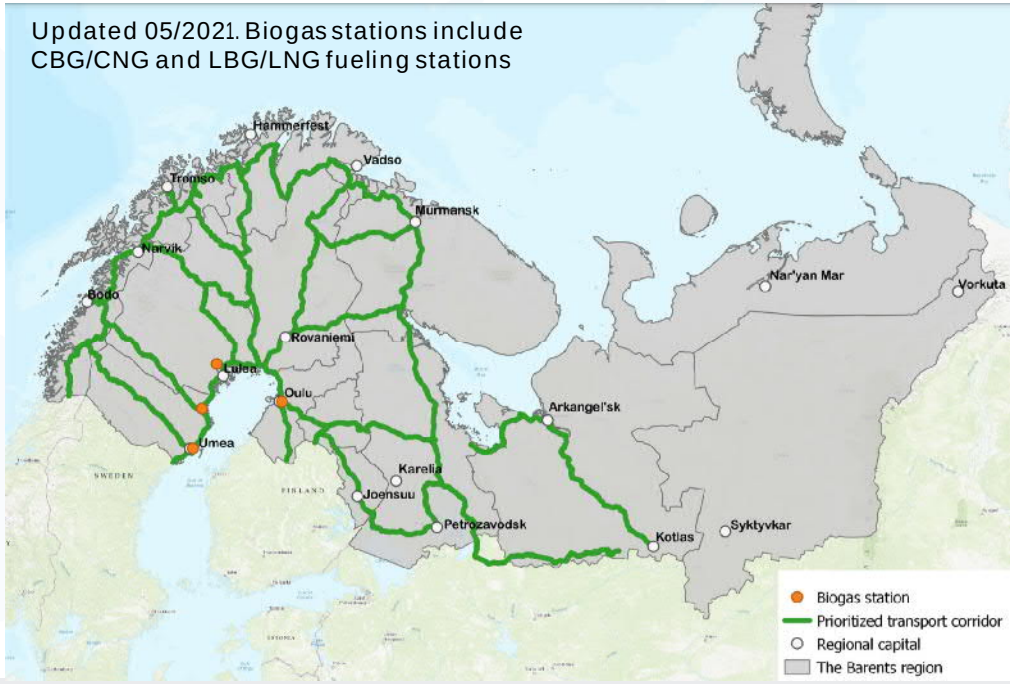
In order to provide favorable conditions to commercial actors constructing green transport infrastructure it is vital to identify the central needs of the commercial sector and implement relevant supportive measures throughout the Barents region.

EU Green Deal and national funding sources are described

Updated in 05/2021. Most recent data available at: https://latauskartta.fi/



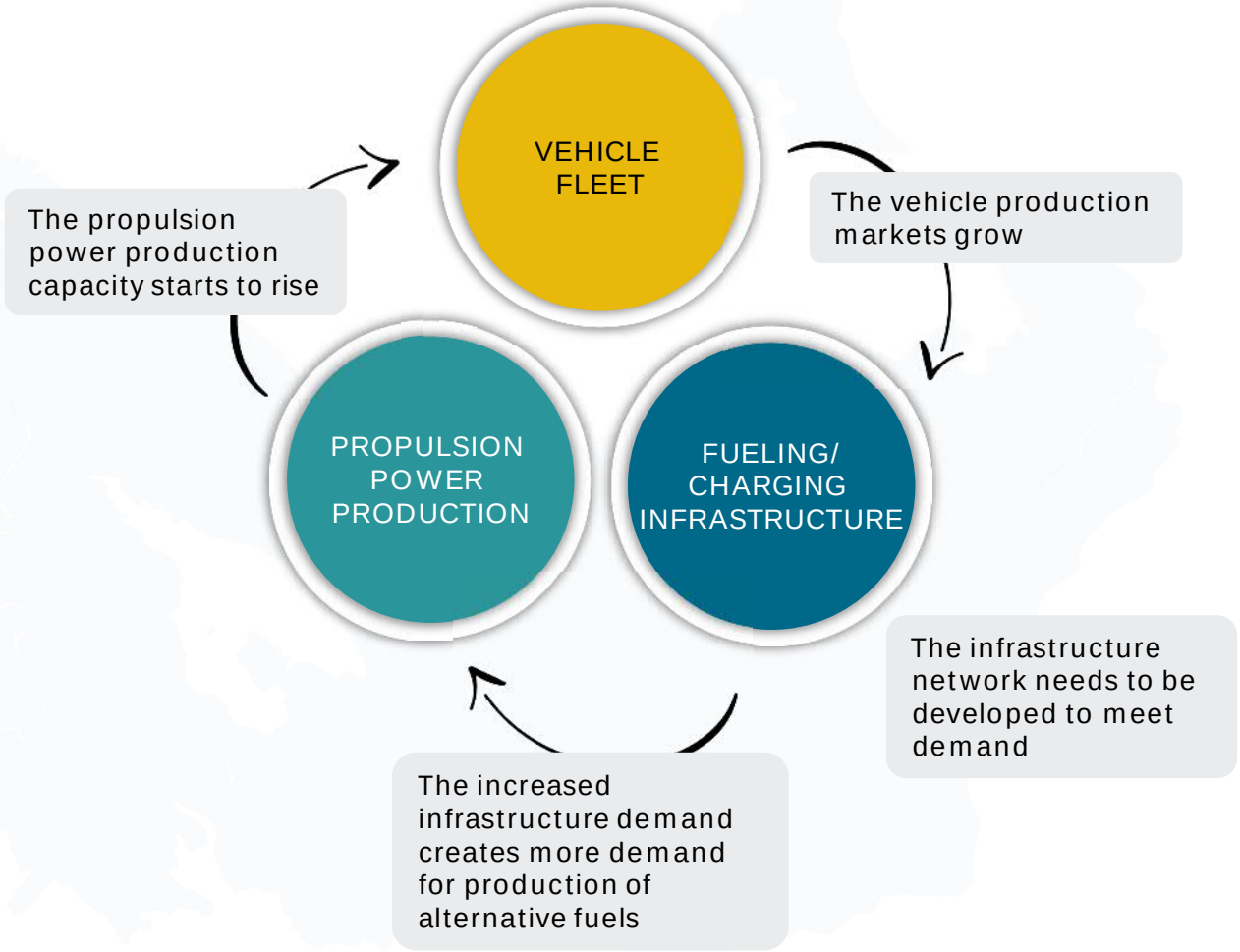
Updated 05/2021. Biogas stations include CBG/CNG and LBG/LNG fueling stations



WHAT PROPULSION POWERS FOR THE BARENTS REGION TRANSPORT?

MODE OF TRANSPORT	PRIORITY FOR THE NEXT FEW YEARS	2030+
Heavy long-haul truck transport	• Renewable diesel • LBG/LNG	• Hydrogen • E-Fuel
Light short-haul truck transport	• Battery electricity • CBG/CNG • Renewable diesel	• Battery electricity • E-Fuel • CBG
Passenger vehicles	• Battery electricity • CBG/CNG • Renewable diesel	• Battery electricity • E-Fuel
Rail transport	• Electricity • Renewable diesel	• Electricity • Hydrogen
Shipping	• Hybrid battery electricity • LNG/LBG	• Ammonia • Hydrogen
Aviation	• Battery electricity • Sustainable aviation fuel (SAF)	• Hydrogen / E-fuels • Battery electricity

It is crucial to recognize that the Barents region or even the whole transport sector won't determine the future of transport fuels. The biggest decisions are made in the energy sector and from there the energy assortment will be carried on to the transport sector.



HEAVY TRANSPORT
PROPULSION POWERS IN THE BARENTS REGION

SHORT TERM	LONG TERM 2030
• Renewable diesel • LBG and LNG	• Hydrogen • E-Fuels

SHORT TERM

For heavy transport, the current alternative fuel options are limited. The vehicle producers are approaching the change with caution and are not going to choose one single approach. With the current situation, it is found that the best short-term options for heavy transport in the Barents region are renewable diesel and LBG/LNG. Battery electricity is currently not viable for long-haul transport as the batteries become too heavy compared to the energy density with the current technology. However, battery technology is developing towards solid-state batteries which could provide an opportunity for heavy vehicle producers to design new truck designs and integrate the batteries into the vehicle hull structure.

For renewable diesel, the existing infrastructure is sufficient, and no new investments are needed. For LBG and LNG, new fueling infrastructure is needed. LBG can both be produced and distributed in the Barents region and the distribution network should serve the largest transport demand corridors. For LNG, the Barents region has existing large production capacity but the fueling infrastructure is lacking.

LONG TERM

Near 2030, it is expected that new hydrogen-based fuels are nearly competitive with other fuels price wise. It is unclear whether heavy transport will use gaseous hydrogen or e-fuels. Hydrogen is difficult to transport and needs new fueling infrastructure. E-fuels can be liquid in normal temperatures, and they would not require new fueling infrastructure and fleet.

Picture: Posti

LBG AND LNG TRUCKS IN FINLAND

The Finnish postal company Posti owns 13 LBG trucks and 6 LNG trucks which are in operation around the clock. The new trucks can be built to correspond HCT-trucks weighing up to 68 tonnes with dollys and B-links. HCT has about 30% more transport capacity than a standard vehicle combination. The trucks are made by Volvo.

The vehicle investments are part of Posti's goal to be carbon neutral by 2030. The 13 LBG trucks reduce carbon dioxide emission by 2 000 tonnes each year. This corresponds to 11 million kilometers driven with a passenger car. The LBG fleet is designed so that the gas fueling stations are near terminals and along the operating routes.

Source: Posti 2021

Picture: ASKO

HYDROGEN TRUCKS IN NORWAY

In January 2020, ASKO started using the world's first hydrogen-powered trucks. The trucks have a range of 500 kilometres with a gross weight of 26 tonnes, and will deliver groceries to stores including those of NorgesGruppen, and will initially operate in Trondheim. ASKO has ordered a total of four trucks, all manufactured by Scania, with funding from agencies including ENOVA.

The hydrogen will be produced locally, using energy from 9,000 square metres of photovoltaic panels on the roofs of ASKO Midt-Norge's buildings. The refueling station, which is also on ASKO's premises, has been funded by Enova as an integral part of the truck project. The hydrogen produced will not only be used by the new trucks, but also by ASKO's cars and fork-lift trucks.

Scania is working with its electrification roadmap in the same way as with the combustion engine-technology; a multi-facetted approach with a broad range of solutions. The company has researched and developed different kinds of bio-fueled hybrid-electric technologies, as well as fully-electric vehicles.

Sources: Norway hydrogen strategy, ASKO and Scania 2020

COST ANALYSIS AND INVESTMENTS

LNG/LBG REFUELLING INFRASTRUCTURE

Currently there is only one LNG refuelling station in Barents region, located in Oulu, Finland. To reach TEN-T requirement (one refuelling station in every 400 kilometres) in all prioritized corridors in Barents, at least 19 new refuelling stations would be needed. Stations are placed to map on the right side as reference purposes and exact locations should be studied after reasonable distances between refuelling points are decided.

- LNG-trucks work with 1 000 km radius and considering the long distances and quite low heavy transport volumes in some routes in the Barents, it should be discussed whether TEN-T requirements are reasonable to be applied to all prioritized corridors.

LNG refuelling stations can fuel LNG as liquid (LNG), as gas (LNG-CNG) or as both (LNG and LNG-CNG). Same infrastructure can be used to LBG as well. Stations can be permanent, mobile or semi-mobile. Investment costs vary significantly between different station types and the ideal type depends on the demand and available technology.

Depending on the source, investment cost of one super saturated and saturated LNG refuelling station also selling CNG is somewhere between 1 million and 1.5 million euros. Stations selling only saturated LNG or super saturated and saturated LNG without CNG option have lower investment costs. Also mobile stations benefit from lower investment costs. Gasum got investment aid from Swedish Klimatklivet in late 2019 for new LNG/LBG refuelling stations. Based on published information the investment cost of one station was estimated to be 1.3 million euros.

The total investment cost of filling the TEN-T requirement for LNG infrastructure in the prioritised corridors would be roughly 19 to 28 million euros, if 1 to 1.5 million euros is the investment cost of one station. If part of the stations would be mobil, or fuel only LNG without CNG, total investment would be lower.

As a part of EU "LNG Blue Corridors Project" cost analysis of LNG refuelling stations was made, and the operational costs were estimated. Based on this estimation, the yearly costs would be approximately 90 000 € in one super saturated and saturated LNG refuelling station also selling CNG. 100 000 € is used as an estimate, since the study is from 2016.

In late April 2021, Nasdaq published article about price hikes in LNG and stated that the rate of about 175,000 to 180,000 cubic metres of LNG has risen to up to $70,000 to $80,000 from around $50,000 to $65,000. Average price is approximately same than what Wega expects for year 2021: 0.4 €/kg.

In May 2021 (21.5.2021) tank price of LNG in Gasum's refuelling station in Sweden was 17,4 SEK/kg (1,7 €/kg) and price of LBG 18,65 SEK/kg (1,8 €/kg). Station price includes excise duties based on country's taxation. For example, in Finland the excise duty of natural gas in 2021 is approximately 0,32 €/kg, which is significantly lower than fossil diesel.

Smalja et al. 2019: Fuel Switch to LNG in Heavy Duty Traffic (2019); LSBT (2016), Techische Universität Kaiserslautern (2018); Klimatklivet resultat; Cost analysis of LNG reguelling stations (2016); Nasdaq; Gasum; Finnish tax authority; Wega;

Payback times with different monthly user rates are presented in the table below. Used VAT is 20 %, weigted average cost of capital 5 % and depreciation time 10 years.

Monthly LNG consumption (kgLNG)	20 000	40 000	60 000
Monthly refuels (á 115 kgLNG)	174	348	522
Payback time (years)	N/A	5	3

Will there be enough LNG trucks?

348 monthly refuels means 11-12 daily. Heavy duty traffic for example in Karesuvanto (number 6 in the map) was 169 vehicles daily. To reach 11 to 12 daily refuels, 7 % of the daily vehicles should refuel LNG at the station. LNG stations to be profitable, they should be located so, that usage rate is as high as possible, but sill so, that routes are drivable with LNG fuelled trucks.

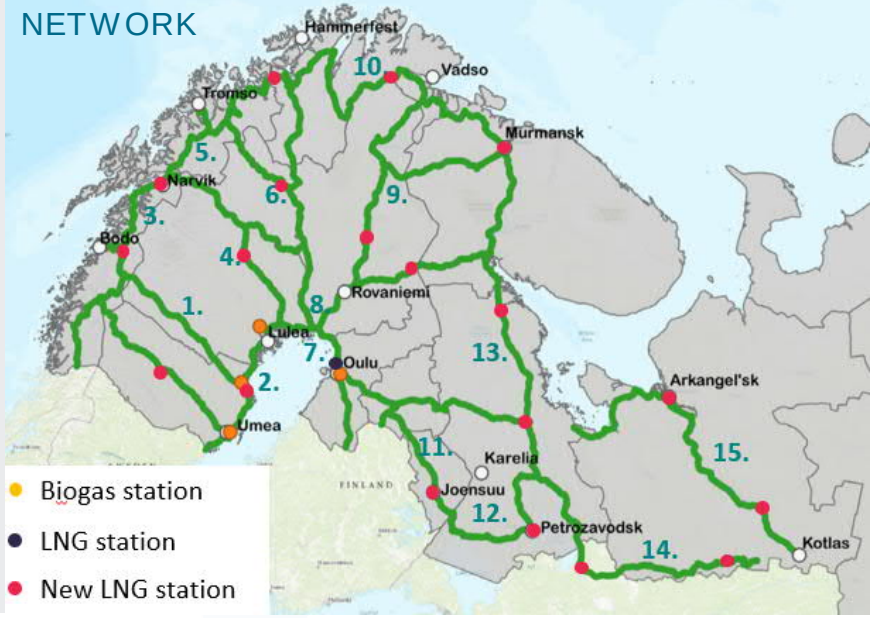
NGVA expects that LNG vehicles would take up a 10 % share of the market by 2030, if this would be true for Barents area as well, the profitability could be secured.

Chalmers University of Technology study concluded that "Studies suggested that for filling stations to be profitable, the filling ratio should be at least between 200 to 800." In Finland, the expected share of gas-powered trucks is estimated to rise as presented in the table below. The share of LNG/ LBG-powered trucks is not specified.

Estimated amount of gas trucks in Finland (>16 t)	
2020	164
2025	1 100
2030	2 800
2035	5 200
2040	7 800

If 200 to 800 LNG trucks would make one refuelling station profitable, a major share of upcoming gas trucks should use LNG in addition to infrastructure to be profitable.

ROUGH ESTIMATE OF LNG/LBG TEN-T NETWORK



USING LBG&LNG HEAVY TRUCKS ON CURRENT TRANSPORT ROUTES IN THE BARENTS REGION

Potential locations for LBG/LNG fueling stations

Karesuvanto is a logistics node in many border-crossing transport chains in the North-West part of the Barents region. In the salmon transport system, it is also transshipment place of cargo between vehicles specially in wintertime. Therefore, Karesuvanto would be an ideal location for LBG/LNG delivery station serving transport chains in both south-north and east-west directions. To operate the Bodø-Kirkenes cargo transport route efficiently, LBG/LNG fueling infrastrucure is needed in Narvik and Kirkenes. This investment would enable utilization of LBG/LNG vehicles in many long-distance transport chains.

The Barents region contains LNG terminals for maritime vessels and industry purposes at least in Bodø, Narvik, Hammerfest and Kirkenes in Norway, and in Tornio in Finland. Would it be possible to utilize this LNG infrastructure to build facilities for road transport? The Barents region has already LNG production and terminal network for industrial and maritime needs. The most northern LBG/LNG fueling station is located in Oulu, Finland. Otherwise, the network is very sparse at the moment. LBG and LNG are one solution for the short term on the way towards carbon neutrality and therefore worth examining in the Barents region. LBG/LNG together with renewable diesel products are the only propulsion powers suitable for long distance road freight transport system without a need for dense distribution network for current propulsion power supply.

Route	Cargo	Distance	CO_2-emissions with diesel	Lifetime CO_2 emissions with LNG	Lifetime CO_2 emissions with LBG
Bodø-Kirkenes	General cargo (including goods)	1 170 km	1 013 kg CO_2	810 kg CO_2	101 kg CO_2
Narvik-Vuosaari	Salmon	1 270 km	1 100 kg CO_2	880 kg CO_2	110 kg CO_2
Skjervoy-Helsinki-Vantaa	Salmon	1 430 km	1 238 kg CO_2	990 kg CO_2	124 kg CO_2
Hammerfest-Helsinki-Vantaa	Salmon	1 370km	1 186 kg CO_2	949 kg CO_2	119 kg CO_2

EURO VI truck emissions: 866 g/km (VTT Lipasto). LNG emissions are 20% lower. LBG emissions are 90% lower.

NOTE: Operative emission of LBG are zero.

COST ANALYSIS AND INVESTMENTS

ELECTRIC CHARGING INFRASTRUCTURE

All corridors are drivable in Norway, Sweden and Finland but TEN-T requirements are filled only on some routes

All prioritized corridors located in Norway are drivable with electric cars and the longest distance between two chargers seems to be between Karasjok and Varangebotn chargers, and the longest distance between chargers is 200 kilometres. All routes in Sweden are also drivable and the longest distances between chargers in the prioritized corridors seems to be 100 kilometres. In Finland, the prioritized corridors are drivable with electric vehicles as well, and the longest distance between chargers seems to be also 200 kilometres. It should be noted, however, that there might be stations with only one slow charger. Prioritized corridors in Russia, e.g., from Murmansk to Petrozavodsk, are currently not drivable with electric vehicles.

Currently the market shares of electric cars (BEV) and plug-in hybrids (PHEV) are: 10 % in Norway, 4 % in Sweden, 2 % in Finland and less than 0,02 % in Russia. In all countries the market shares of BEV and PHEV of all new cars are significantly higher than market share of all cars – from Norway's 75 % in 2020 to 0,14 % in Russia in 2018. (Elbil 2021, Trafikanalys 2021, Autoalan Tiedotuskeskus 2021, Bellona 2021, PwC & Autostat Info 2019).

The increasing number of electric cars is accelerating the development of chargerging infrastructure in all countries in the Barents region. For example, in Finland two supermarket chains announced in the beginning of May (2021) that they will increase the number of fast chargers in their locations "significantly". Norway and Sweden have set targets to phase out from cars with internal combustion engines – Norway in year 2025 and Sweden in year 2030. This will most likely increase the number of electric vehicles and consequently the needed infrastructure and number of chargers.

Investments to new chargers

As seen from the charging map on the right, new chargers are needed especially to eastern corridors, for example routes from Oulu to Joensuu and Petrozavodsk. Also routes from example Rovaniemi to Murmansk and from Murmansk to Petrozavodsk are lacking charging infrastructure currently.

Investment cost of new chargers vary significantly depending on the location and type of the charger. Based on approved Klimatklivet grants, investment costs to charging posts in Sweden start from as low as 2 000 € for slow chargers. Based on the same results estimated cost of fast charger start from 30 000 €.

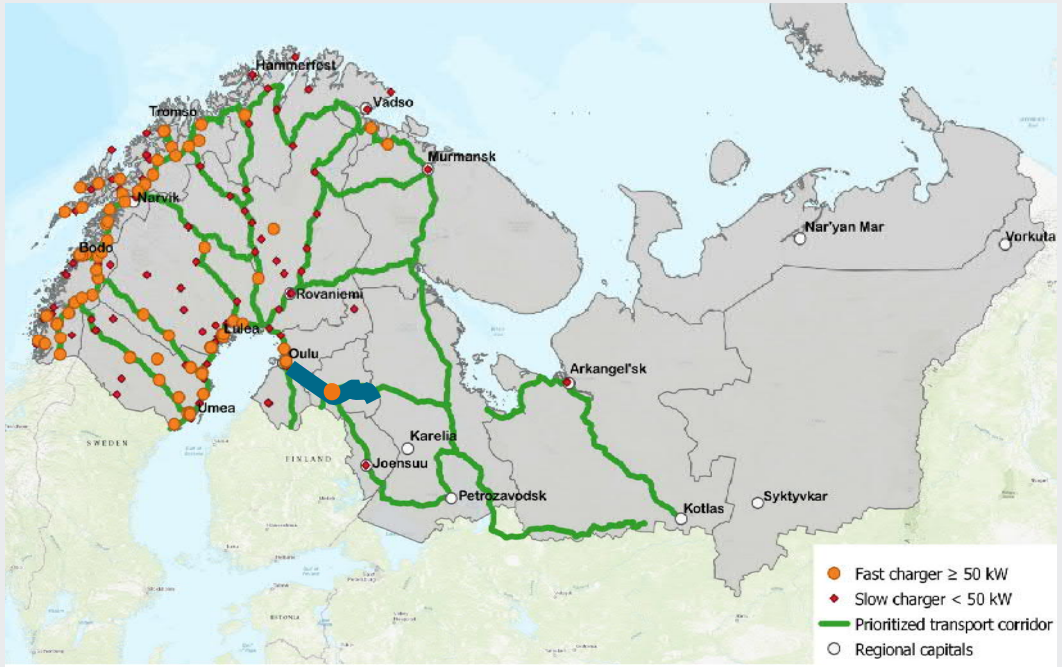
Based on information from Finnish charging station operator one fast charging operation along highway takes some 30 minutes, 16 kWh of electricity and costs roughly 5,5 €. From one single charging operation roughly 3 € is profit for the operator to be used to pay back the investment. In theory investment could be paid in three years with 400 monthly charging operations.

Directive 2014/94/EU proposes to have one slow charger for every 10 cars and one fast charger for every 100 cars, and TEN-T network proposes one charger in every 60 kilometre for every ten electric vehicles.

Amount of electric vehicles and chargers – Examples from Finland

Some dead points in the Barents' main corridors can be found for example in the route from Oulu to Russia via Kainuu (highlighted with blue in the map below). Traffic amounts on this route, as in every route, vary significantly in different parts of the route. But for example 313 daily vehicles were measured close to the Finnish-Russian border in 2020. To fill TEN-T network requirement four additional chargers are needed to be installed to the route as a whole: two chargers between Oulu and charging station in Kontiomäki and two between Kontiomäki and the Kuhmo-Vartius border crossing point.

Kainuu area as a whole has 19 charging points with 40 individual chargers and 8 fast chargers. There is 275 registered electric vehicles (electric cars and plug-in hybrids) in Kainuu. So if the Kainuu region is examined as a whole, the requirement of having one slow charger for every 10 cars and one fast charger for every 100 cars is currently fulfilled.
(Teknologiateollisuus 2021, latauskartta)



PASSENGER VEHICLE CASES

Case 1: Vadsø – Äkäslompolo

A Norwegian skier drives to Ylläs with an electric car to ski.

Route is currently drivable

However, there are no fast chargers between Varangebotn and Kittilä currently (distance 400 kilometres).

If the radius of electric vehicle is from 200 to 300 kilometres, electric car driver needs to stop at least once to charge with slow charger in this route.

Distances between chargers (km)

Vadso	Between	Total
Varangebotn	50	50
Nuorgam	35	85
Utsjoki	43	128
Inari	125	253
Pokka	107	360
Kittilä	89	449
Äkäslompolo	50	499

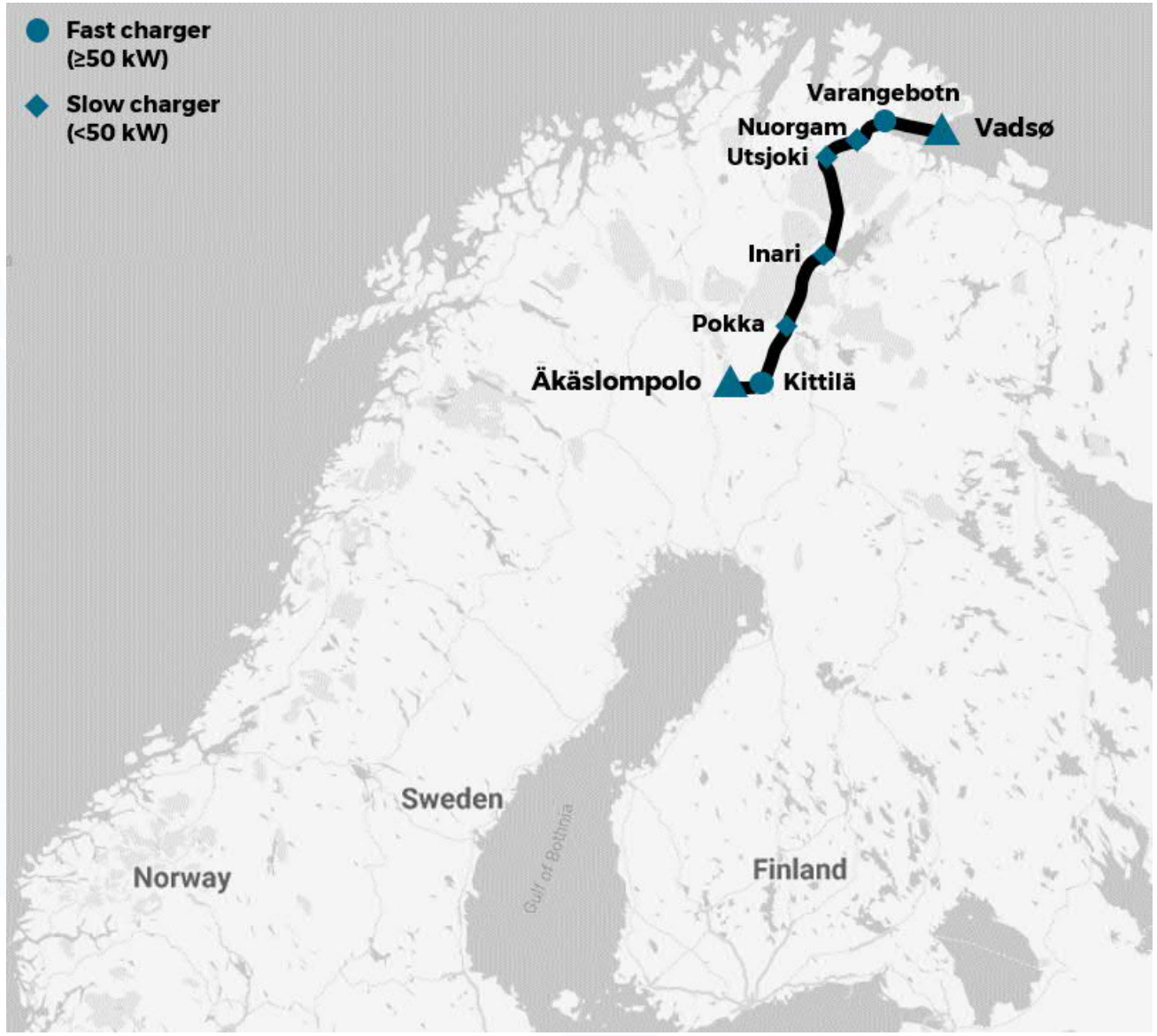
Possibility to increase the number of chargers in the Northern Lapland

The average amount of passenger cars daily in 2019-2020 between the longest distance in this case without chargers, Inari and Utsjoki, was 295 passenger cars daily based on Finnish Transport Infrastructure Agency.

In Finland the share of electric cars from all passenger vehicles in Lapland in the end of 2020 was 1 % based on Statistics Finland and Technology Industries of Finland. Using this as an estimate there were on average 3 electric cars daily at Inari-Utsjoki route. Since the charging infrastructure is currently quite poor, this might be too optimistic estimation at least in long-distance trips.

However, if the amount of traffic would stay the same, in the year 2030 there could be 17-40 electric passenger vehicles during one day on average. This would make from 510 to 1200 electric passenger cars monthly.

- Investment for a new charger would pay itself back in three years with approximately 400 monthly charges.
- If assumed that each electric car driver needs to charge in every 250 kilometres, then every driver having a long-distance trip between Kittilä and Utsjoki with electric vehicle would stop either at Inari or Pokka. If half of the drivers would drive long-distance, it would make from 250 to 600 charges monthly in these two locations. This might not fulfil the three years' payback time, but investments to chargers can still be potential to e.g. attract customers to shops or restaurants.



PASSENGER VEHICLE CASES

Case 2: Hammerfest – Oulu

Finnish salesperson drives from Oulu to Hammerfest to sell maintenance services. Which propulsion power is possible?

Electric vehicle

Route is drivable. However, between Pello and Kautokeino there is only slow chargers currently available (distance is 300 kilometres).

It is possible that electric car driver needs to use one slow charger in this route, depending on the radius of the vehicle.

Also, there is one distance of more than 100 km in this route, between Pello-Tornio in Finland (distance is 120 kilometres). Second longest distances are in Norway, between Skaidi and Alta and in Finland, between Muonio and Kolari. These don't exceed 100 km.

Traffic in this route is busier than in case 1, so new chargers are more likely to be installed in near future.

Distances between chargers (km)		
Hammerfest	Between	Total
Skaidi	55	55
Alta	85	140
Maasi	71	211
Koutokeino	62	273
Galdotieva	54	327
Hetta	27	354
Sonkamuotka	44	398
Muonio	33	431
Kolari	78	509
Pello	65	574
Ylitornio	60	634
Tornio	63	697
Kemi	29	726
Kuivaniemi	37	763
Oulu	71	834

CNG – not an option currently

CNG is challenging propulsion power for this route. There is currently only one CNG refuelling station, which is located in Oulu, Finland. Total distance of this trip is some 820 kilometres, so at least two additional refuelling points are needed to make round-trip drivable.

Some possible locations for new CNG refuelling station could be in Muonio, which is close to Finnish-Swedish border, or in Kivilompolo, close to Finnish-Norwegian border. Also, one station should be in Hammerfest to make round-trip possible.

Finnish gas operator Gasum is investing in the construction of around 50 gas filling stations for heavy-duty vehicles in Finland, Sweden, and Norway by the beginning of the 2020s.

PASSENGER VEHICLE CASES

Case 3: St. Petersburg – Saariselkä

A technology entrepreneur driving a Tesla from St. Petersburg decides to go downhill skiing and snowmobiling in Saariselkä. What route should he take to make the trip a success with his own car? Under what conditions could he drive through Niirala, for example, to Finland and continue the route 5 and then the route 4?

Two optional routes

3.1. Route via Niirala-Vartius is not currently drivable (left picture). From Saint Petersburg driver would go first to Joensuu, but the distance is 400 kilometres without public chargers. There is fast charger in Joensuu, and after that next fast charger is in Kajaani. Distance from Joensuu to Kajaani is approximately 240 kilometres. In the middle there is Nurmes with a few slow chargers.

After Kajaani the next fast charger is in Sodankylä. The distance between Kajaani and Sodankylä is 493 kilometres, so in this route driver would most likely need to use slow charger one or twice.

For the route to be drivable at least one additional charger is needed to Niirala-Vyartsilya border crossing point. And in addition to make the route more pleasant to drive with electric vehicles, a few fast chargers would be needed between Kajaani and Sodankylä. Kuusamo area would be one potential location for fast charger(s): Kuusamo and Ruka attract many tourists to the area to ski or do other outdoor sports. Finnish supermarket chain Kesko is planning to install fast charger to Kuusamo in 2021.

3.2. Fastest route from St Petersburg from Saariselkä would be the route via Oulu (right picture). This route is currently drivable with electric vehicles and includes multiple fast chargers. Longest distance, 137 kilometres, is from St Petersburg to Vyborg and the second longest, 128 kilometres, is from Sodankylä to Saariselkä.

3.1. Distances between chargers (km)

St Petersburg	Between	Total
Joensuu	403	403
Nurmes	127	530
Kajaani	112	642
Kontiomäki	25	667
Suomussalmi	85	752
Piispajärvi	55	807
Kuusamo	86	893
Ruka	27	920
Kemijärvi	116	1036
Sodankylä	99	1135
Saariselkä	128	1263

3.2. Distances between chargers (km)

St Petersburg	Between	Total
Vyborg	137	137
Imatra	63	200
Puumala	68	268
Juva	52	320
Varkaus	55	375
Kuopio	78	453
Lapinlahti	59	512
Pyhäntä	87	588
Siikalatva	33	621
Oulu	92	713
Kuivaniemi	72	785
Tervola	77	862
Rovaniemi	75	937
Käyrämö	67	1004
Sodankylä	61	1065
Saariselkä	128	1193

PASSENGER VEHICLE CASES

Case 4: Petrozavodsk to Bodø

Electric car route from Petrozavodsk to Bodo.

Electric – route is not drivable currently

Distance from Petrozavodsk to Joensuu is approximately 350 kilometers. It seems that there is no chargers in this route before Joensuu. After Joensuu, there is one slow charger located at Nurmes, and it also requires little detour. Distance between Joensuu and Kajaani is approximately 240 kilometers, and Nurmes is on the halfway

Distances in Finland from Joensuu to Oulu are long without chargers, for example, Kajaani-Oulu distance is 180 kilometers. There is one slow charger 20 kilometers from Kajaani to Oulu, and one "worksite socket" in between Kajaani and Oulu (charger output 11 kW).

From Luleå to Norway there is two chargers currently, first one is slow charger located in Advisjaur, 154 kilometers from Luleå. Distance from Luleå to the next fast charger in Arjeplog, Sweden, is approximately 240 kilometers.

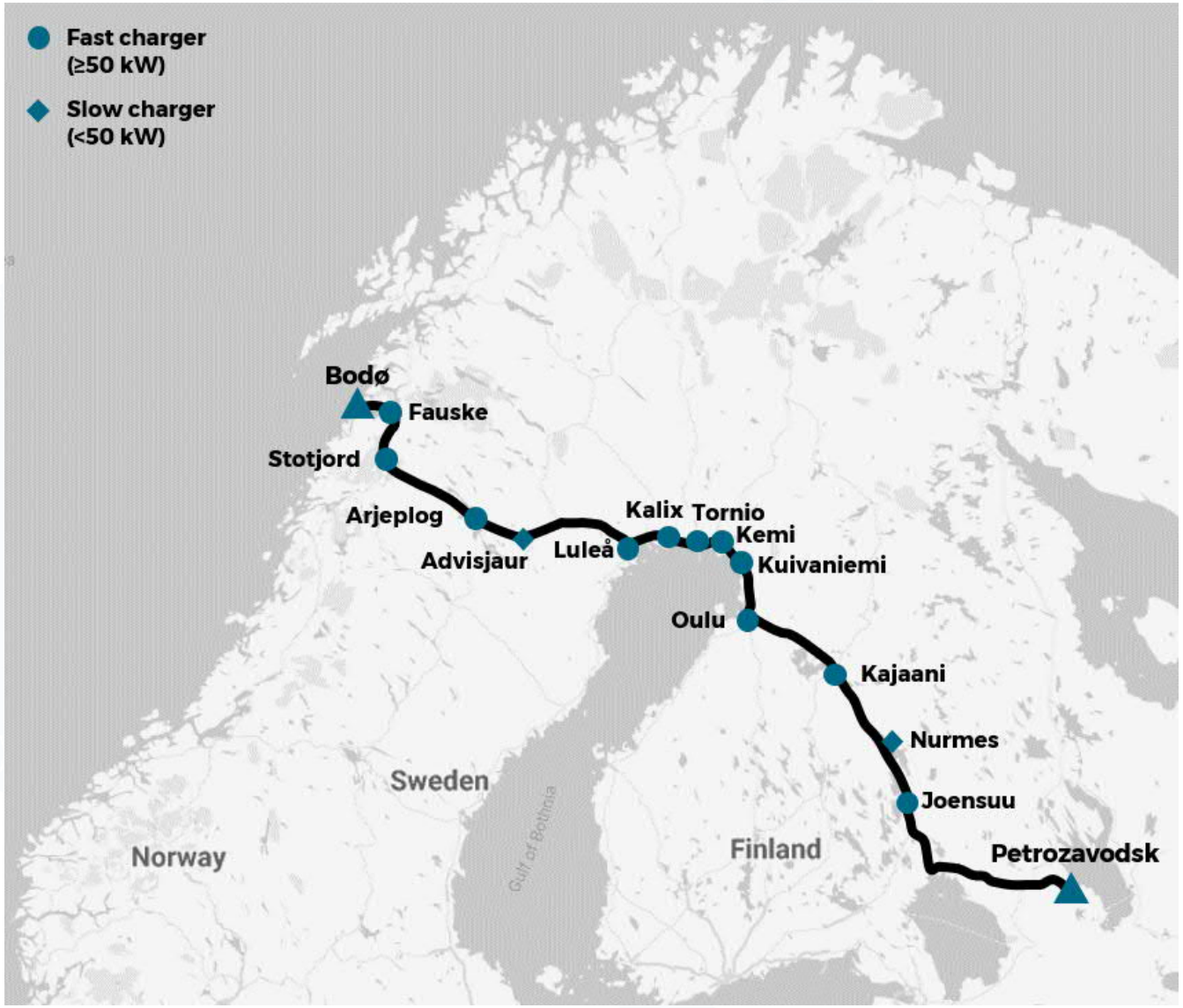
Based on information from Plugshare, there is two slow chargers under construction between Arjeplog, Sweden, and Stotjord, Norway (distance 162 kilometers). Currently there is no chargers between these cities.

From Stotjord to Bodø, the final destination, there is fast chargers in every 60 kilometers.

Between Oulu, Finland, and Luleå, Sweden, the fast charger network is adequate to even TEN-T requirements. Same applies to route from Stotjord to Bodø. All stations between Oulu and Luleå, as well as between Stotjord and Bodø are not presented in the map, since the purpose of this map is to present whether routes are drivable with electric passenger cars or not.

Distances between chargers (km)

Petrozavodsk	Between	Total
Joensuu	365	365
Nurmes	127	492
Kajaani	112	604
Oulu	183	787
Kuivaniemi	71	858
Kemi	42	900
Tornio	28	928
Kalix	52	980
Luleå	80	1060
Advisjaur	154	1214
Arjeplog	86	1300
Stotjord	161	1461
Fauske	63	1524
Bodo	53	1577



ALTERNATIVE PROPULSION POWERS

Key points for the Barents region

1

Future of road transport propulsion powers

In passenger transport there are many fuel alternatives available. Investments in the fleet are reasonable, technologies are already available and main solution seems to be towards hybrid and electric cars. Traditional fuels are moving to biofuels with larger amount of biocomponents. Public transport is focusing on electric buses in the city regions but in longer distances the problem-setting is quite similar as for heavy trucks.

Freight transport has many approaches. Light vehicles, mainly in regional distribution, are possible to electrify. In heavy vehicles there are ongoing testing regarding electric vehicles with diverse charging solutions. The Barents region is a large area with long distance freight transport demand and therefore renewable diesel and LNG/LBG are probably going to be the main propulsion powers completed with hybrid technologies to some extent.

The Barents region is a significant producer of LNG in Norway and Russia. Would it be possible to utilize this production in the region's transport system. Industries and shipping are utilizing LNG as an energy source and there are investments in LNG terminals in the region. But is it possible and what are preconditions to utilize LNG supply for heavy road transport? How to combine large scale production to small scale distribution?

2

Perspectives for investments

The Barents region is mainly a sparsely populated and geographically wide area. In addition, industrial structure consists of a few industrial centers. Otherwise, businesses are mainly SMEs spread like the population. This creates a challenge for investments in propulsion power distribution and charging networks.

If the energy networks are based on market-driven investments and operators, this special characteristics of the region must be considered. Utilization of present distribution networks of fuels as a basis for distribution of new propulsion powers is one robust approach. New investments need careful consideration as the energy sector is in a rapidly changing state

It's necessary to analyze main transport flows (conducted in BRTL World logistics market report) and focus the investments on these main corridors. Large transport volumes and energy demand makes the investment environment attractive in addition to diverse aids and public funding, which are available on state level and EU level (CEF funding for modernizing the TEN-T network). Investments should be seen at least at a regional perspective to improve the availability of alternative fuels by a larger margin, not just one station at a time.

3

Actions of vehicle manufacturers give signals to follow

Two of the worlds biggest truck manufacturers, Daimler AG and Volvo, are looking into hydrogen technology as one key propulsion power for heavy trucks in the future. They announced in 2020 to establish a joint-venture company Cellcentric to develop and produce fuel cell technologies for heavy vehicles.

Truck manufacturers are also developing battery electric trucks. E.g. Volvo has launched three different types of trucks using battery electricity. The fleet is designed for regional transport needs and the heaviest truck for city-to-city transport up to 300km. To summarize, electricity will be one key propulsion power for both passenger and heavy transport but the means to produce the electricity are still somewhat unclear and depend on the technological developments in electrolysis, carbon capturing and battery technology.

4

E-fuel infrastructure as a future solution?

There are a lot of large-scale industrial plants in the Barents region which produce CO2-emissions. At the same time industries are planning development towards carbon neutral production processes. Is it possible to utilize emissions of these production units to produce e-fuels locally? Could it be possible to form an own ecosystem for e-fuel and hydrogen production and distribution also utilized in the transport system of the Barents region? Which preconditions would this kind on development require?

In addition to industrial production units there is a lot of LNG production and other energy production available for hydrogen production in the region. Are these industrial and energy production structures key drivers for Barents region to progress in the front line in utilization of new propulsion powers? Is it possible, that these approaches form a competitive factor as well for the Barents region?

Chapter 5

ITS solutions in winter maintenance

BACKGROUND FOR ITS
IN THE BARENTS REGION

Barents ITS report is a project report that focused on ITS pilots done in the Barents region. The report also lists possible pilots and project that might serve as demonstrations for cross-border ITS operations. Each of the pilots addresses some of the natural barriers that characterize the region, the anticipated increases in traffic volumes and the organizational/cultural barriers.

This study focuses on ITS solutions in winter maintenance operations on the road network.

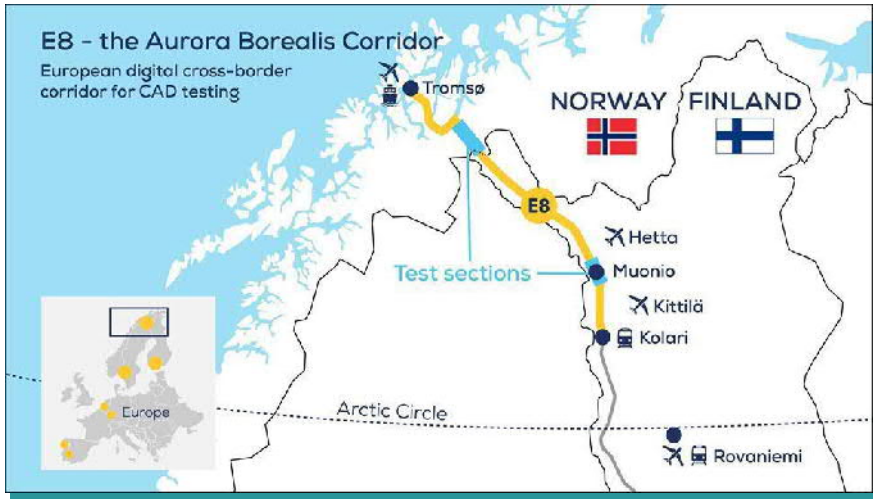
Report ITS Pilot is a project report, that focuses on availability of real-time data regarding truck stops. There were two piloting locations for testing of camera and data applications, where truck drivers are capable to see in advance availability of space and services of truck stops. This is very important topic for long distance and also cross-border transport chains combined with requirements of driving and resting period legislation.

Pilots carried out in the Barents region regarding winter maintenance

Borealis E8 PSI-Group - piloted in 2019 The travel time prediction on road sections pilot from PSI Group will give commercial organisations greater predictability, enabling production and transport to be planned with higher precision and efficiency. By considering both weather forecasts and winter operations, more precise travel time forecasts with longer time horizons can be achieved.

WIRMA 2018-2020 The objective of the WIRMA project was to design, implement and test an IoT system for winter road maintenance in the north. The long-term vision was to overcome winter maintenance challenges using modern digital solutions — specifically, by providing more data, information and knowledge to the road maintenance and ITS domain with a focus on vehicle-based data and vehicle-mounted sensors.

ALASCA 2017-2018 The objective of the Automated Road Monitoring Pilot Using 2D Laser Scanning (ALASCA) regional pilot project was to develop and test a laser scanning unit that would enable crowd-sourced data collection from roads, especially by using large goods vehicles equipped with 2D laser scanning units. The idea was to create new solutions for road monitoring, especially for quickly changing winter conditions.



E8 - the Aurora Borealis Corridor as a test environment

Road E8 was in 2017-2019 a target for large ITS project both in Finland and Norway. In Finland there is a test road in Muonio, which is 15 km long. In addition to this test area, the project related to the whole E8 road up to Kilpisjärvi and further to Skibotn in Norway. This 46 km long extension to Norway was Borealis project. Target of these projects have been twofold. At first there were investments for road and ITS infrastructure, which enabled testing and piloting of autonomous vehicles, positioning technologies, road maintenance and platooning in challenging weather conditions.

On the other hand, these projects created an ecosystem around these research and development topics. The project have been successful, and piloting continues on these roads, although its not driven by public authorities and funding anymore. An open test laboratory for border-crossing transport to gather data and test future solutions in public road network has been formed. The instrumentation exist on these test roads and is available for development of ITS technologies and solutions regarding road transport in a wide extent. It is also important to maintain this kind of test environment for the future needs.

During the Aurora project, a drone hackathon in Enontekiö was organized which tested utilization of drone technologies for utilization in road maintenance. Thus, these projects caused a wide variety of testing and piloting in addition to target-setting of these projects itself.

ITS GOALS FOR THE COUNTRIES OF THE BARENTS REGION

NORWAY

The National Transport Plan 2022-2033 states that rapid phasing in of ITS and technology is facilitated for all modes of transport by supporting knowledge development, R&D, experiments and pilots. ITS solutions reduce safety risks and help to detect and notify drivers (and eventually vehicles) of demanding conditions and low friction, as well as provide advice on the use of a chain or stop / pause in anticipation of plowing, spreading or salting, or alternative route / driving.

Sweden

”Leading the way by innovative transport solutions” is the vision for Sweden's ITS Strategy and Action Plan. It describes how and why Sweden should take a leading role in developing and introducing innovative transport solutions that are beneficial to citizens and industry. The ITS strategy encompasses all actors and modes and is based on strong collaboration and coordination between modes. The main focus areas are city logistics, C-ITS , Cooperative, Connected and Autonomous Mobility (CCAM), MaaS/public transport, micromobility, traffic management and regulation. The Strategy and Action Plan, serve as the national focus for ITS implementations.

Finland

The National Transport Plan includes strong focus on digital transport system. The full utilization of the physical infrastructure and the development of smooth passenger and freight transport services requires the construction of a digital data layer on top of the physical infrastructure. This includes digital twins. The goal is to promote automated transport and improve transport network maintenance. Finland has also publications on logistics digitalization, digital aviation and digital infrastructure.

The NTP states that the possibilities of a wider use of dynamic data collection and analysis utilizing communication networks in the maintenance of transport networks will be investigated and piloted by Finnish Transport Infrastructure Agency. The work takes into account, among other things, the needs of efficient asset management, winter maintenance, automation and logistics. Existing tools such as the Finnish Meteorological Institute's condition observations and data modeling can be utilized in the work.

Russia

The Finnish and Russian aim is that ITS cooperation will focus especially on the challenges of border crossings. Digitalization of logistics in particular is promoted in the Corridor as a Service approach.

Russia has a strong commitment to develop digital connectivity in the Arctic Regions. They have three approaches:

1) Arctic Connector, megaproject connecting Asia, Russia and Europe.
2) Support for industrial operations in the regions. Relating for example analysis and collecting data of geological structures. This can be used in discovering oil and minerals.
3) Arctic area as an ideal location for data centers. (solving heat problem)

ITS SOLUTIONS IN WINTER MAINTENANCE IN THE BARENTS REGION

Importance of the topic

Operations environment related to the topic consists of transport infrastructure, data connections, business and societal structures, and ITS solutions supporting business and transport operations. On the other hand, winter conditions may be challenging in wintertime and at the same time companies are expected to operate with punctual and reliable supply chains to global markets. *This requires predictability and reliability of the transport chains.* In addition, the Barents region is a wide and sparsely populated area. All these characteristics mean, that winter maintenance of road network and thus preconditions for functionality of transport systems must be based on predictable and on demand-based operations. This approach needs ITS to plan and direct necessary maintenance actions to right locations and timely accurate service supply.

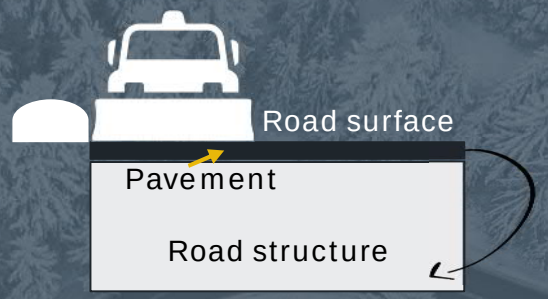
Data networks

Availability of data networks is a crucial precondition for business operations and one topical development area in the Barents region. Wide and sparsely populated area affects to data networks so that data networks are nor covering the whole region. For example forestry industry needs mobile data network for management of raw material transport. Business processes are planned and operated by real time information and lack of data networks, mobile or solid, may cause challenges for supply chains of the companies.

Another approach is a large scale development of data connections. Arctic Connector, which is the northern sea data cable from Asia to Europe is one example of a project that connects arctic areas to diverse markets with minimum latency. This offers a lot of opportunities to develop data ecosystems in the Barents region. Data server centres and high performance computing are examples of these opportunities.

WHAT IS TYPICALLY CONSIDERED WINTER MAINTENANCE?

- Antiskid treatment
- Snow ploughing
- Levelling road surfaces
- Removing snowbanks
- Cleaning of traffic signs
- Usually in winter maintenance, snow is ploughed first, and slipperiness is prevented after ploughing.



Winter maintenance should be seen as a tool to reduce road tear and infrastructure costs. Insufficient winter maintenance weakens the road pavement and thus the lower levels of the road structure.

PROBLEMS WITH CURRENT OPERATIONS

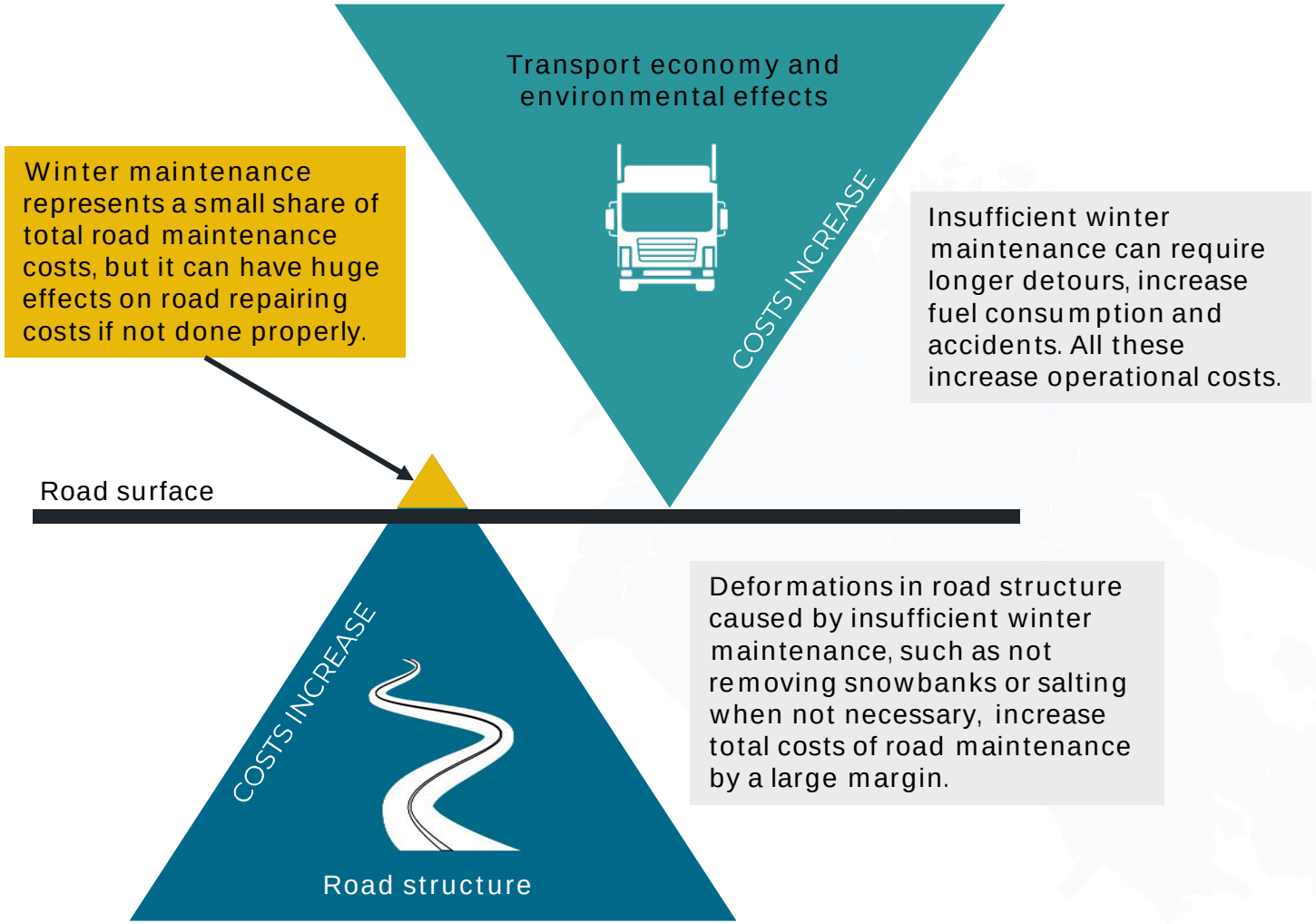
- Traditionally winter maintenance is seen as a treatment, which usually means providing a flat road surface for users.
- Shortcomings in winter maintenance typically consist of not overturning the snowbanks and slush ditches are made too late. This causes edge deformation and road safety problems. Eventually this weakens the road structure, increasing costs and safety risks. This problem will increase as a result of climate change.
- Excessive salt usage can cause exceptional rutting and increase safety risks and maintenance costs.
- Winter maintenance is divided between different contractors. This causes fragmented quality and eventually also reflects on the road structure
- Road network is classified in winter maintenance, which means that highly prioritized roads are operated first. In the Barents region there is a lot of heavy freight transport on the lower road network which are classified lower also from winter maintenance point of view. This leads to a situation where for example a timber truck is driving on a road network before winter maintenance operations, which in turn may cause severe problems to the road maintenance and road structure later.

Benefits of ITS solutions in road winter maintenance

- Winter maintenance operations are possible to direct more precisely according to challenging weather conditions combined with prioritized needs.
- Predictability of weather conditions is an important factor to take these into account both in road maintenance operations and for example in planning of supply chains.
- These approaches affects also to cost efficiency both in winter maintenance of roads and transport operations.

THE EFFECTS OF WINTER MAINTENANCE ON TRANSPORT ECONOMY AND ROAD STRUCTURE

Illustration of winter maintenance effects. The triangles represent increasing costs if winter maintenance is lacking.



Transport company

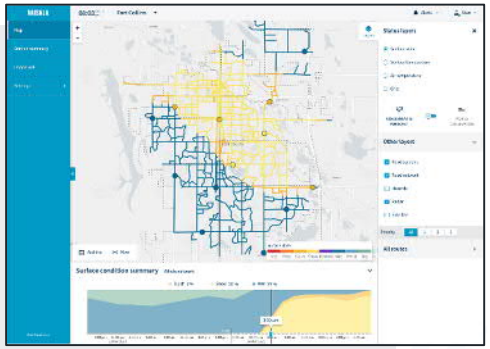
- Is the road in drivable condition? When will it be or are there alternative route options available?
- What should be optimized?
  - The whole supply chain
  - Operating routes and schedule
  - Staff

Road authority

- What is the road network's real time situation?
- What roads should be maintained first?
- What should be optimized?
  - Fleet size
  - Routes and schedules
  - Maintenance style: plowing or salting

ITS SOLUTIONS IN WINTER MAINTENANCE – BEST PRACTICES

Vaisala Wx Horizon for better winter maintenance decisions



Vaisala Wx Horizon decision support system helps road authorities, contractors and municipalities make roads safer with proactive working methods and save money due to precautionary winter maintenance actions. The service is suitable for road and airport winter maintenance in any country.

Data gathering methods

- Satellites, weather radars, weather stations and road weather stations
- Mobile data sensors installed on vehicles such as snowplows and heavy vehicles
- The model can also use road meta data, such as location of bridges, typical traffic flow, etc.

What is done with the data

- Realtime situation knowledge
- Simulations and forecasts
- Advanced Nowcasting technology fuses radar, satellite and ground-based observations every 15 minutes to create a fresh forecast of the next couple of hours for key markets.
- The road network is dynamically modeled for optimal resolution.

Who can benefit from the system?

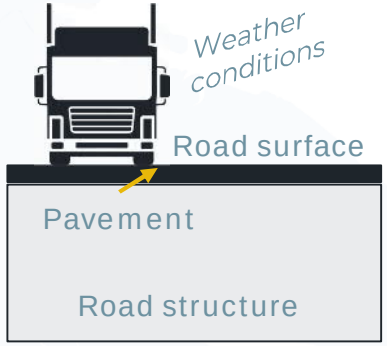
- Road and Airport authorities required to ensure safety despite adverse winter weather. The system can also help reduce the use of salt which provides both environmental and economical benefits.
- Svevia in Sweden utilizes such services in performing winter maintenance faster, more proactively and efficiently. Also cities can benefit, like the city of Espoo in Finland, who is a Vaisala decision support system customer.

Other road and winter maintenance services by Vaisala

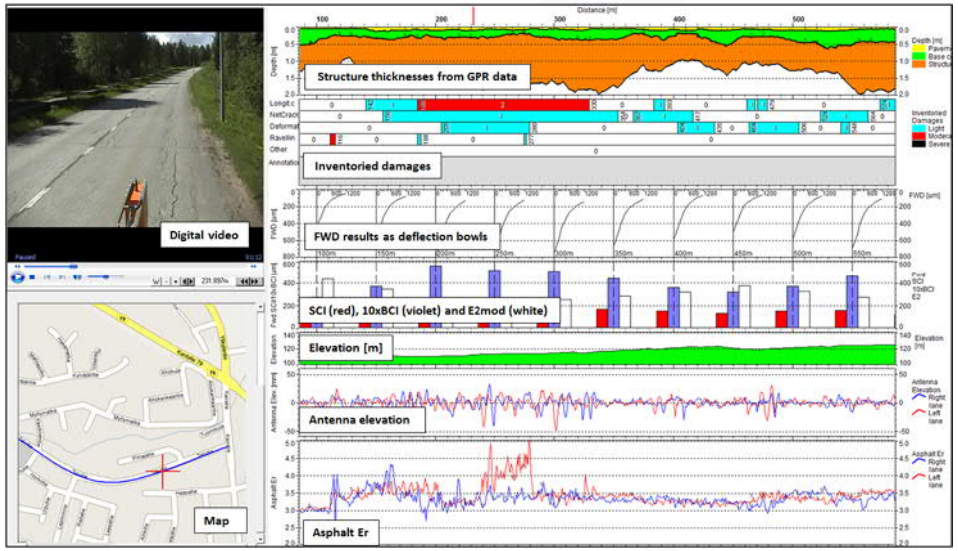
- Route Optimization is a bespoke consultancy service that specializes in the development of winter treatment routes in order to optimize resources and comply with best practice.
- RoadAI combines a user-friendly Artificial Intelligence (AI) tool, high-quality video data, and reliable methodology to visually assess pavement conditions quickly and accurately.

Source: Vaisala

Vaisala's *services provide insight mainly on the things happening on and above the road surface*



Roadscanners's *services provide insight mainly on the things happening in and below the road surface*



Roadscanners

Roadscanners operates on the interface of road structure and road pavement. Combining these two models by creating a digital twin is a core in the management of road maintenance, which can be used in winter maintenance planning and also maintenance of road structures. These two approaches have a close connection with each other.

Sub-optimization in winter maintenance above road surface affects the life cycle of road structures causing serious damage. Therefore, proactive planning is a key to secure good road condition. Scanning of road structures is one solution to support a proactive approach, as visual quality control focuses on existing road surface condition. Real-time monitoring is a crucial part of ITS solutions in road maintenance, including winter maintenance. This forms basis for intelligent asset management of road network.

Tools and services

- Road Doctor Maintenance Controller, which produces real-time monitoring of road conditions both in winter and summer time.
- Road Doctor Survey Van including a wide variety of scanning and measurement tools offers a complete system for road condition data collection, survey and analysis.
- Percostation, Instrumented station for real time monitoring moisture content, frost and temperature in the pavement structure and subgrade soil.
- Road asset management and a wide variety of specialized surveys.

Source: Roadscanners

A THEORETICAL TIMBER TRANSPORT CASE
TRANSPORT FROM FOREST TO SAWMILL

Timber transport to sawmills follow a strict timetable that has little room to maneuver. The process requires predictability from each part of the supply chain.

Timber load from a Swedish forest near the Finland-Sweden border

First part on a private gravel road

Regional road

Main road

Municipality road

SAWMILL IN KEMIJÄRVI, FINLAND

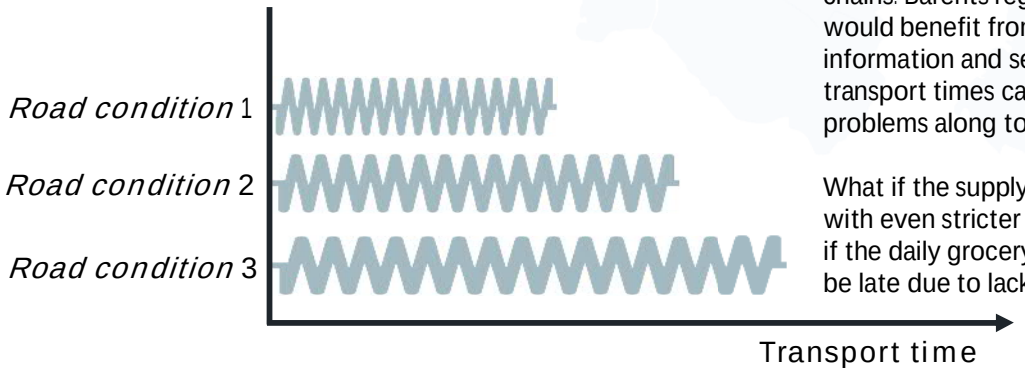
Timber load from a Finnish forest near Sodankylä

1. The supply chain management receives information of a snowstorm from the winter maintenance platform. One part of the road will have very low standard of service due to weather conditions. The Swedish authorities confirm that this road can't be cleared in a sufficient time.

2. The supply chain management reacts proactively to the received information and reschedules a timber transport from Sodankylä to replace the timber load from Sweden. The Finnish authorities happen to have extra capacity and can provide winter maintenance for this route at an earlier time.

3. The sawmill can continue operations and there is no downtime in the process.

4. The end products can be shipped on time. The transport times are known by the road authority so it can make sure the road is in a drivable condition. The saw products reach the seaport and are shipped to customers on time.



Estimating transport times is critical for efficient supply chains. Barents region has a lot of export industry that would benefit from better road winter maintenance information and services. Longer than anticipated transport times can delay production and create problems along to supply chain.

What if the supply chain would be even more complex with even stricter schedules than presented here? What if the daily grocery transport in the Barents region would be late due to lacking winter maintenance?

ITS WINTER MAINTENANCE ECOSYSTEM

Illustration of the winter maintenance framework in the Barents region

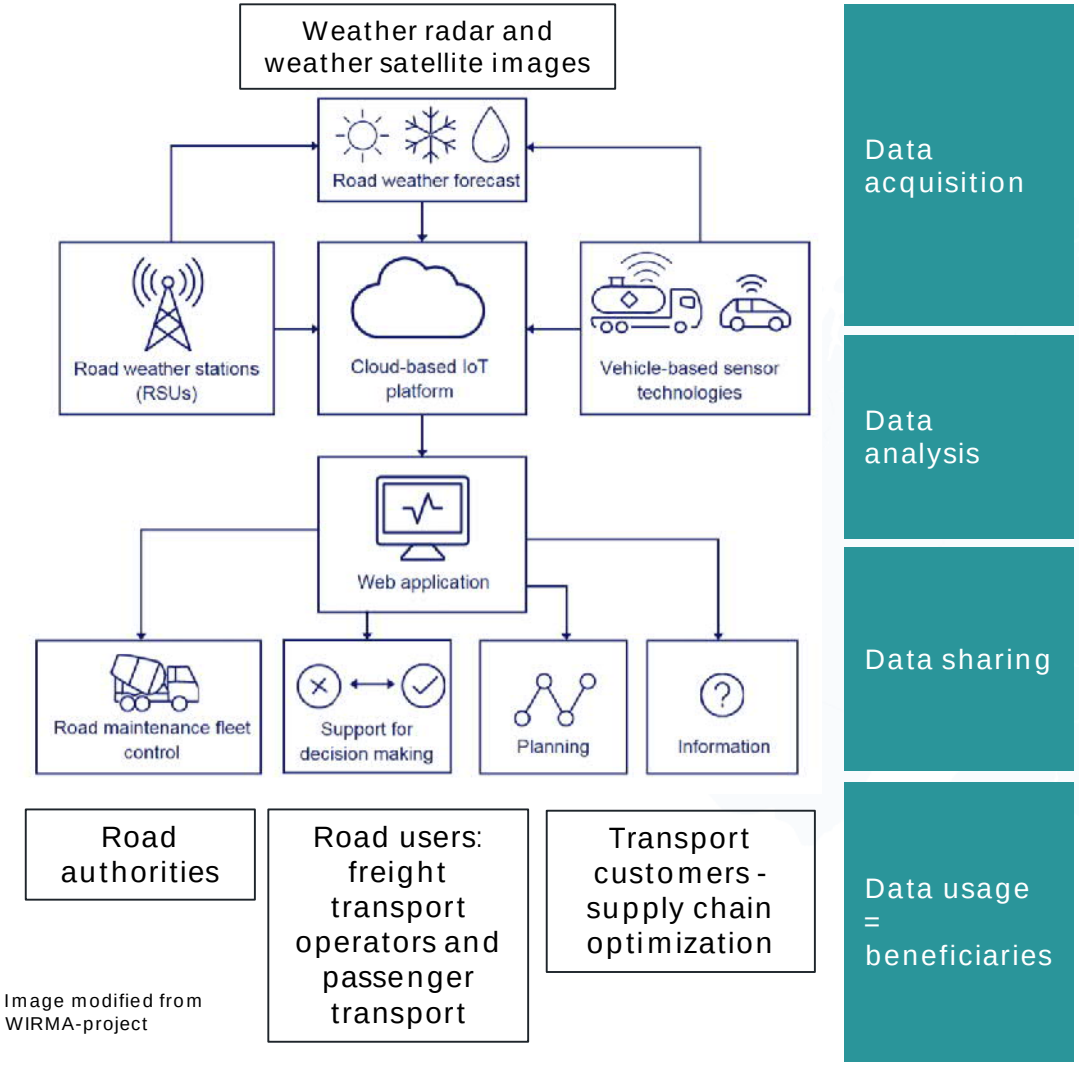


Image modified from WIRMA-project

Border-crossing approach for ITS solutions in winter maintenance

- The Barents region has challenging weather conditions for road transport system in wintertime. There are also a lot of border-crossing transport chains to all directions. When supply chains are border-crossing, also winter maintenance should be border-crossing supporting these supply chains with real time information and road maintenance.
- Each country in the Barents region has winter maintenance of their own and diverse ITS solutions, weather and monitoring systems. There is also piloting of ITS for various purposes (positioning, road weather stations, automatization and manoeuvring of traffic) with installed instrumentation. These ITS infrastructure pilots should be actively utilized and maintained for future purposes. The Barents region wide ecosystem for ITS solutions in winter maintenance would be one development path to support operations of transport system in the region.
- Road freight transport system needs forecasting of road conditions to operate in a punctual and safe way. All the technologies needed exist already for use and form a basis for a border-crossing ITS ecosystem. In addition to operational perspective of supply chains, there is also road maintenance point of view in offering real time information directly to the vehicles. Especially in frost heave situation, re-routing transport to avoid risky areas keeps road infrastructure in better operational condition.

Next steps – how to utilize existing ITS systems in winter maintenance?

- Development of an intelligent asset management system where information of real-time monitoring system is delivered through cloud services to supply chain management, heavy vehicles and road maintenance operators. Thus, it's possible to avoid serious damages in road structures and minimize the effects on road transport operations.
- ITS measurement systems brings uniform quality to quality control of road and especially winter maintenance.
- Forms preconditions to use higher total weight of heavy vehicles in wintertime, when road structure is on ice. Winter premium project (originally from Canada) is evaluating this approach. It would require changes in the legislation of total weight of heavy vehicles, but is an interesting opportunity from the Barents region point of view.

ITS SOLUTIONS IN WINTER MAINTENANCE

Key points for the Barents region

1

Winter maintenance should be linked to the structural condition of the roads

Winter maintenance quality has a long-lasting effect on road tear. Developing winter maintenance operating models to be more efficient and consider the effects on road structure is vital to prolong the road network's age and reduce costs. With ITS solutions, winter maintenance can be improved and effects on road pavement and structure monitored. Proactive measures will improve road conditions and provide efficiency with smaller total costs. This has also effects on service level of infrastructure, efficiency and costs of transport, and traffic safety.

2

Cross-border transport chains require cross-border winter maintenance

A Barents region wide ecosystem for ITS solutions in winter maintenance would support operations of the transport system. Barents countries should form nation wide winter maintenance ecosystems and collaboration between these would benefit the whole region. Recognizing key actors, data sources and required measures is a good way to start the process. Development of an intelligent asset management system where information of real-time monitoring system is delivered through cloud services to supply chain management, heavy vehicles and road maintenance operators. Thus, it's possible to avoid serious damages in road structures and minimize the effects on road transport operations. EU funding is available for modernizing the TEN-T network and for ITS, the Horizon Europe 2021-2017 (€95.5 billion) program is also a good opportunity for R&D projects.

3

Utilizing the Aurora and Borealis ITS road sections in Norway and Finland for living lab piloting

Aurora and Borealis projects are an example of border-crossing road corridor with focus on ITS applied to piloting and testing of new technologies in challenging weather conditions. The instrumentation exist on these test roads and is available for development of ITS technologies and solutions regarding road transport in a wide extent. It is also important to maintain this kind of test environment for the future needs. These projects created an ecosystem around ITS research and development topics including research institutes, technology developers, vehicle manufacturers and public organisations. Thus, there is a good basis for development of ITS ecosystem available.

4

Improving transport chain forecasting and integration into production planning

Companies require predictability and reliability of their supply chains and road transport chain is often a crucial part of the supply chain. The Barents region would be ideal for piloting integration of ITS winter maintenance solutions to supply chain management of industrial companies. There are some large-scale industrial production plants with large procurement and production flows. Thus, the number of companies for piloting is quite limited, but material flows are large. Forecasting of weather and road conditions for transport operations is an opportunity to increase punctuality in supply chains.

Chapter 6

Roadmap for smart and low-carbon transport in the Barents region

Proposed vision for the Barents Region transport system

Efficient and sustainable logistics system that uses all the transport infrastructures efficiently, uses more locally produced fuels and has intelligent properties to anticipate dynamic events.

THE ROADMAP CONSISTS OF FOUR WORKING PACKAGES

1. THE BIG PICTURE

CREATE A SHARED VISION FOR THE DEVELOPMENT OF BARENTS REGION TRANSPORT AND LOGISTICS

- Sharing the findings and conclusions of the study to the national level
- Cross-checking the findings and the vision with the Russian AC and Finlands BEAC Chairmanship's priorities
- Deciding upon the shared vision in the Declaration of Barents Transport Ministers 14 Oct 2021
- Creating national plans to meet the common vision
- Aligning the Barents transport plan, the national transport plans and the shared vision

2. MODAL SHIFT

SUPPORT THE EFFICIENT USE OF THE TRANSPORT INFRASTRUCTURE & SOLVE CURRENT BOTTLENECKS

PUT INTO ACTION OR PILOT

Tacking bottlenecks by enabling cross-border rail transport with Haparanda-Tornio transshipment facilities and needed rail investments

STUDY FURTHER

Studying the needs of different industries in terms of the modal shift and identifying further bottlenecks to be solved

PROMOTE

The extensions and development of railways in the region

- Swedish ore railway and Finnish main railway
- Norwegian extension from Fauske to Tromsø
- Extensions based on the needs of mining industry in Finland

Developing the national funding instruments to support modal shift

3. PROPULSION POWERS

SUPPORT THE USE OF LOCALLY PRODUCED SUSTAINABLE FUELS

PUT INTO ACTION OR PILOT

Defining the specific locations for LNG/LBG fueling extensions, starting from Karesuvanto

Building charging infrastructure based on TEN-T requirements to the main corridors

Piloting long distance transport with hydrogen

STUDY FURTHER

Possibilities to utilize maritime vessels' LNG/LBG infrastructure for road transport

Studying biogas and e-fuel production capacity and scalability in the area

Follow the development and the actions in the market frequently

PROMOTE

Promote the development of the charging and fueling infrastructure on a regional level in addition to the national level

4. ITS SOLUTIONS IN WINTER MAINTENANCE

PROMOTE THE POSSIBILITIES AND VALUE OF THE SOLUTIONS TO LOCAL ACTORS

PUT INTO ACTION OR PILOT

Creating an ITS winter maintenance ecosystem: Border-crossing pilot to understand the value of further utilizing ITS solutions

STUDY FURTHER

Systemic approach to find most beneficial applications and implementation areas (industry, citizen usage in a wider network or supply chain)

Analysing the financial and other benefits of further using ITS possibilities (eg, through forestry case)

PROMOTE

Promote the continuous development and use of ITS solutions in the Region based on the findings of past projects

THE ROADMAP

The big picture | Modal shift | Propulsion powers | ITS solutions in winter maintenance

THE JOINT VISION

Efficient and sustainable logistics system that uses all the transport infrastructures efficiently, uses more locally produced fuels and has intelligent properties to anticipate dynamic events.

2021

Agreeing upon the shared vision

2022

Tackling bottlenecks by enabling cross-border rail transport with Haparanda-Tornio transshipment facilities and needed rail investments

Alternative propulsion power update study

2023

Building charging infrastructure based on TEN-T requirements to the main corridors

Defining the specific locations for LNG/LBG fueling extensions, starting from Karesuvanto

2024

Studying biogas and e-fuel production capacity and scalability in the area

Analysing the financial and other benefits of further using ITS possibilities (eg, through forestry case)

2025

Piloting long distance transport with hydrogen

Creating an ITS winter maintenance ecosystem: Border-crossing pilot → value created to the parties calculated

Renewing of the Joint Barents Transport plan

2026

Updating the national transport plans to correspond with the Joint plan

Studying the needs of different industries in terms of the modal shift and identifying further bottlenecks to be solved

Systemic approach to find most beneficial applications and implementation areas (industry, citizen usage in a wider network or supply chain)

2030

Possiblities to utilize maritime vessels' LNG/LBG infrastructure for road transport

POTENTIAL FUTURE PROJECTS & ACTIONS

Enabling cross-border rail transport with Haparanda-Tornio transshipment facilities

In order fo futher enable modal shift in the Barents Region, the focus should be put in solving the identified bottlenecks.

The Haparanda-Tornio hub has been identified as one of the key transshipment bottlenecks, and hence the actions should be directed into building the needed facilities and ensuring rail investments in the area.

Defining the specific locations for LNG/LBG fueling extensions

To meet with the future needs for the fueling infrastructure, the LNG/LBG fueling network for road transport should be extended.

The decisions to widen the LNG/LBG fueling network and the specific locations for the fueling stations starting from Karesuvanto should be made. In addition to the decisions, the financial calculations and concreate measures to implement the decisions should be done.

Building charging infrastructure based on TEN-T requirements to the main corridors

To meet with the future needs for the charging infrastructure in the Region, deciding upon the widening the charging network and the specific locations for the charging stations based on the TEN-T requirements should be put to the agenda.

Conducting financial calculations and taking concreate measures to implement the decisions are also needed.

Studying the local biogas production potential in the Barents Region

In order to fully understand the possibilities of biogas as a locally produced propulsion power, a study should be conducted to study the local biogas production capacity and demand in the Barents Region.

The study should also aim to unveil the potential use cases, users and new business models around locally produced biogas.

Creating an ITS winter maintenance ecosystem

In order for the actors in the Region to better understand the full potential and possibilities of the ITS solutions, a ecosystem pilot project should be developed.

In a cross-border pilot, an ITS winter maintenance ecosystem should be built and the value to the different parties calculated.

See page 71

POSSIBLE FUNDING ALTERNATIVES

Country specific funding mechanisms

Country-specific funding alternatives are possible for modal shift and new propulsion power promotion.

In Norway, Enova, the state-owned company provides funding for Norway's transition to a low-emission society including charging infrastructure, biogas production, infrastructure and vehicles and hydrogen fueling stations.

- Enova can support up to 100% of approved investment costs within the minimum technical requirements.
- Norway offers eco-bonus for railway and maritime companies to shift transport from road to sea or rail

In Sweden, The Transport Administration offers investment support for the expansion of public fast charging stations for charging vehicles.

- It is possible to apply for up to 100 % of the investment cost. However, it is not possible to apply for support for the operation of the fast-charging stations, only for the investment cost.
- Klimatlivet program provides support for wide variety of carbon emission reduction projects such as biogas production and fueling stations.
- Sweden has also eco-bonus schemes to support transfer of freight transport from road to rail or sea

In Finland, the Energy Authority provides support for alternative fuel infrastructure. Support can be given to gas fueling stations, local public transport electric charging stations and for fast and slow public charging stations.

- Infrastructure support shall not exceed 35% of the eligible costs in the case of high-capacity vehicle recharging points, and otherwise up to 30%.

In Russia, the government of Russian Federation has decided investments and conducted action plans for increasing LNG delivery network for transport vehicles. Russia has also developed strategic planning documents for the increasing use of alternative fuels, for example a concept for the development of production and use of electric transport for the period up to 2030, a strategy for the development of transport production with a reduced carbon footprint and an action plan for development of the energy storage systems industry including measures to support the production and location of the minimally required infrastructure of electric charging stations.

EU

European Union's funding mechanism

For larger development initiatives and low-carbon and digital innovation research

- EU's main strategic funding program for TEN-T development is CEF (Connecting Europe Facility) which supports modernization and expansion of the existing infrastructure.
- CEF funding can be applied for both domestic and border crossing development projects.
- In order to attract and utilize CEF funding, the Barents region must prepare a joint vision and strategy to be demonstrated in the EU, instead of promoting regional targets and development projects.
- For the regional development EU provides funding through EFDR, ESIR and Interreg Europe programs, which are managed by local regional councils. Regional funding mechanism can be gathered to support larger development initiatives such as required in the Barents region.
- In addition to CEF and other larger regional development funds, EU provides significant funding opportunities for digitalization and low-carbon research and development work through Horizon EU multibillion program. For emission reduction aiming projects Innovation Fund and smaller research-orientated smaller fund can be utilized as well.
- Lastly EIB (European Investment Bank) delivers large debt-based arrangements for infrastructure projects. EIB has communicated being in middle of transformation process towards climate neutrality. In the future EIB will focus more and more on digitalization and emission reduction related projects.

Both national and EU level strategic development initiatives and funding mechanism provide opportunities to develop the Barents region.

Nevertheless, Barents region must show why funding should directed to the region and demonstrate clear development vision and how development of the Barents region will benefit the entire EU economy area.

A JOINT DIRECTION IS NEEDED TO GET
THE MOST OUT OF THE EFFORTS IN THE BARENTS REGION

SHARE INFORMATION

The European Union is pushing the area towards carbon neutrality and green transition where the transportation sector has a key role to play. Also, the natural conditions and resources in the Barents region are linked to many of the EU Green Deal targets. Norway has national goals related to both the environment and Russia is investing in creating more efficiency in its transport sector.

The national institutions can benefit from the insights from this report and other publications produced through the Barents collaboration as they provide concrete knowledge and answers to the big shared challenges the countries in the Barents region face at the moment.

ALIGN GOALS

In a complex world, resources should be directed to joint challenges in order to create both clarity and efficiency.

In the Barents Region the challenge in development comes from the multi-actor nature of the Region. In order to make the most out of the always limited resources, all the different actors, decision makers and organizations working in the area should be led towards the same direction.

The proposed vision for the development of the Barents Region transport system could act as a way to direct the efforts.

COORDINATE ACTIONS

In addition to the information and plans, the action taken in the Region should support the Region as a whole.

This requires for example better allignment between the Joint Barents Transport Plans and the national transport plans.

Sharing information supports in coordinating actions, yet in order to develop the area focusing on the long term, the coordination is needed also before actions are taken and projects begin.

This can support the participation of all right stakeholders in the development work within the Region.

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